Practice Question Bank for NEET - 2013

Booklet -1

Aakash

Medical | IIT-JEE | Foundations

(Divisions of Aakash Educational Services Ltd.)

CONTENTS

2012-13

PHYSICS

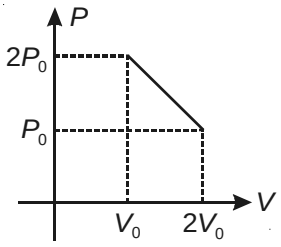
[Chapter-1.a) : Mathematical Tools]

1. If $y = (x^2 + R^2)^{3/2}$ where R is a positive constant, then find $\frac{dy}{dx}$

(1) $\frac{3}{2}\sqrt{x^2 + R^2}$ (2) $3x\sqrt{(x^2 + R^2)}$

(3) 2x (4) $\sqrt{(x^2 + R^2)}$

2. The variation of pressure with respect to volume is shown in the graph. Which of the following is correct relation between P and V?



(1) $P = 3P_0 - \left(\frac{P_0}{V_0}\right) V$ (2) $P = 3P_0 + \frac{P_0 V}{V_0}$

(3) $P = 2P_0 - \frac{P_0}{V_0} P$ (4) $P = P_0 - \left(\frac{P_0}{V_0}\right) V$

3. The charge flowing through a circuit in time interval dt is given by $dq = e^{-t/\tau} dt$, where τ is a constant. How much charge will flow through the circuit between $t = 0$ to $t = \tau$?

(1) $\frac{\tau}{e}$ (2) $\tau\left(1 + \frac{1}{e}\right)$

(3) $\tau\left(1 - \frac{1}{e}\right)$ (4) $\tau (e + 1)$

4. The force F varies with x as $F = Kx - x^2$. The maximum value of F is

(1) K^2 (2) $\frac{K^2}{2}$

(3) $\frac{K^2}{4}$ (4) Zero

[Chapter-1.b) : Units and Measurements]

1. The equation of a wave is $y = 2A \sin\left(\frac{2\pi}{\lambda}x\right)\cos\left(\frac{2\pi v}{\lambda}t\right)$. Which of the following expression is dimensionless?

(1) $\frac{2\pi}{\lambda}$ (2) $\frac{2\pi v}{\lambda}$

(3) $\frac{x}{vt}$ (4) $\frac{xt}{\lambda}$

2. If kinetic energy K and momentum p are related as $K = \frac{a + p^2}{b}$, then dimensions of a and b are respectively

(1) $[M^{-1}L^3T^{-1}]$, $[M^2L^2T^{-2}]$

(2) $[M^2L^2T^{-2}]$ and $[ML^0T^0]$

(3) $[M^1L^2T^{-2}]$, $[ML^{-3}T^{-1}]$

(4) $[M^{-2}L^{-2}T^2]$, $[M^1L^{+3}T^1]$

3. In a new system of dimensions force (F), distance (r) and gravitational constant (G) are the fundamental dimensions. Find the dimensions of mass

(1) $\left[F^{\frac{1}{2}} r^{\frac{1}{2}} G^{\frac{-1}{2}}\right]$ (2) $\left[F^{\frac{1}{2}} r^1 G^{-\frac{1}{2}}\right]$

(3) $[F^1 r^1 G^1]$ (4) $\left[F^{\frac{1}{2}} r^{-\frac{1}{2}} G^{\frac{1}{2}}\right]$

4. In a new system of units, the unit of mass is 100 kg, unit of length is 1 km and unit of time is 60 seconds. The numerical value of 1 joule in this system will be

(1) 3.6×10^{-5} (2) 3.6×10^{-7}

(3) 3.6 (4) 3.6×10^5

5. The density of a cube is found by measuring its mass and the length of its side. If the maximum errors in the measurement of mass and length are 0.1% and 0.3% respectively, the maximum error in the measurement of density is

(1) 1% (2) 0.4%

(3) 0.2% (4) 0.8%

6. The Bernoulli's equation may be written as $P + \frac{1}{2}\rho v^2 + h\rho g = K$ (constant) where P is pressure, ρ is density, v is velocity and h is height. The unit of $\frac{K}{\rho v^2}$ is same as that of

(1) Stress (2) Modulus of rigidity

(3) Density of a body (4) Relative density

7. If universal gravitational constant G, speed of light c and Planck's constant h are considered as fundamental quantities, then the dimensional formula of length will be given as $[G^{1/2}\ c^{-x}\ h^{1/2}]$, where x is equal to

(1) $\frac{1}{2}$ (2) $-\frac{1}{2}$

(3) $\frac{3}{2}$ (4) $-\frac{3}{2}$

8. A quantity q depends on three variables x, y and z as $q = k\ (x^a\ y^b\ z^c)$, where k, a, b, c are dimensionless constants. If percentage error in x, y and z are respectively α, β and γ, then percentage error in q will be

(1) $\alpha + \beta + \gamma$ (2) $\alpha a + \beta b + \gamma c$

(3) $\frac{\alpha}{a} + \frac{\beta}{b} + \frac{\gamma}{c}$ (4) $\alpha^a + \beta^b + \gamma^c$

9. The amplitude of damped oscillations varies with time t as $A = A_0 e^{-\left(\frac{b}{2m}\right)t}$, where b and m are constants. The dimensions of $\left(\frac{b}{2m}\right)$ are same as that of

(1) Frequency (2) Time

(3) Velocity (4) Displacement

10. The electric field near a point charge varies with distance x as $E = \frac{b}{x^2}$, where b is a constant. If percentage error in x is 1%, then percentage error in E will be

(1) 0.5% (2) – 2%

(3) 2% (4) 4%

11. The amplitude (A) of damped oscillations is given as $A = \alpha.e^{-\beta t}$, where t is time and α, β are constants. The product αβ may represent

(1) Speed (2) Angular momentum

(3) Acceleration (4) Linear momentum

12. If work done is $W = \frac{A\sqrt{t}}{t^2 + B}$ then dimensional formula of AB will be

(1) $M^1L^2T^{-1}$ (2) $M^1L^1T^{5/2}$

(3) $M^1L^2T^{3/2}$ (4) $M^1L^2T^{5/2}$

13. Given that $y = A^2 \sin\left(\frac{t}{p} - qx\right)\cos\frac{2\pi M}{Z}$ then which statement is wrong?

(1) Dimension of A is same as that of $\sqrt{y}$

(2) Dimension of $\frac{t}{x}$ is same as that of qp

(3) Dimension of M is same as that of z

(4) Dimension of $\frac{M}{Z}$ is same as that of $\frac{qx}{t}$

14. Which of the following equation is dimensionally incorrect? (U = potential energy, E = energy, P = momentum, m = mass, τ = torque, θ = angular displacement, F = force, K = force constant, x = displacement, v = speed)

(1) $U = E + \frac{P^2}{2m}$ (2) $U = mv^2 + \frac{P^2}{2m} + \tau\theta$

(3) $W = U - E + \frac{F^2}{K}$ (4) $U = \frac{P^2}{4m} + \frac{F^2}{K} + \tau x$

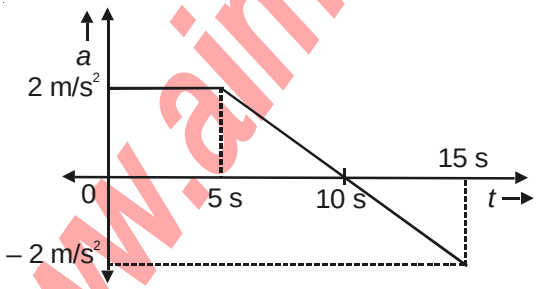
15. Time taken by a vehicle to go from one station to the other is 100 s. It is recorded with a stop watch having the least count 1 s, significant figures in time t = 100 s is

(1) 3 (2) 4

(3) 2 (4) 1

[Chapter-2.a) : Motion in a Straight line]

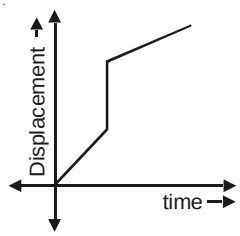
1. Acceleration (a) versus time (t) graph of a body is as shown in figure, velocity of the body is maximum at

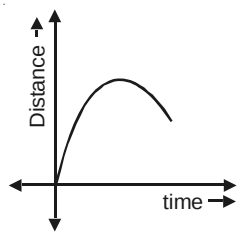


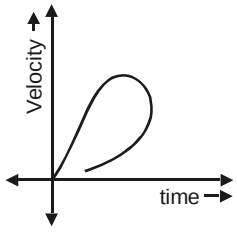
(1) t = 5 s (2) t = 10 s

(3) t = 15 s (4) Both (1) & (3)

2. Which of the following graphs is/are not possible for a particle moving in a straight line?

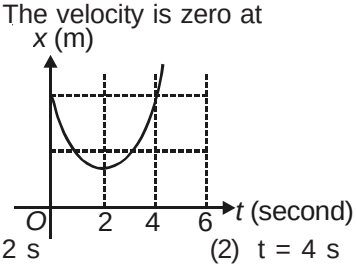
(1) 

(2) 

(3) 

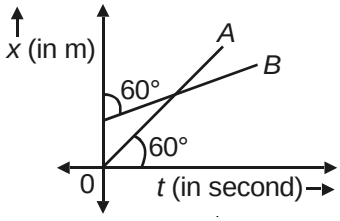
(4) All of these

3. Position (x) versus time (t) graph of a particle is as shown. The velocity is zero at



(1) t = 2 s (2) t = 4 s
(3) t = 6 s (4) Nowhere

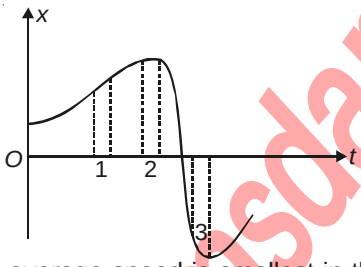
4. Position time graph of two particles A and B are as shown in figure. Velocity of A w.r.t. B is



(1) $\frac{1}{\sqrt{3}}$ m/s (2) $\frac{2}{\sqrt{3}}$ m/s
(3) $\sqrt{3}$ m/s (4) $\frac{4}{\sqrt{3}}$ m/s

5. A body thrown vertically up takes time t_1 during upward journey and time t_2 during downward journey. If air friction is taken into consideration, then the correct relation between t_1 and t_2 will be
(1) $t_1 > t_2$
(2) $t_1 < t_2$
(3) $t_1 = t_2$
(4) None of the above

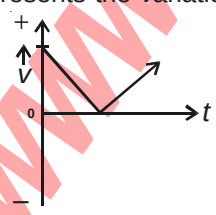
6. The diagram shown below is the position-time graph of a particle in one dimensional motion. Three equal intervals of time are shown. Pick-up the wrong statement



(1) The average speed is smallest in the interval 2
(2) The average speed is largest in the interval 3
(3) Velocity is positive in the interval 1
(4) Average velocity is zero in the interval 3

7. A tennis ball is released so that it falls vertically to the floor and bounces again. Taking velocity upwards as positive, which of the following graphs best represents the variation of its velocity v with time t?

(1)



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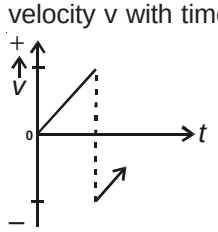

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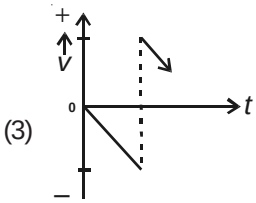
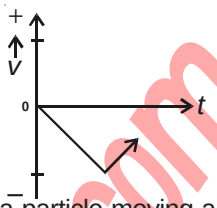
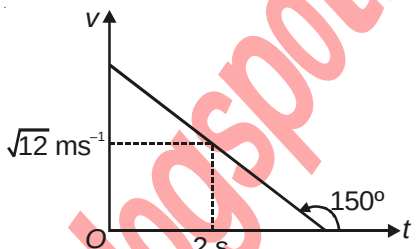


(4)

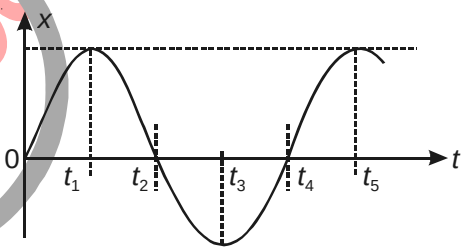


8. Velocity versus time curve for a particle moving along a straight line is shown in figure. The acceleration at t = 2 s will be



(1) $-\frac{1}{\sqrt{3}}$ ms^{-2} (2) $\frac{1}{\sqrt{3}}$ ms^{-2}
(3) $\sqrt{3}$ ms^{-2} (4) $-\sqrt{3}$ ms^{-2}

9. If the position (x) varies with time (t) as shown in the diagram. The particle has zero average velocity during

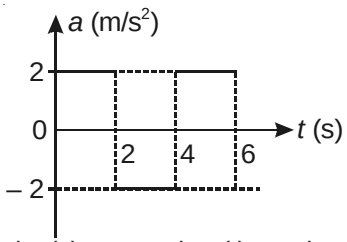


(1) t = t_1 to t = t_3 (2) t = 0 to t = t_3
(3) t = t_1 to t = t_4 (4) t = t_1 to t = t_5

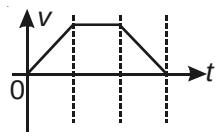
10. A motor-boat can move with constant speed v in still water. It moves from point A to another point B in the downstream and comes back to the point A. Time taken in downstream journey is 10 minute and that in the upstream journey is 20 minute. The speed of the river flow is

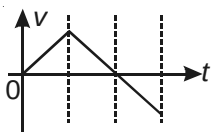
(1) $\frac{v}{2}$ (2) $\frac{v}{3}$
(3) $\frac{3v}{4}$ (4) $\frac{2v}{5}$

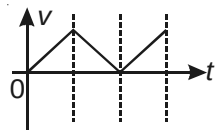
11. A particle starts from rest and moves with an acceleration a that varies with time (t) as shown

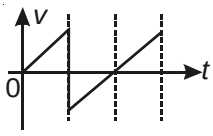


The velocity (v) versus time(t) graph will be

(1) 

(2) 

(3) 

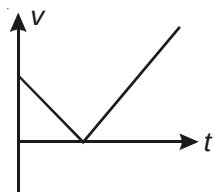
(4) 

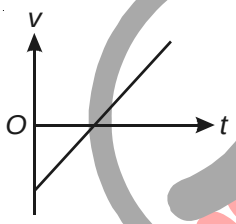
12. A particle thrown vertically up with speed 50 ms^{-1} attains the height h after 3 second. After 7 second from the start, the height of the particle is ($g = 10\ ms^{-2}$)

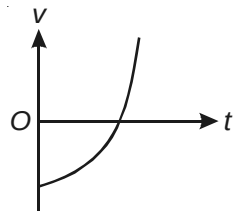
(1) $\frac{h}{2}$ (2) $\left(\frac{7}{3}\right)h$

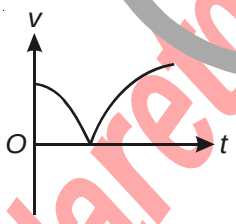
(3) $\left(\frac{3}{7}\right)h$ (4) h

13. The position (x) of a particle moving along x-axis varies with time (t) as $x = t^2 - 8t + 3$. The speed (v) versus time graph will be

(1) 

(2) 

(3) 

(4) 

14. A train 'A' moving with velocity 20 m/s approaches another train 'B' moving in the same direction on the same track, with velocity 10 m/s. If the maximum retardation that can be produced in the train A is 2 m/s^2 on applying the brakes fully, what should be minimum separation between the two trains to avoid collision?

(1) 12.5 m (2) 25 m

(3) 40 m (4) 50 m

15. A car accelerates from rest at 3 ms^{-2} and then retards to rest at 5 ms^{-2}. The maximum velocity of the car is 30 ms^{-1}, what is the distance covered by the car?

(1) 150 m (2) 240 m

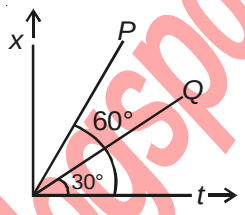
(3) 300 m (4) 360 m

16. A body projected vertically upward from the surface of earth is same height at t = 6 s and t = 11 s. The speed with which it is projected vertically upward is [Take g = 10 m/s^2]

(1) 60 m/s (2) 40 m/s

(3) 20 m/s (4) 85 m/s

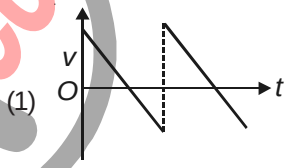
17. Displacement versus time curve of two particles P and Q are given. Calculate ratio of velocities of P and Q

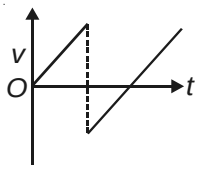


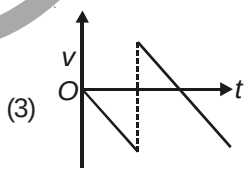
(1) $\frac{3}{1}$ (2) $\frac{1}{3}$

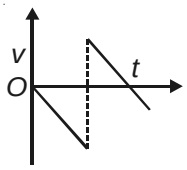
(3) $\frac{3}{2}$ (4) $\frac{2}{3}$

18. A ball is projected with velocity v vertically upward from ground. It comes back and rebounds. Assume that collision is elastic, The curve between velocity and time is (take upward directions positive)

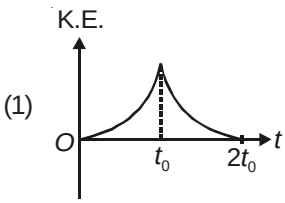
(1) 

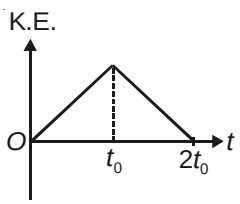
(2) 

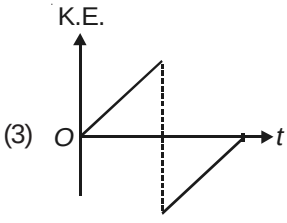
(3) 

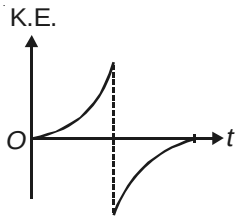
(4) 

19. A particle of mass m is released from rest from certain height H. It strikes the ground elastically. What will be the graph between kinetic energy (K.E.) and time (t) till it returns to its initial position?

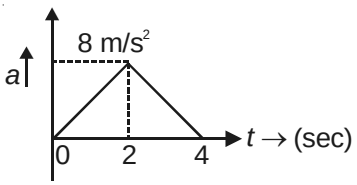
(1) 

(2) 

(3) 

(4) 

20. Acceleration time graph of a particle moving in a straight line is shown. Velocity of particle at t = 0 is 5 m/s. The velocity of the particle at the end of fourth second is



(1) 16 m/s (2) 11 m/s

(3) 21 m/s (4) 5 m/s

21. A person walking on an escalator takes time t_1 to reach at the top of tower when escalator is at rest. If man is at rest and escalator moves then it takes t_2 time to reach at top of tower. If both man and escalator move, then how much time will he take to reach at top?

(1) $t_2 - t_1$ (2) $\frac{t_1 t_2}{t_1 - t_2}$

(3) $\frac{t_2 - t_1}{t_1 t_2}$ (4) $\frac{t_1 t_2}{t_1 + t_2}$

22. A particle is projected vertically upward. If t_1 and t_2 are the time related with a height h, then its total time of flight is

(1) $2(t_1 + t_2)$ (2) $\frac{t_1 + t_2}{2}$

(3) $t_1 + t_2$ (4) $\frac{2t_1 + t_2}{t_1 + t_2}$

23. Two particles start moving from origin along same straight line such that one moves with constant velocity v and another with constant acceleration a. During the time that elapses before the second catches the first, the greatest distance between the particle is

(1) $\frac{v^2}{2a}$ (2) $\frac{v^2}{a}$

(3) $\frac{2v^2}{a}$ (4) $\frac{v^2}{3a}$

24. A car moves with speed v_1 upto $\frac{t}{3}$ time and then with speed v_2 upto $\frac{2t}{3}$ time. Path is straight line. What is the average speed of car?

(1) $\frac{2v_1 v_2}{v_1 + v_2}$ (2) $\frac{v_1 + v_2}{2}$

(3) $\frac{2v_1 + v_2}{3}$ (4) $\frac{v_1 + 2v_2}{3}$

[Chapter-2.b) : Motion in a Plane]

1. Rain is pouring vertically downward with 10 km/h. The velocity of the rain with respect to a man running toward north on a horizontal ground with 10 km/h is

(1) $10\sqrt{2}$ km/h from north east

(2) $10\sqrt{2}$ km/h from north west

(3) $10\sqrt{2}$ km/h at 45° with the vertical toward south

(4) $10\sqrt{2}$ km/h at 45° with the vertical towards north

2. A particle is thrown with 50 m/s at an angle 60° above horizontal from the top of a tower. If g = 10 m/s², then change in velocity of the body in first 5 s is

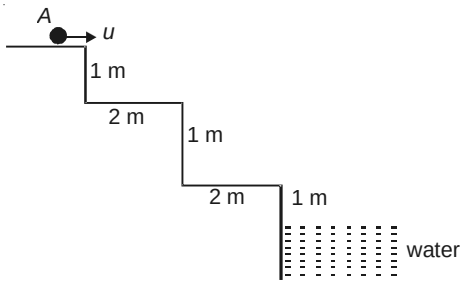
(1) 50 m/s vertically up

(2) 50 m/s vertically down

(3) $50\sqrt{2}$ m/s at 45° below horizontal

(4) $50\sqrt{2}$ m/s at 45° above horizontal

3. Stairs of height 1 m and width 2 m are as shown in figure. Minimum horizontal velocity u given to the ball A for which it will hit water directly is



(1) $\sqrt{10}$ m/s (2) $2\sqrt{10}$ m/s

(3) $4\sqrt{10}$ m/s (4) $\frac{\sqrt{10}}{2}$ m/s

4. A river (width = 200 m) is flowing at a speed of 3 km/h. A man swims across the river along the shortest path and swims back the same way. If the velocity of swimming of man is 5 km/h in still water then time taken by the man for his round trip is

(1) $\frac{1}{10}$ h (2) $\frac{1}{20}$ h

(3) $\frac{1}{40}$ h (4) $\frac{1}{60}$ h

5. A particle is thrown horizontally from the top of a tower of height H with velocity v. Time taken by it to hit the ground is T. If another particle is thrown horizontally from the same point with speed 2v, then time taken by it to reach the ground is

(1) T (2) 2T

(3) $\frac{T}{2}$ (4) $\sqrt{2}\,T$

6. Six persons are standing of a regular hexagon of side 'a'. Each person starts moving towards the person standing at the adjacent corner with speed 'v'. They will meet after a time

(1) $\frac{3v}{a}$ (2) $\frac{6v}{a}$

(3) $\frac{a}{6v}$ (4) $\frac{2a}{v}$

7. Two vectors $\vec{A} = 2\hat{i} + 3\hat{j} - y\hat{k}$ and $\vec{B} = x\hat{i} - \hat{j} + 3\hat{k}$ are given. If $(\vec{A} + \vec{B})$ is a vector of magnitude 2 along +y axis then the values of x and y will be

(1) 2, 3 (2) –2, 3

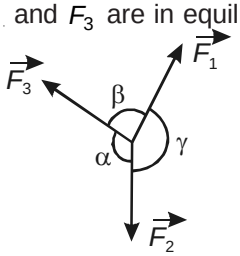
(3) 2, –3 (4) –2, –3

8. A projectile is fired with a speed u at an angle 'θ' with the horizontal. When its direction of motion makes an angle α with the horizontal, its speed at that instant is

(1) u cos α sec θ (2) u cos θ sec α

(3) $u\frac{\cos\alpha}{\sec\theta}$ (4) $u\frac{\sec\theta}{\cos\alpha}$

9. In the situation shown in figure, the three concurrent forces $\vec{F_1}$, $\vec{F_2}$ and $\vec{F_3}$ are in equilibrium then



(1) $\frac{F_1}{\sin\alpha} = \frac{F_2}{\sin\beta} = \frac{F_3}{\sin\gamma}$

(2) $\frac{F_1}{\cos\alpha} = \frac{F_2}{\cos\beta} = \frac{F_3}{\cos\gamma}$

(3) $\frac{F_1}{\text{cosec}\,\alpha} = \frac{F_2}{\text{cosec}\,\beta} = \frac{F_3}{\text{cosec}\,\gamma}$

(4) $\frac{F_1}{\sec\alpha} = \frac{F_2}{\sec\beta} = \frac{F_3}{\sec\gamma}$

10. A body of mass 7 kg at rest explodes into three fragments having masses in the ratio 3 : 3 : 1. The fragments with equal masses fly in mutually perpendicular directions with speed 15 ms^{-1}. What will be the speed of the lighter fragment?

(1) 15 m/s (2) $15\sqrt{2}$ m/s

(3) 45 m/s (4) $45\sqrt{2}$ m/s

11. Two projectile projected from ground towards each other with same initial speed u but at angles θ and (90 – θ) from horizontal. If initial separation between them is equal to range (R) of projection, then time after which they cross same vertical line is

(1) $\frac{R}{\cos\theta}$ (2) $\frac{R}{\sin\theta}$

(3) $\frac{R}{u(\sin\theta + \cos\theta)}$ (4) $\frac{R}{u^2(\sin\theta + \cos\theta)}$

12. In non-uniform circular motion. If radial vector is rotated by an angle 30°, then the velocity vector is rotated by

(1) 15° (2) 30°

(3) 60° (4) 120°

13. A projectile is projected at an angle θ with horizontal with speed u. If air resistance is taken into account, then angle with vertical at time of hitting the ground will be

(1) More than (90 – θ) (2) Less than (90 – θ)

(3) (90 + θ) (4) Equal to θ

14. Choose correct relation [where s, θ and r are displacement of particle, angular displacement and radius of circle respectively]

(1) $\frac{1}{r}\frac{ds}{dt} = \frac{d\theta}{dt}$ (2) $\frac{d\theta}{dt} = s$

(3) $\frac{rds}{dt} = \frac{d\theta}{dt}$ (4) $\frac{dv}{dt} = \frac{1}{r}\frac{d\omega}{dt}$

15. Unit vector of a vector $\vec{A} = 3\hat{i} + 8\hat{j} - \hat{k}$ is

(1) $\frac{\vec{A}}{\sqrt{74}}$ (2) $\frac{\vec{A}}{\sqrt{72}}$

(3) $\vec{A}$ (4) Zero

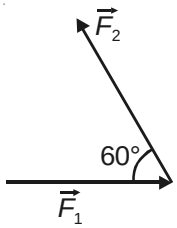
16. The magnitude of resultant of two forces $\vec{F_1}$ and $\vec{F_2}$ each of magnitude 10 N as shown in figure is

(1) $F\sqrt{3}$

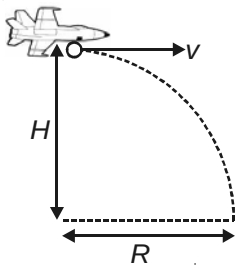
(2) $\frac{F}{\sqrt{3}}$

(3) F

(4) $\frac{F\sqrt{3}}{2}$



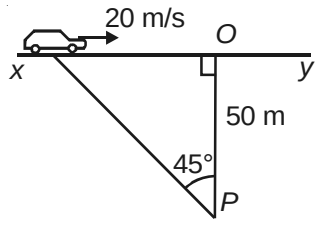
17. A fighter plane moving with velocity v horizontally drops a bomb from height H. The horizontal range at which bomb will strike the ground is



(1) $\frac{2H}{g}$ (2) $\frac{2H}{gv}$

(3) $v\sqrt{\frac{2H}{g}}$ (4) $\sqrt{\frac{H}{2g}}$

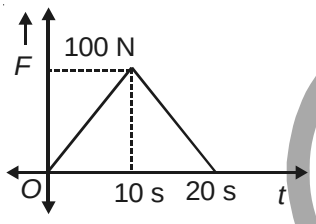
1. A car is moving at a constant velocity 20 m/s on a straight road xy. P is an observer at a perpendicular distance 50 m from the cross O. The angular velocity of the car with respect to the observer at the instant shown is



(1) 0.1 rad/s (2) 0.2 rad/s

(3) 0.3 rad/s (4) 0.4 rad/s

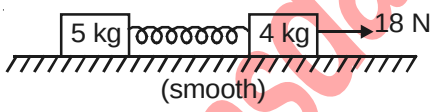
2. Force-time graph of a body is as shown in figure. The body starts with initial velocity 10 m/s at t = 0. Change in momentum of the body in the interval 0 to 20 s is



(1) 1000 Ns (2) 2000 Ns

(3) 100 Ns (4) 500 Ns

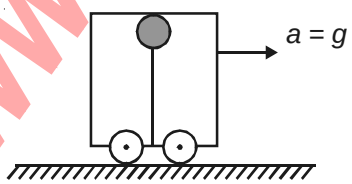
3. Two blocks of masses 5 kg and 4 kg are connected by a massless spring as shown in figure. If the instantaneous acceleration of the 5 kg body is 4 m/s^2 towards right, then instantaneous acceleration of the 4 kg body will be



(1) 0.5 m/s^2 to right (2) 0.5 m/s^2 to left

(3) 5 m/s^2 to right (4) 5 m/s^2 to left

4. A hydrogen balloon is fixed by a string at the bottom of a closed car as shown in figure. If the car accelerates horizontally with acceleration a = g, then the balloon will



(1) Shift to right through 45°

(2) Shift to left through 45°

(3) Remain vertical

(4) Shift to left through any angle

5. A motor delivers water of density ρ at a constant speed v through a pipe of area A. Force exerted by motor on water is

(1) $Av^2\rho$ (2) $Av\rho$

(3) $Av^3\rho$ (4) $A\rho^2v$

6. Linear momentum of a body of mass 5 kg is given by $\vec{p} = \left(\frac{t^2}{2} + 5\right)\hat{i}$ Ns. Acceleration of the body at t = 5 s is

(1) $-1\ \text{ms}^{-2}\ \hat{i}$ (2) $1\ \text{ms}^{-2}\ \hat{i}$

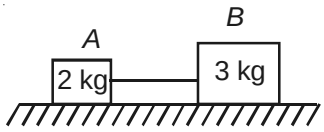
(3) $-1\ \text{ms}^{-2}\ \hat{j}$ (4) $1\ \text{ms}^{-2}\ \hat{j}$

7. N small balls each of mass m hit a surface each second elastically with velocity u. The force experienced by the surface is

(1) Nmu (2) $\frac{Nmu}{2}$

(3) 2Nmu (4) 4Nmu

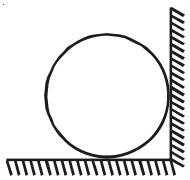
8. Two blocks A and B are connected by a massless string. A and B are kept on a horizontal frictionless floor. When B is pulled to right by a force horizontally, tension in the string is T_1. When A is pulled to left by the same force horizontally, tension in the string is T_2. The ratio $\frac{T_1}{T_2}$ is



(1) 1 : 1 (2) 2 : 3

(3) 4 : 9 (4) 5 : 3

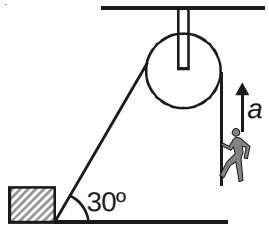
9. A sphere is placed between two walls. How many normal reactions are acting on the sphere?



(1) 1 (2) 3

(3) 2 (4) 4

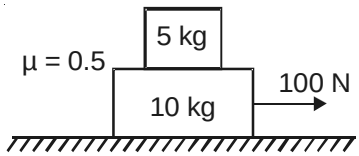
10. A light string passes over a pulley as shown in figure. A man of mass 5 kg climbs up the rope. If tension in the rope is equal to 80 N, what will be the acceleration of man in upward direction? ($g = 10\ m/s^2$)



(1) 4 ms^{-2} (2) 8 ms^{-2}

(3) 6 ms^{-2} (4) 2 ms^{-2}

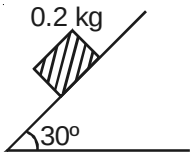
11. Two blocks having masses 10 kg and 5 kg are placed on smooth surface, having co-efficient of friction between the surfaces of block as shown in figure. Find the acceleration of mass 10 kg



(1) 0 ms^{-2} (2) 3.75 ms^{-2}

(3) 0.1 ms^{-2} (4) 7.5 ms^{-2}

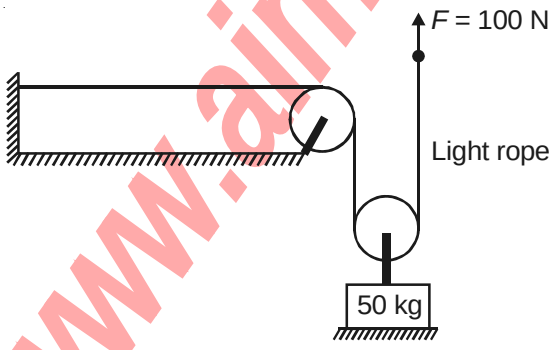
12. In the figure shown below, if the inclined plane has coeff. of friction, $\mu = 0.3$, then 0.2 kg mass will move down with an acceleration



(1) 0.2 ms^{-2} (2) 0.4 ms^{-2}

(3) 2.4 ms^{-2} (4) 0.8 ms^{-2}

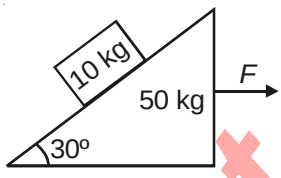
13. In the arrangement shown, the rope is light and inextensible and pulley is light and smooth. The normal reaction between the 50 kg block and ground is ($g = 10\ m/s^2$)



(1) 200 N (2) 300 N

(3) 500 N (4) Zero

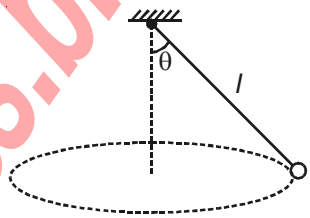
14. A body m of mass 10 kg is placed on an inclined plank of mass M of 50 kg as shown in figure. If 10 kg mass falls freely, then contact force between M and m will be



(1) 100 N (2) $100\sqrt{3}$

(3) $\frac{100}{\sqrt{3}}$ (4) Zero

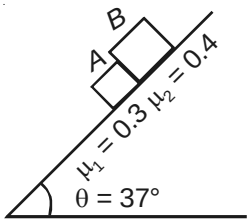
15. A body of mass m is suspended by a string of length l. The string is fixed at the other end and the body moves in a horizontal circle such that the string makes angle θ with vertical. The time period of its circular motion is



(1) $2\pi\sqrt{\frac{l}{g}}$ (2) $2\pi\sqrt{\frac{l\cos\theta}{g}}$

(3) $2\pi\sqrt{\frac{l}{g\cos\theta}}$ (4) $2\pi\sqrt{\frac{l\sin\theta}{g}}$

16. Two blocks A and B of mass 2 kg and 3 kg are kept in contact with each other on a rough inclined plane as shown in figure. Coefficient of static fraction of block A and block B with plane are 0.3 and 0.4 respectively. If both are released simultaneously, then reaction between A and B is



(1) 10 N (2) 5 N

(3) 15 N (4) Zero

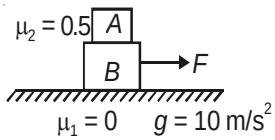
17. Block B is pulled by a horizontal force F. Maximum acceleration of the blocks for which A will not slip over B is

(1) 5 m/s^2

(2) 10 m/s^2

(3) 2 m/s^2

(4) 8 m/s^2

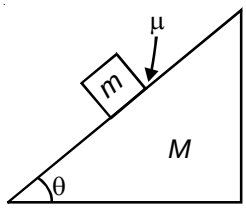


18. Two weights W_1 and W_2 are suspended from the ends of a light string passing over a smooth fixed pulley. The net force on the pulley will be

(1) $\frac{8W_1W_2}{(W_1+W_2)}$ (2) $\frac{4W_1W_2}{(W_1+W_2)}$

(3) $\frac{4W_1W_2}{(W_1+W_2)}g$ (4) Zero

19. A small block of mass m is placed on a rough fixed wedge of mass M as shown. If the coefficient of friction between m and M is μ and θ is less than $\tan^{-1}(\mu)$, then the force exerted by M on m will be



(1) mg cosθ (2) mg sinθ

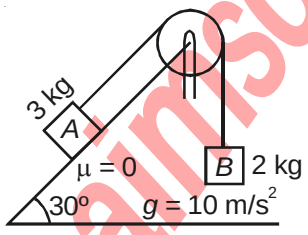
(3) μmg cosθ (4) mg

20. A hemispherical bowl of radius R is rotating about its own axis (vertical) with an angular velocity ω. A particle of mass 10^{-2} kg on the frictionless inner surface of bowl is also rotating with the same angular velocity. The particle is at a height h from botton of bowl. The condition to be satisfied to have a non-zero value of h is

(1) $\omega > \sqrt{\frac{g}{R}}$ (2) $\omega < \sqrt{\frac{g}{R}}$

(3) $\omega > \sqrt{\frac{R}{g}}$ (4) $\omega = \frac{R}{g}$

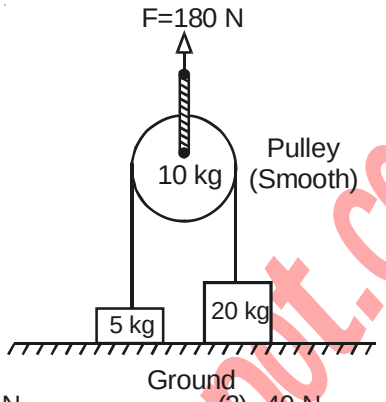
21. Pulley and string shown in the figure are massless and frictionless. Tension in the string will be



(1) 20 N (2) 18 N

(3) 16 N (4) 12 N

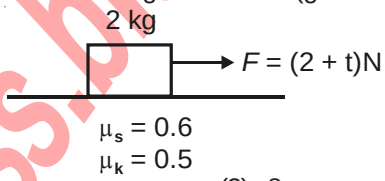
22. Figure shows two blocks of masses 5 kg and 20 kg connected by a light, inextensible string passing over a smooth pulley of mass 10 kg. An upward pulling force is applied on the pulley as shown. The reaction force between 5 kg block and ground is



(1) 50 N (2) 40 N

(3) 10 N (4) Zero

23. A block of mass 2 kg is kept on horizontal surface with coefficient of friction as indicated in figure. A horizontal time varying force F = (2 + t)N starts acting on the block at t = 0. Find the time after which the block begins to slide (g = 10 ms^{-2})



(1) 2 s (2) 8 s

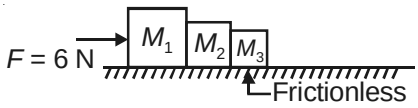
(3) 10 s (4) 16 s

24. A uniform rope of mass M and length L is hanging from the ceiling inside a lift going vertically upward with a constant acceleration a. The tension in the rope at a distance x (x < L) below its upper end is

(1) $\frac{Mx}{L}(g+a)$ (2) $M\left(1-\frac{x}{L}\right)(g+a)$

(3) $M\left(\frac{L}{x}-1\right)(g+a)$ (4) $M\left(1-\frac{x}{L}\right)(g-a)$

25. If in the given figure M_1 = 1 kg; M_2 = 2 kg; M_3 = 3 kg, then



the acceleration of mass M_2 will be

(1) 2 m/s^2 (2) 1 m/s^2

(3) 6 m/s^2 (4) 3 m/s^2

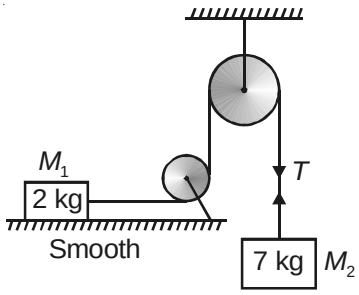
26. Two masses M_1 and M_2 of mass 2 kg and 7 kg respectively attached to massless and frictionless pulleys with light string as shown. Tension in string will be

(1) $\frac{70}{9}$ N

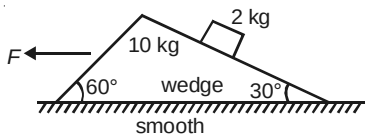
(2) $\frac{140}{9}$ N

(3) $\frac{90}{7}$ N

(4) $\frac{90}{14}$ N



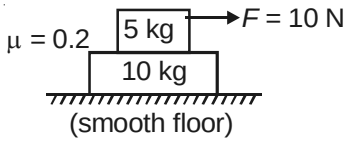
27. A wedge and block having masses 10 kg and 2 kg respectively shown in figure. A force F is applied on the wedge towards left so that block falls freely. At time of falling, contact force between wedge and block is



(1) $2g\cos30°$ (2) $2g\cos60°$

(3) $g\sin30°$ (4) Zero

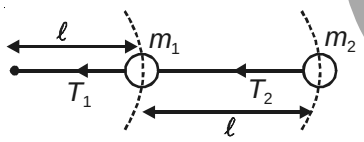
28. Accelerations of the blocks m_1 and m_2 in the given figure are (m_1 = 5 Kg, m_2 = 10 Kg)



(1) 1 m/s^2, 0 (2) 2 m/s^2, $\frac{2}{3}$ m/s^2

(3) $\frac{2}{3}$ m/s^2, 1 m/s^2 (4) $\frac{2}{3}$ m/s^2, $\frac{2}{3}$ m/s^2

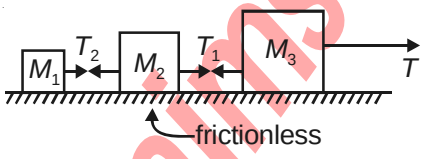
29. Two masses m_1 and m_2 are connected by massless string as shown in figure. If both are moving in a circle with same angular speed and T_1 and T_2 are tensions in the strings, then



(1) $T_1 < T_2$ (2) $T_2 = T_1$

(3) $T_1 > T_2$ (4) $T_2 > T_1$ if $m_2 > m_1$

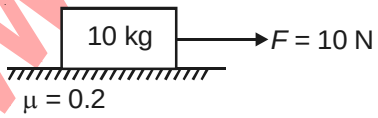
30. Three masses M_1, M_2, M_3 of masses 1 kg, 3 kg and 3 kg respectively are attached as shown in figure. Correct relation between T, T_1 and T_2 is



(1) $T < T_1 < T_2$ (2) $T > T_1 > T_2$

(3) $T = T_1 > T_2$ (4) $T_1 > T_2 > T$

31. In given figure a body of mass 10 kg placed on a rough horizontal surface of coefficient friction of

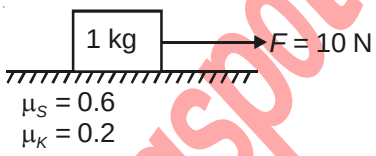


If a horizontal force F = 10 N applied on it, then the value of acceleration of the body will be

(1) 1 m/s^2 (2) 0.8 m/s^2

(3) Zero (4) 1.2 m/s^2

32. A block of mass 1 kg is placed on a rough horizontal surface. Find acceleration of body if horizontal force F = 10 N applied on it. (Initially block is at rest)



(1) 1 m/s^2 (2) 8 m/s^2

(3) Zero (4) 1.2 m/s^2

33. If a nucleus of mass m eject an α - particle of mass $\frac{m}{59}$ with velocity u, then recoil speed of product nucleus is

(1) $\frac{u}{59}$ (2) $\frac{58u}{59}$

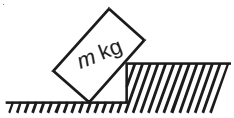
(3) $\frac{u}{58}$ (4) $\frac{59u}{58}$

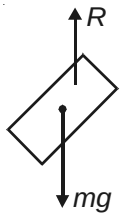
34. A bullet of mass 10 g fired by a gun at speed 150 m/s. It comes to rest in 0.01 s after collision with a wall, then average force applied by the wall on it is

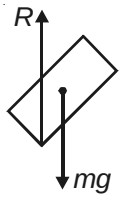
(1) 15 N (2) 30 N

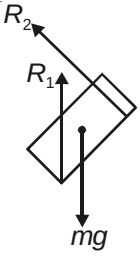
(3) 150 N (4) 1500 N

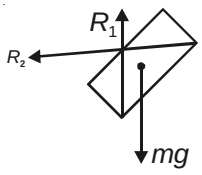
35. Free body diagram of a block of mass m at rest on an unlevelled ground as shown in figure is



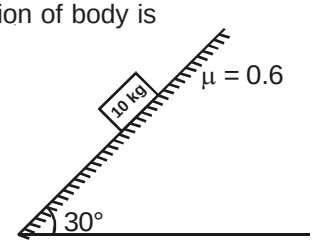
(1) 

(2) 

(3) 

(4) 

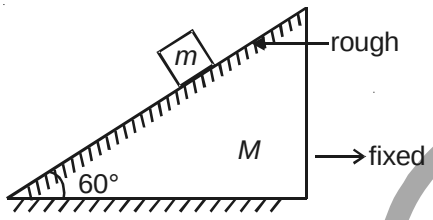
36. A block of mass 10 kg is at rest on a rough surface coefficient of friction $\mu = 0.6$, then downward acceleration of body is



(1) gsin30° (2) gcos30°

(3) $\frac{g}{\sin 30°}$ (4) Zero

37. A block of mass m kg rest on a fixed rough wedge of inclination 60° having mass M kg. Then minimum value of coefficient of friction between block and wedge is



(1) $\frac{mg}{\cos 60°}$ (2) gcot60°

(3) $\sqrt{3}$ (4) $\frac{1}{\sqrt{3}}$

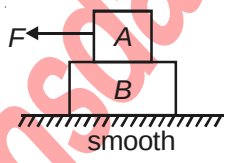
38. Two block A & B are placed as in figure ($m_A < m_B$). A force F acts on block A towards left. Friction force acting on B due to A block is in direction [μ is friction coefficient between A & B]

(1) Toward right

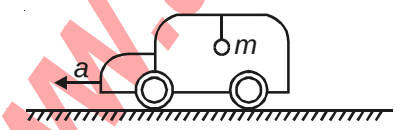
(2) Towards left

(3) Towards up

(4) Towards down



39. A car is accelerating horizontally with acceleration a towards left. A bob of mass m suspended from its roof by a string. The angle made by string from vertical at equilibrium is



(1) $\sec^{-1}\left(\frac{g}{a}\right)$ (2) $\tan^{-1}\left(\frac{g}{a}\right)$

(3) $\tan^{-1}\left(\frac{a}{g}\right)$ (4) $\cot^{-1}\left(\frac{a}{g}\right)$

40. On a highway at a horizontal sharp turn of radius 20 m a sign board indicate that the maximum speed of vehicles will be 20 m/s. The minimum coefficient of friction between tyres of vehicle and road is

(1) 0.02 (2) 0.2

(3) 2 (4) 20

41. A circular road of radius 40 m is banked at an angle of 45° with horizontal. The speed of vehicle on the road at which effect of friction neglected is

(1) 40 km/h (2) 72 km/h

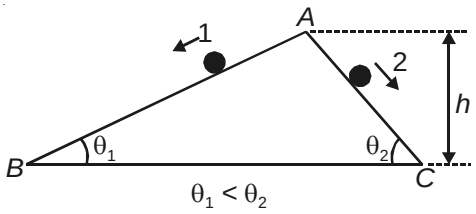
(3) 20 km/h (4) 80 km/h

42. A man slides down on a rough vertical pole with an acceleration equal to one-fifth of acceleration due to gravity (g). The frictional force between man and pole is (w = weight of man)

(1) $\frac{w}{5}$ (2) $\frac{3w}{5}$

(3) $\frac{4w}{5}$ (4) $\frac{w}{2}$

43. Two inclined frictionless tracks, one gradual and the other step meet at A from where two stones are allowed to slide down from rest one on each track (figure). Then mark correct option



(1) Both stones reach the bottom at same speed

(2) They will reach the bottom at different time

(3) Stone (2) will reach bottom first

(4) All of these

1. A particle is moving in a region, where its potential energy U varies with co-ordinates x, y and z as $U=\frac{a}{2}(x^2+y^2+z^2)$, where a is a positive constant. The force acting on the particle is

(1) $-a(x\hat{i}+y\hat{j}+z\hat{k})$ (2) $-2a(x\hat{i}+y\hat{j}+z\hat{k})$

(3) $-\frac{a}{2}(x^2+y^2+z^2)$ (4) $(x\hat{i}+y\hat{j}+z\hat{k})$

2. A knife having mass m is dropped from a height h above the surface of earth. If the knife penetrates upto distance x in the soil. The average force applied by the soil is

(1) $mg\left(\frac{h}{x}+1\right)$ (2) $\frac{mgh}{x}$

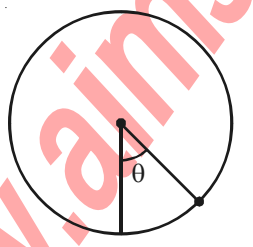
(3) $mg\left(\frac{h}{x}-1\right)$ (4) $\frac{mgx}{h}$

3. The potential energy U of a diatomic molecule varies with interatomic separation r as $U=\frac{a}{r^{12}}-\frac{b}{r^6}$, where a and b are positive constants. Find the interatomic separation for which atoms are in equilibrium

(1) Zero (2) $\left(\frac{b}{2a}\right)^{1/6}$

(3) $\left(\frac{2a}{b}\right)^{1/6}$ (4) $\left(\frac{a}{b}\right)^{1/6}$

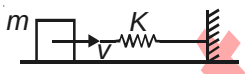
4. A stone is tied to a string of length ℓ and is moving in vertical circle such that the tension in the string at the highest position of stone is zero. Find the angle θ of string with lowest position when tension in the string is equal to the weight of stone



(1) $\cos^{-1}\left(\frac{1}{3}\right)$ (2) $\cos^{-1}\left(\frac{2}{3}\right)$

(3) $\cos^{-1}\left(-\frac{2}{3}\right)$ (4) $\sin^{-1}\left(\frac{1}{3}\right)$

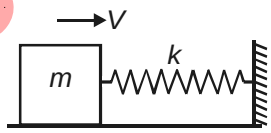
5. A body of mass (m) moving with speed v compresses a spring of spring constant(K). Maximum compression in spring is given by



(1) $x=\sqrt{\frac{m}{2K}}V$ (2) $x=\sqrt{\frac{m}{K}}V$

(3) $x=\sqrt{\frac{m}{K}}V^2$ (4) $x=\sqrt{\frac{2m}{K}}V$

6. A block moving with speed V starts compressing a spring of spring constant k as shown in figure. The compression in spring when speed of block becomes $\frac{V}{2}$ is



(1) $V\sqrt{\frac{m}{k}}$ (2) $\frac{V}{2}\sqrt{\frac{3m}{k}}$

(3) $\frac{V}{2}\sqrt{\frac{3m}{4k}}$ (4) $V\sqrt{\frac{2m}{k}}$

7. Work done against spring force in increasing the extension in a spring from x_1 to x_2 is (spring constant is k)

(1) $\frac{1}{2}k(x_2-x_1)^2$ (2) $\frac{1}{2}k\left(\frac{x_2-x_1}{2}\right)^2$

(3) $\frac{1}{2}k(x_2-x_1)(x_2+x_1)$ (4) $\frac{1}{2}k(x_1^2-x_2^2)$

8. A block of mass m is lowered vertically by a distance d with constant acceleration g/4 by means of a light inextensible string. Work done on the block by gravity is

(1) $\frac{mgd}{4}$

(2) $\frac{3mgd}{4}$

(3) $-\frac{3mgd}{4}$

(4) mgd

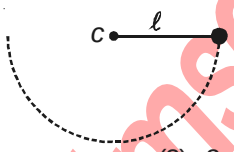
9. A body of mass m is lifted up from the earth surface to a height R above the earth's surface without changing its kinetic energy. The work done in this process is equal to
(1) Zero by the resultant force acting on the body
(2) $\frac{mgR}{2}$ by the applied force acting on the body
(3) $\frac{-mgR}{2}$ by the gravitational force acting on the body
(4) All of these

10. A body of mass m initially at rest starts moving and attains a velocity A in time T. Then, what is the instantaneous power delivered by force to the body in time t?
(1) $m\frac{A^2}{T^2}t$ (2) $m\frac{A^2}{T^2}t^2$
(3) $m\frac{A}{T}t$ (4) $m\frac{A^2}{T}t^2$

11. A bullet of mass m is moving with speed u hits a stationary wooden block of mass M placed on a smooth surface and gets embedded into it, then the percentage loss of energy during collision is
(1) $\left(\frac{100M}{M+m}\right)\%$ (2) $\left(\frac{100m}{M+m}\right)\%$
(3) $\left(\frac{m}{M+m}\right)\%$ (4) $\left(\frac{100m}{M}\right)\%$

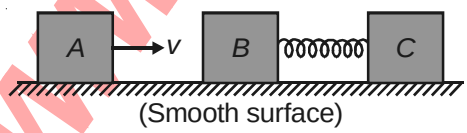
12. A radioactive nucleus of mass number A initially at rest emits an α-particle having kinetic energy K. The KE of recoiling nucleus will be
(1) K (2) $\frac{K}{A-4}$
(3) $\frac{4K}{A-4}$ (4) $\frac{K}{4}$

13. If a small particle of mass m is released from horizontal position as shown. (c is centre of circular path). Then the maximum tension in thread will be



(1) mg (2) 2mg
(3) 3mg (4) 4mg

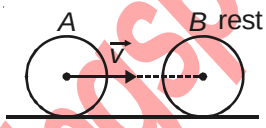
14. The blocks shown in figure are identical and each has mass 2 kg. If block A moving with speed 4 m/s collides with B and collision is perfectly elastic then the maximum compression produced in spring will be [spring constant k = 100 N/m]



(1) 0.4 m (2) 0.8 m
(3) 1.2 m (4) 1.6 m

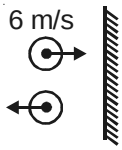
15. A ball of mass 500 gm moving with speed 2 m/s collide to a floor making an angle of 45° with vertical. If coefficient of restitution is $\frac{1}{\sqrt{3}}$, then the angle made by the ball with normal, after collision is
(1) 60° (2) 30°
(3) 45° (4) 37°

16. A body A of mass m elastically collides with another identical body B as shown in figure. The velocity of body A after collision is



(1) $\vec{v}$ (2) $\frac{\vec{v}}{2}$
(3) Zero (4) $\frac{\vec{v}}{3}$

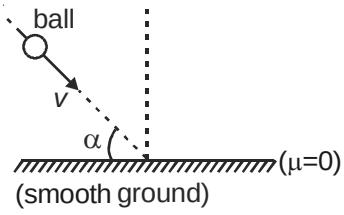
17. A ball moving with velocity = 6 m/s perpendicular to a wall collides with it. Magnitude of change in velocity of ball the due to collision is (Assuming coefficient of restitution = $\frac{1}{3}$)



(1) 2 m/s (2) 6 m/s
(3) 9 m/s (4) 8 m/s

18. A body of mass m moving with a constant velocity v hits another body of the same mass moving with the same speed v in the opposite direction and sticks to it. The speed of the compound body after collision is
(1) $v\sqrt{2}$ (2) 2v
(3) $\frac{v}{2}$ (4) Zero

19. If coefficient of restitution between ball and ground is e, then find speed of ball just after collision



(1) ev (2) v
(3) $v\sqrt{\sin^2\alpha + e^2\cos^2\alpha}$ (4) $v\sqrt{\cos^2\alpha + e^2\sin^2\alpha}$

20. A ball is dropped from height 32 cm above ground level. If the coefficient of restitution between the ball and ground is 0.5 then, to what height will it rise after first collision?
(1) 16 m (2) 8 m
(3) 4 m (4) 0.8 m

21. A bullet of mass m moving horizontally with velocity v is fired into a large wooden block of mass M kept at rest on a smooth horizontal surface. The magnitude of final velocity of this bullet-block system is
(1) $\frac{(m+M)v}{m}$ (2) $\frac{(m+M)v}{M}$
(3) $\frac{mv}{M+m}$ (4) $\frac{(M-m)v}{m}$

22. A ball of mass 10 kg is moving with velocity 10 m/s strikes the bob of a pendulum at rest. The mass of the bob is also 10 kg. If the collision is perfectly inelastic, then the height to which the combination of two will rise is
(1) 2 m (2) 1.6 m
(3) 1 m (4) 1.25 m

23. A ball is dropped from a height h = 10 m on the ground. If the coefficient of restitution is e, the height to which the ball goes up after it rebounds for the nth time is
(1) $\frac{e^{2n}}{10}$ m (2) $10e^{2n}$ m
(3) ne^{10} m (4) $10e^{n}$ m

24. A bullet loses $\frac{1}{n}$th of its velocity passing through one plank. How many such planks are required to stop the bullet?
(1) $\left(\frac{2n-1}{n^2}\right)$ (2) $\left(\frac{n}{n-1}\right)$
(3) $\frac{n^2}{(2n-1)}$ (4) $\frac{(n-1)}{n}$

25 A stationary body explodes into two pieces of masse 6 kg and 4 kg, which move in opposite directions. The ratio of their kinetic energies $\frac{E_1}{E_2}$ is
(1) $\frac{3}{2}$ (2) $\frac{13}{2}$
(3) $\frac{2}{3}$ (4) $\frac{2}{13}$

26. A bomb at rest explodes into two fragments of masses 3 kg and 1 kg. The ratio of magnitude of velocities of the smaller and bigger fragment is
(1) 3 (2) 1
(3) $\frac{1}{2}$ (4) $\frac{1}{3}$

CHEMISTRY

[Chapter-1 : Some Basic Concepts of Chemistry]

1. The equivalent weight of Fe_2S_3 in the reaction is
$Fe_2S_3 \rightarrow FeSO_4 + SO_2$
(1) $\frac{\text{Mol. wt.}}{4}$ (2) $\frac{\text{Mol. wt.}}{16}$
(3) $\frac{\text{Mol. wt.}}{22}$ (4) $\frac{\text{Mol. wt.}}{20}$

2. A compound contains 0.08% sulphur. The minimum molecular mass of the compound is
(1) 10,000 (2) 20,000
(3) 35,000 (4) 40,000

3. A zinc rod weighing 25g was kept in 100 ml of 1 M $CuSO_4$ solution. After a certain time the molarity of Cu^{2+} in the solution was 0.8 M. The weight of Zn rod left is equal to [At. mass of Zn = 65, Cu = 63.5]
(1) 1.308 g (2) 23.692 g
(3) 25 g (4) 26.8 g

4. In hot alkaline solution, Br_2 disproportionates to Br^- and BrO_3^-
$3Br_2 + 6OH^- \rightarrow 5Br^- + BrO_3^- + 3\,H_2O$
hence equivalent weight of Br_2 is (Mol. wt. = M)
(1) $\frac{M}{6}$ (2) $\frac{M}{5}$
(3) $\frac{3M}{5}$ (4) $\frac{5M}{3}$

5. On heating a litre of $\frac{N}{2}$ HCl, 1.375 g of HCl is lost and the volume of solution becomes 400 ml. The normality of resulting solution will be
(1) 0.58 (2) 1.155
(3) 0.057 (4) 5.7

6. H_3BO_3 on heating decomposes in two ways
I $H_3BO_3 \rightarrow HBO_2 + H_2O$
II $H_3BO_3 \rightarrow B_2O_3 + H_2O$
If 9 moles of H_3BO_3 is taken and some part decomposed like (I) and remaining like (II). If total 11 moles of water are formed, the moles of B_2O_3 formed is
(1) 6 (2) 5
(3) 3 (4) 2

7. 12.5 ml of a solution containing 6.0 g of a dibasic acid in one litre was found to be neutralized by 10 ml of a decinormal solution of NaOH. The molecular weight of the acid is

(1) 110 (2) 75

(3) 120 (4) 150

8. One litre of CO and CO_2 is passed through a tube containing red hot charcoal. The volume now becomes 1.6 L at same conditions of temperature and pressure. The composition of mixture is

(1) 0.8 L CO, 0.2 L CO_2 (2) 0.2 L CO, 0.8 L CO_2

(3) 0.4 L CO, 0.6 L CO_2 (4) 0.6 L CO, 0.4 L CO_2

9. X g of silver dissolved in HNO_3 and the solution was treated with excess of NaCl when 2.87 g of AgCl was precipitated. The value of x is

(1) 2.70 g (2) 2.16 g

(3) 1.08 g (4) 1.62 g

10. An oxide of metal contains 60% by mass of metal. Metal (M) has relative atomic mass of 24. The empirical formula of the oxide is

(1) M_2O (2) MO

(3) M_2O_3 (4) M_3O

11. 100 ml of a mixture of NaOH and Na_2SO_4 is neutralised by 10 ml of 0.5 M H_2SO_4. The amount of NaOH in 100 ml solution is

(1) 0.2 g (2) 0.4 g

(3) 0.6 g (4) 0.8 g

12. Dehydration of sucrose, by concentrated H_2SO_4 gives purest form of carbon. The amount of carbon which can be obtained by 34.2 g sucrose is

(1) 14.4 g atoms (2) 12 g atoms

(3) 3.2 g atoms (4) 1.2 g atoms

13. The number of gram atoms of oxygen present in 0.3 gram mole of $(CH_2COOH)_2.2H_2O$ is

(1) 0.6 (2) 1.8

(3) 1.2 (4) 3.6

14. 100 ml of 0.1 N hypo decolourised iodine by the addition of x g of crystalline copper sulphate to excess of KI. The value of x is (Mol. wt. of $CuSO_4.5H_2O$ is 250)

(1) 5.0 g (2) 1.25 g

(3) 2.5 g (4) 4 g

15. A gaseous mixture contains CH_4 and C_2H_6 in equimolar proportion. The weight of 2.24 L of this mixture at S.T.P is

(1) 4.6 g (2) 1.6 g

(3) 2.3 g (4) 1.8 g

16. The specific heat of a metal is 0.16. Its approximate atomic weight would be

(1) 32 (2) 16

(3) 40 (4) 64

17. Iodometric titration is based on the following reaction

$I_2(s) + I^- \rightleftharpoons I_3^-$

The equivalent weight of iodine in reaction is

(1) M (2) $\frac{3M}{2}$

(3) $\frac{M}{3}$ (4) $\frac{M}{4}$

18. 0.275 g of metal dissolved in dil H_2SO_4 and 120 ml of H_2 was evolved. The equivalent mass of metal is

(1) 29.4 (2) 25.6

(3) 51.2 (4) 2.78

19. If isotopic distribution of C-12 and C-14 is 98% and 2% respectively, then the number of C-14 atoms in 12 g of carbon is

(1) 1.032×10^{22} (2) 3.01×10^{22}

(3) 5.88×10^{23} (4) 6.023×10^{23}

20. 12 L of H_2 and 11.2 L of Cl_2 are mixed and exploded. The composition by volume of the mixture is

(1) 24 L of HCl

(2) 0.8 L Cl_2 and 20.8 HCl

(3) 0.8 L H_2, 22.4 L HCl

(4) 22.4 L HCl

21. The crystalline salt $Na_2SO_4.xH_2O$ on heating loses 56% of its weight. The formula of the crystalline salt is

(1) $Na_2SO_4.5H_2O$ (2) $Na_2SO_4.7H_2O$

(3) $Na_2SO_4.10H_2O$ (4) $Na_2SO_4.6H_2O$

22. Maximum moles of NO, that will be obtained by using 10 mole each of NH_3 and O_2 in the reaction $4NH_3(g) + 5O_2(g) \rightarrow 4NOg + 6H_2O(l)$ is

(1) 8 (2) 10

(3) 12 (4) 14

23. Superoxide is used for generating O_2 in space programmes. The volume of O_2 produced on reaction of 0.15 mole KO_2 and 0.12 mole H_2O at STP will be

$2KO_2 + 2H_2O \rightarrow 2KOH + H_2O_2 + O_2$

(1) 1.344 L (2) 1.68 L

(3) 2.688 L (4) 3.36 L

24. Cl_2 is produced in lab by the action of HCl on MnO_2. The mass of pure MnO_2 required to produce 10 mole of Cl_2 is (At mass of Mn = 55)

$MnO_2 + 4HCl \rightarrow MnCl_2 + Cl_2 + 2H_2O$

(1) 1160 g (2) 870 g

(3) 652.5 g (4) 600 g

25. The number of significant figures in 6.02×10^{23} is

(1) 23 (2) 3

(3) 4 (4) 26

26. 1 kg of NaOH solution contains 4 g of NaOH. The approximate concentration of solution is

(1) 1 M (2) 0.1 M

(3) $\frac{1}{100}$M (4) 10 M

27. The maximum moles of barrium phosphate that can be obtained on complete reaction of 1 mole each of $BaCl_2$ and Na_3PO_4 is

$BaCl_2 + Na_3PO_4 \rightarrow NaCl + Ba_3(PO_4)_2$

(1) 1 mole (2) $\frac{1}{2}$ mole

(3) $\frac{1}{3}$ mole (4) $\frac{2}{3}$ mole

28. Mass of sulphur that will be produced by action of 10 L each of SO_2 and H_2S at STP is

$SO_2 + H_2S \rightarrow S + H_2O$

(1) 42.86 g (2) 21.43 g

(3) 18.34 g (4) 14.23 g

29. Moles of H_3PO_4 required to completely neutralise 1 mole of NaOH will be

(1) $\frac{1}{3}$ (2) $\frac{1}{2}$

(3) 2 (4) 3

30. The concentration term which doesn't changes with temperature is

(1) g-strength (2) Normality

(3) Molarity (4) Percentage by weight

31. 1g of a mixture of NaCl and Na_2CO_3 is completely reacted with 75 ml $\frac{N}{10}$ HCl. The % of Na_2CO_3 in the mixture is

(1) 53 (2) 39.75

(3) 26.5 (4) 79.5

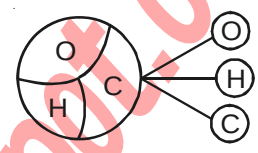
32. A ball made of C, H and O, gets fragmented in such a way that all the atoms of same elements goes together. If the mass of each fragement is equal then number of moles in the ratio of O, H and C respectively is

(1) 16 : 1 : 12

(2) 8 : 1 : 6

(3) 3 : 48 : 4

(4) 1 : 1 : 1



33. 1.575 g $(COOH)_2.xH_2O$ is dissolved in water and diluted upto 250 ml. 25 ml of this solution is completely neutralised with 25 ml $\frac{N}{10}$ NaOH. The value of x is

(1) 1 (2) 2

(3) 5 (4) 10

34. 5.6 L of an ideal diatomic gas at STP contains n-'molecules', then the number of atoms in another triatomic gas in its 11.2 L at STP is

(1) 2n (2) 3n

(3) 4n (4) 6n

35. A compound containing elements A, B and C contains 30% each of A and C. If atomic masses of A, B and C are respectively 60, 40 and 30, the empiricial formula of the compound will be

(1) A_2B_2C (2) A_2BC_2

(3) AB_2C_2 (4) $A_6B_9C_{16}$

36. In an ozonizer, oxygen is converted into ozone as per the reaction $3O_2(g) \longrightarrow 2O_3(g)$ 1L O_2 on passing through ozonizer reduces to 0.8 L mixture of O_2 and O_3 at STP. The ratio of volume of O_2 and O_3 in the mixture will be

(1) 1 : 1 (2) 1 : 2

(3) 2 : 3 (4) 3 : 2

[Chapter-2 : Structure of Atom]

1. The energy of electron of H atom in an orbit is –1.51 eV. Its angular momentum in that orbit will be

(1) $\frac{h}{2\pi}$ (2) $\frac{h}{\pi}$

(3) $1.5\frac{h}{\pi}$ (4) $2\frac{h}{\pi}$

2. Number of waves made by electron in 3rd orbit of hydrogen atom is

(1) 2 (2) 3

(3) 4 (4) 5

3. If E is the kinetic energy of the particle than which of the following expressions is correct for the de-Broglie wavelngth of the particle ?

(1) $\lambda = \frac{h}{2mE}$ (2) $\lambda = \sqrt{\frac{h}{2mE}}$

(3) $\lambda = \frac{h}{\sqrt{2mE}}$ (4) $\lambda = \sqrt{\frac{2mE}{h}}$

4. Which of the following orbitals has a maximum number of radial node?

(1) 6s (2) 6p

(3) 6d (4) 6f

5. The two particles A and B have de-Broglie wavelengths 1 nm and 5 nm respectively. If mass of A is four times the mass of B, the ratio of kinetic energies of A and B would be

(1) 5 : 1 (2) 25 : 4

(3) 20 : 1 (4) 5 : 4

6. Out of the following radiations, which one is most easily stopped by air?

(1) X-rays (2) α-rays

(3) β-rays (4) γ-rays

7. If threshold wavelength for ejection of electron from metal is 330 nm, then work function for the photoelectric emission is

(1) 6×10^{-10} J (2) 1.2×10^{-18} J

(3) 3×10^{-19} J (4) 6×10^{-19} J

8. The energy of the second orbit of hydrogen is equal to the energy of

(1) Fourth orbit of He^+ (2) Fourth orbit of Li^{2+}

(3) Second orbit of He^+ (4) Second orbit of Li^{2+}

9. The de-Broglie wavelength of an electron accelerated by a potential difference of 'V' volts is given by the relationship

(1) $\frac{12.28}{\sqrt{V}}$ Å (2) $\frac{12.28}{\sqrt{V}}$ cm

(3) $\frac{12.28}{\sqrt{V}}$ m (4) $\frac{12.28}{V}$ Å

10. The threshold frequency of a metal is 1×10^{15} s^{-1}. The ratio of maximum kinetic energy of the photoelectrons when the metal is irradiated with radiations of frequency 1.5×10^{15} s^{-1} and 2.0×10^{15} s^{-1} respectively, would be

(1) 3 : 4 (2) 1 : 2

(3) 2 : 1 (4) 4 : 3

11. If the quantum numbers of electron in a multielectron atom is 2, 0, 0, $\frac{1}{2}$ and 2, 0, 0, $-\frac{1}{2}$. What is the next higher allowed set of n and l quantum numbers for this atom in its ground state?

(1) n = 2, l = 0 (2) n = 2, l = 1

(3) n = 3, l = 0 (4) n = 3, l = 1

12. An electron in H atom in its ground state absorbs 1.50 times as much energy as the minimum required for ionisation of the atom. Thus KE of emitted electron is

(1) 13.6 eV (2) 20.4 eV

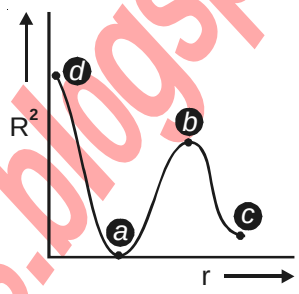
(3) 34.0 eV (4) 6.8 eV

13. The number of radial nodes for 4s, 4f, 5p orbitals are respectively

(1) 0, 3, 1 (2) 4, 4, 5

(3) 3, 0, 3 (4) 3, 3, 4

14. The region where $\psi^2 = 0$ is marked in the graph as



(1) a (2) b

(3) c (4) d

15. Potential energy of electron of He^+ is

(1) $-\frac{e^2}{4\pi\varepsilon_0 r}$ (2) $-\frac{e^2}{\pi\varepsilon_0 r}$

(3) $-\frac{e^2}{2\pi\varepsilon_0 r}$ (4) $+\frac{2e^2}{4\pi\varepsilon_0 r}$

16. Which of the following spectrum series of hydrogen belongs to visible region?

(1) Lyman series (2) Balmer series

(3) Paschen series (4) Pfund series

17. Which of the d orbitals lie/s in the xy plane?

(1) d_{xz} only (2) d_{xy} only

(3) $d_{x^2-y^2}$ only (4) d_{xy} and $d_{x^2-y^2}$

18. A 10^{-10} volt, accelerating potential is applied to an electron beam, then the order of wavelength of electron is approximately

(1) 10^{-4} m (2) 10^{-5} m

(3) 10^{-6} m (4) 10^{-7} m

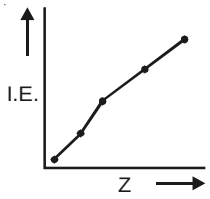
19. If electron jumps from n = 6 to n = 2 then total number of spectral lines obtained in infrared region are

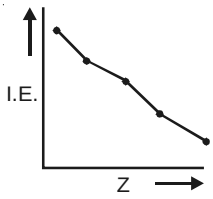
(1) 10 (2) 6

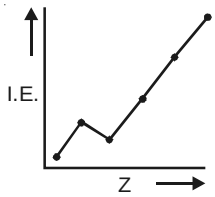
(3) 15 (4) 5

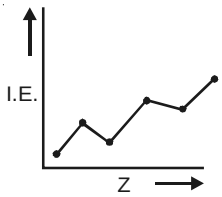
[Chapter-3 : Classification of Elements and Periodicity]

1. Which is correct order of electron affinity?
   (1) Cl > F (2) Br > Cl
   (3) F > Cl (4) I > Br
2. The correct plot of ionisation energy of elements of group 2 is

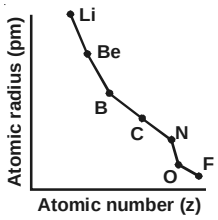
(1) 

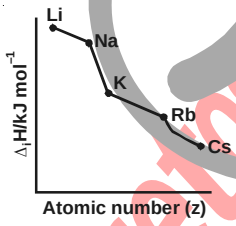
(2) 

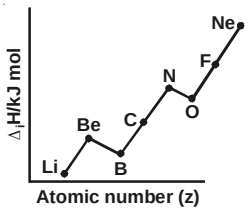
(3) 

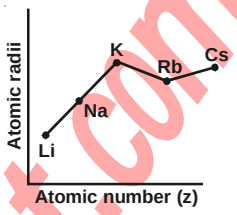
(4) 

3. The first ionisation energy of magnesium and aluminium are respectively given by
   (1) 7.64, 5.98 (2) 7.64, 7.64
   (3) 5.98, 7.64 (4) 5.98, 5.98
4. Which of the following graph is incorrect?

(1) 

(2) 

(3) 

(4) 

5. Which of the following element is having least negative electron gain enthalpy?
   (1) P (2) S
   (3) Cl (4) F
6. Which of the following statement is incorrect?
   (1) The first ionisation energy of N is greater than O
   (2) The second ionisation energy of O is greater than N
   (3) The first ionisation energy of F is greater than Ne
   (4) The first ionisation energy of He is greater than Ne
7. The correct decreasing order of negative electron gain enthalpy of oxygen family is
   (1) S > Se > Te > Po > O
   (2) S > O > Se > Te > Po
   (3) O > S > Se > Te > Po
   (4) O > Se > S > Te > Po

[Chapter-4 : Chemical bonding and Molecular Structure]

1. Which of the following compound is/are polar?

CCl_4	BCl_3	NH_3	AsH_3
(A)	(B)	(C)	(D)

   (1) B, C & D (2) C & D
   (3) C only (4) B & C
2. Compound in which central atom assumes sp^3d hybridization
   (1) XeF_4 (2) SF_4
   (3) PCl_3 (4) XeO_3
3. In the formation of O_2^+ from O_2 the electron is removed from
   (1) A σ orbital (2) A π orbital
   (3) A σ* orbital (4) A π* orbital
4. When BF_3 react with KF to form KBF_4, F–B–F bond angle
   (1) Increases
   (2) Decreases
   (3) Remains same
   (4) Depends on pressure
5. If the observed dipole moment of LiF is 6.32 D and Li–F bond length is 0.156 nm, then what will be percentage of ionic character?
   (1) 84.4 (2) 44.8
   (3) 26.5 (4) 33.33
6. In PCl_5
   (1) Axial P—Cl bond is shorter than equatorial P—Cl bond
   (2) Axial P—Cl bond is longer than equatorial P—Cl bond
   (3) Axial P—Cl bond is neither longer nor shorter than equatorial P—Cl bond
   (4) Axial P—Cl bond feel lesser repulsive force than equatorial P—Cl bond

7. Which of the following observation is correct?

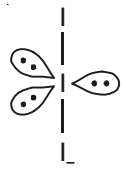
(1) CaO > NaCl (m.p.)

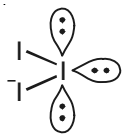
(2) LiCl < KCl (Ionic character)

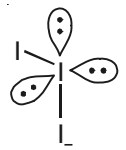
(3) KCl < AgCl (Covalent character)

(4) All of these

8. Correct structure of I_3^- ion is

(1) 

(2) 

(3) 

(4) 

9. Among the following compound which has square planar shape?

(1) $NH_4^{\oplus}$ (2) $BF_4^{\ominus}$

(3) XeF_4 (4) SF_4

10. Which has highest bond angle among NO_2, NO_2^+ & NO_2^-?

(1) NO_2^- (2) NO_2^+

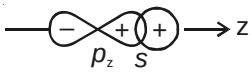
(3) NO_2 (4) All are equal

11. Which of the following is paramagnetic?

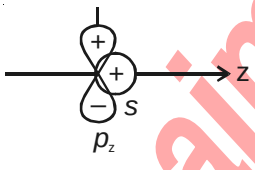
(1) KO_2 (2) Na_2O

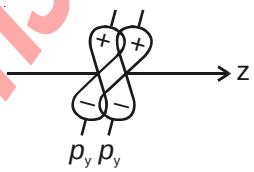
(3) Na_2O_2 (4) BaO_2

12. Which of the following diagram represents zero overlapping of s and p atomic orbitals?

(1) 

(2) 

(3) 

(4) 

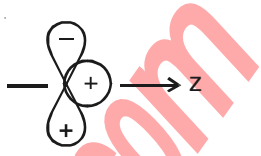
13. The molecular orbital shown below is

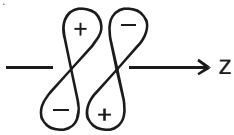
(1) $2p_x \pi^*$ (2) $2p_x \pi$

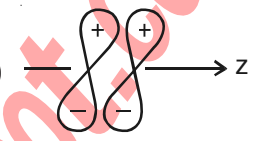
(3) σ_{2p_z} (4) $\sigma^*_{2p_z}$

14. Which of the following represents positive overlaps?

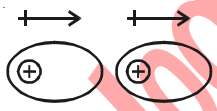
(1) 

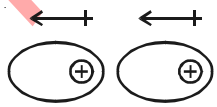
(2) 

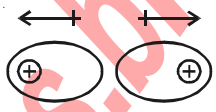
(3) 

(4) 

15. Which of the following figure represents dispersion forces?

(1) 

(2) 

(3) 

(4) Both (1) & (2)

16. Which of the following is correct statement?

(1) CH_4, CCl_4 and NH_4^+ contain same number of electrons and their shapes are same

(2) The shape of BeF_2 and XeF_2 are linear but different hybridization

(3) Lone pair of e^- in BF_3 and ClF_3 are same

(4) Hybridization of B in BF_3 and Cl in ClF_3 are same

17. Which of the following is correct order of bond angle?

(1) $SO_2 > H_2O > NH_3 > CH_4$

(2) $CH_4 > NH_3 > H_2O > SO_2$

(3) $SO_2 > CH_4 > NH_3 > H_2O$

(4) $NH_3 > SO_2 > CH_4 > H_2O$

18. Which of the following species have both σ and π bond according to M.O.T?

(1) N_2 (2) B_2

(3) C_2 (4) All of these

19. In which of the following pairs, the two structures are iso-structural?

(1) SF_4 and CF_4 (2) NCl_3 and BCl_3

(3) SO_3^{-2} and NO_3^- (4) BrO_3^- and XeO_3

1. van der Waal's equation at very high pressure for 1 mole of gas may be written as

(1) $P(V - b) = RT$ (2) $\left(P + \frac{a}{V^2}\right) V = RT$

(3) $\left(P + \frac{a}{V^2}\right) (V - b)$ (4) $P(V + b) = RT$

2. An open flask contains air at 27ºC. The temperature at which the flask must be heated to escape out the one third of air measured at 27ºC would be

(1) 289 K (2) 450 K

(3) 500 K (4) 380 K

3. The ratio of rates of diffusion of gases P and Q is 1 : 4 and ratio of their masses present in the mixture is 2 : 3 then ratio of their mole fraction will be

(1) 1 : 4 (2) 1 : 24

(3) 1 : 6 (4) 2 : 5

4. If relative humidity of air is 60%, it means that partial pressure of water vapour in air is

(1) 6 times more than vapour pressure of water at that temperature

(2) 0.06 times more than vapour pressure of water at that temperature

(3) 0.6 times more than vapour pressure of water at that temperature

(4) 60 times more than vapour pressure of water at that temperature

5. Two gases A and B having the mole ratio 4 : 7 in a container, exert a pressure of 11 atm. If gas A is removed then the pressure exerted by B at constant temperature will be

(1) 11 atm (2) 4 atm

(3) 7 atm (4) 5.5 atm

6. The ratio $\frac{a}{b}$ (a and b being the van der Waal's constants of real gases) has the dimensions of

(1) atm mol^{-1} (2) 1 mol^{-1}

(3) atm L mol^{-1} (4) atm L mol^{-2}

7. A gaseous mixture of 2 moles of A, 3 moles of B, 5 moles of C and 10 moles of D is contained in a vessel. Assuming that gases are ideal and the partial pressure of C is 1.5 atm, the total pressure is

(1) 3 atm (2) 6 atm

(3) 9 atm (4) 0.6 atm

8. Helium gas at 1 atm and SO_2 at 2 atm pressure, temperature being the same, are released separately at the same moment into 1 m long evacuated tubes of equal diameter. If He reaches the other end of tube in one second. What distance SO_2 would traverse in the same interval in the other tube?

(1) 25 cm (2) 50 cm

(3) 60 cm (4) 75 cm

9. 2 mol of NH_3 and 1 mol of HCl are introduced into a 10 L evacuated closed container at 27°C. The pressure set up in the container will be

(1) $\frac{3 \times 0.0821 \times 300}{10}$ atm (2) $\frac{2 \times 0.0821 \times 300}{10}$ atm

(3) $\frac{1 \times 0.0821 \times 300}{10}$ atm (4) $\frac{4 \times 0.0821 \times 300}{10}$ atm

10. Relative humidity of air is 80% at 27°. If the aqueous tension at the same temperature is 27 mm Hg, partial pressure of water vapour in the air will be

(1) 27 mm Hg (2) 25 mm Hg

(3) 23 mm Hg (4) 21.60 mm Hg

11. Two flasks X and Y of volumes 250 ml and 300 ml respectively at the same temperature are connected by a stop cock of negligible volume. The flask X contains nitrogen gas at a pressure of 660 torr and the flask Y contains neon at pressure of 825 torr. If the stop cock is opened to allow the two gases to mix. The partial pressure of neon and total pressure of the system will be

(1) 300 torr, 700 torr (2) 400 torr, 700 torr

(3) 450 torr, 750 torr (4) 300 torr, 750 torr

12. The reciprocal of compressibility factor of a real gas in critical state is

(1) $\frac{3}{8}$ (2) $\frac{3}{4}$

(3) $\frac{8}{3}$ (4) $\frac{1}{3}$

13. If V is the volume of one molecule of gas under given conditions, the van der Waal's constant b is

(1) 4 V (2) $\frac{4V}{N_0}$

(3) $\frac{N_0}{4V}$ (4) $4 V N_0$

14. The density of gas A is twice that of a gas B at the same temperature. The molecular mass of gas B is thrice that of A. The ratio of pressure acting on A and B will be

(1) 6 : 1 (2) 7 : 8

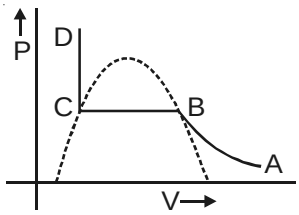
(3) 2 : 5 (4) 1 : 4

15. What should be the percentage increase in the pressure for a 5% decrease in volume of gas at constant temperature?

(1) 2.12 (2) 4.23

(3) 5.26 (4) 6.97

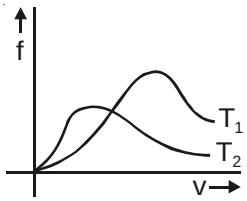
16. In the given isotherm for liquefaction of a gas, the part of the graph which represents liquefaction is

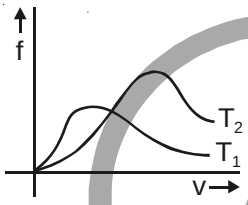


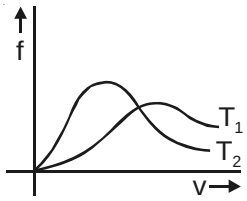
(1) A to B (2) B to C

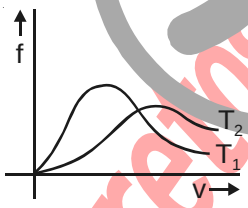
(3) C to D (4) A to C

17. If $T_1 > T_2$ then select the correct graph from the followings (f = fractions of molecules ; v = molecular speed)

(1)


(2)


(3)


(4)


18. The percentage increase in pressure at a constant temperature to reduce volume of given amount of a gas to 80% of initial volume will be

(1) 20% (2) 25%

(3) 30% (4) 40%

19. Ratio of average speed to that of most probable speed is

(1) $\sqrt{2.5}$ (2) $\sqrt{1.27}$

(3) $\sqrt{0.5}$ (4) $\sqrt{0.25}$

20. Pressure and temperature at bottom of a pond are 2 atm and 17ºC, while at the top it is 1 atm and 27ºC. Give the fractional increase in volume of an air bubble when it comes from bottom to top

(1) 1.06 (2) 1.6

(3) 2.06 (4) 3.02

21. Pressure exerted by one mole of an ideal gas kept in a vessel of 'V' L having root mean square speed of molecules 'v' and 'm' mass of each molecule is correctly given by the equation

(1) $P = \frac{1}{2}\frac{N_A}{V}mv^2$ (2) $P = \frac{1}{3}\frac{N_A}{V}mv^2$

(3) $P = \frac{2}{3}\frac{N_A}{V}mv^2$ (4) $P = \frac{3}{2}\frac{N_A}{V}mv^2$

22. NH_3 and HCl gases are introduced from the two ends of a straight tube under same condition. The formation of NH_4Cl is first observed at 'x' distance from NH_3 end and 'y' distance from HCl end, then

(1) x = y (2) x > y

(3) x < y (4) Can't be predicted

23. In two vessels (A) and (B) there are O_2 and N_2 under same temperature and pressure. (A) contains equal moles of O_2 & N_2 while (B) contains their equal masses. The partial pressure of O_2 in two vessels is correctly given as

(1) $p_{O_2(A)} > p_{O_2(B)}$ (2) $p_{O_2(A)} < p_{O_2(B)}$

(3) $p_{O_2(A)} = p_{O_2(B)}$ (4) Can't be calculated

24. Let inversion temperature of H_2 and CO_2 are respectively T_1 and T_2, then

(1) $T_1 > 25^oC > T_2$ (2) $T_1 > 25^oC < T_2$

(3) $T_1 < 25^oC < T_2$ (4) $T_1 < 25^oC > T_2$

25. A mixture of H_2 and O_2 gas contains 30% by weight of H_2. The partial pressure exerted by O_2 is (if total pressure of mixture is P)

(1) $\frac{9P}{50}$ (2) $\frac{11P}{59}$

(3) $\frac{7P}{55}$ (4) $\frac{15P}{72}$

26. The van der Waal's constant 'b' is

(1) Two times of actual volume of gaseous molecules

(2) Three times of actual volume of gaseous molecules

(3) Four times of actual volume of gaseous molecules

(4) Five times of actual volume of gaseous molecules

27. The pressure required to compress 1000 dm^3 of a gas at 1 atm to 700 dm^3 at room temperature is

(1) 1.42 atm (2) 1.90 atm

(3) 0.95 atm (4) 1.20 atm

28. If pressure and temperature of a x litre O_2 gas are doubled, the new volume of gas would be

(1) x litre (2) $\frac{x}{2}$ litre

(3) 2x litre (4) $\frac{x}{4}$ litre

29. van der Waal's equation for half mole of real gas is

(1) $\left(\frac{4PV^2+a}{4V^2}\right)(2V-b)=RT$

(2) $\left(\frac{3PV^2+a}{4V}\right)(2V-b)=RT$

(3) $\left(\frac{4PV+a}{4V^2}\right)(2V-b)=RT$

(4) $\left(\frac{2PV^2+a}{3V^2}\right)\left(V-\frac{b}{2}\right)=RT$

30. At 1 atm pressure and 1 bar pressure boiling temperature respectively, called is

(1) Normal boiling point and standard boiling point

(2) Standard boiling point and normal boiling point

(3) Normal boiling point in both

(4) Standard boiling point in both

31. The density of a gas at STP is x gm litre^{-1}. The density of gas at 17ºC and 2 atm pressure would be

(1) $\frac{1\times 290}{x\times 2\times 273}$ (2) $\frac{x\times 2\times 273}{1\times 290\times 3}$

(3) $\frac{1\times 290\times 3}{x\times 2\times 273}$ (4) $\frac{x\times 2\times 273}{1\times 290}$

BOTANY

Chapter - 1 : Living World

1. *Mangifera indica* belongs to the order and family respectively

(1) Sapindales and Annonaceae

(2) Parietals and Cruciferae

(3) Malvales and Malvaceae

(4) Sapindales and Anacardiaceae

2. Six kingdoms (by Carl Woese) are naturally clustered into 3 domains on the basis of

(1) 16 S r-RNA gene

(2) Major ecological role

(3) DNA gene

(4) Mode of Nutrition

3. Identify the **correct** sequence of taxonomical categories

(1) Species → Genus → Family → Class → Order

(2) Tribe → Subfamily → Family → Order → Class

(3) Variety → Tribe → Class→ Genus → Family

(4) Subspecies → Species → Order → Family → Class

4. Systematics

a. Is the study of diversity of organisms and their evolutionary relationship

b. Term was first used by Carolus Linnaeus

c. Theophrastus is considered as Father of Systematics

(1) Only a is correct

(2) Only b is incorrect

(3) Only c is incorrect

(4) b & c both are incorrect

5. Mark the incorrect statement

(1) Isolated metabolic reactions *in vitro* are not living things but surely living reactions

(2) Plant species in botanical gardens are grown for identification purposes

(3) No non-living object exhibits growth

(4) Cellular organisation of the body is the defining feature of life forms

6. Kew Bulletin and Index Kewensis are the two premier publications of

(1) Orto Botanico Garden

(2) Villa Toranto Garden

(3) Royal Botanical Garden

(4) Botanischer Garten

7. Mark the incorrect one

(1) Growth is extrinsic type in non-living objects

(2) Self-consciousness is present in human beings

(3) Most living and some non-living objects are capable of reproduction

(4) Cellular organisation is the defining feature of life forms

8. Select correct statement w.r.t. identification key

(1) Different taxonomic categories are identified by separate taxonomic keys

(2) Based on the pair of similar characters as couplet

(3) Each statement of key is grade

(4) Indented key is most popular and analytical in nature

9. Specimen selected from original material to serve as nomenclatural type when the holotype is missing is

(1) Isotype (2) Syntype

(3) Topotype (4) Lectotype

1. Terminal swollen structure of germ tube for penetration and attachment is regarded as
   (1) Appressorium (2) Haustoria
   (3) Sclerotium (4) Rhizomorph
2. Which of the following characteristic is not possessed by gram positive bacteria?
   (1) Presence of teichoic acid
   (2) Sensitivity to penicillin
   (3) Produce exotoxins
   (4) Presence of porins in cell wall
3. Which of the following is **incorrect**?
   (1) Slime layer does not contain D-glutamic acid
   (2) Central mesosomes help in holding the nucleoid
   (3) Teichoic acids are acidic polymers consisting of aminoacids, sulphates and aldehyde
   (4) *Chlorobium* is photolithotrophic and green sulphur bacteria
4. When DNA fragment from donor bacterium is not integrated in the genome of recipient bacterium and is lost after one or few generations. This is regarded as
   (1) Restricted transduction
   (2) Specialised transduction
   (3) Abortive transduction
   (4) Transformation
5. Match the following

	Column-I		**Column-II**
a.	*Morchella*	(i)	Drosophila of plant kingdom
b.	*Mucor mucedo*	(ii)	Blue/green mould
c.	*Penicillium*	(iii)	Dung mould
d.	*Neurospora crassa*	(iv)	Sponge mushroom

   (1) a(i), b(ii), c(iii), d(iv) (2) a(ii), b(iii), c(iv), d(i)
   (3) a(iv), b(iii), c(ii), d(i) (4) a(iii), b(ii), c(i), d(iv)
6. What is the **correct** sequence for the formation of spores of *Puccinia graminis*?
   (1) Uredospores → Basidiospores → Aeciospores → Pycniospores
   (2) Teleutospores → Uredospores → Basidiospores → Aeciospores
   (3) Pycniospores → Uredospores → Aeciospores → Teleutospores
   (4) Teleutospores → Basidiospores → Pycniospores → Aeciospores
7. Gram positive bacteria are characterised by all **except**
   (1) Presence of teichoic acid
   (2) Presence of single layered thick cell wall
   (3) Presence of diaminopimellic acid in the cell wall
   (4) Presence of more amino sugars in cell wall as compared to gram negative bacteria
8. Which of the following group of bacteria give rise to sphaeroplast when treated with lysozyme?
   (1) *E. coli* and *Lactobacillus*
   (2) *Rhizobium* and *Clostridium*
   (3) *Staphylococcus* and *Vibrio*
   (4) *Agrobacterium* and *Xanthomonas*
9. Which of the following is **correct** w.r.t. *Mycoplasma* out of the following features?
   i. Diseases like potato witches broom and little leaf of brinjal are caused
   ii. Contain flagella made up of protein flagellin
   iii. Filterable through bacterial filters and are resistant to antibiotics like penicillin
   (1) i & ii (2) ii & iii
   (3) i & iii (4) Only i
10. Which of the following group of viruses contain ss-RNA?
    (1) Hepatitis B virus and chicken pox virus
    (2) Cauliflower mosaic virus and herpes virus
    (3) Polio virus and $\phi \times 174$
    (4) Rabies virus and mumps virus
11. Cellular slime moulds are not characterised by which of the following feature?
    (1) Presence of wall-less uninucleate myxamoebae
    (2) Formation of pseudoplasmodium by the aggregation of macrocyst
    (3) Capillitia are lacking in the sporangium
    (4) Presence of cellulosic wall around spores
12. Which of the following is **incorrect** statement w.r.t. *Agaricus?*
    (1) The vegetative or assimilative part of mycelium is subterranean
    (2) Primary mycelium is short lived and consists of septate hyphae, having monokaryotic cells
    (3) In button stage the pileus is connected to gills by a memberane called velum
    (4) Basidiospores are the product of meiosis and hence are haploid

13. Endospores are thick walled highly dehydrated and resistant spores formed under adverse conditions usually by *Bacillus* and *Clostridium*. It is regarded as a method of perennation, not reproduction because
(1) Produced endogenously
(2) Cortex has dipicolinic acid
(3) One endospore produces one bacterium
(4) No genetic variation in bacterium

14. Conidia produced at tip of conidiophores in fungi are
(1) Always diploid (2) Mitospores
(3) Meiospores (4) Produced sexually

15. Lichens are
(1) Not indicator of SO_2
(2) Capable of N_2 fixing if they have BGA as phycobiont
(3) Pioneer vegetation in a hydrosere
(4) Symbiotic association between fungi and roots of higher plants

16. Select **incorrect** statement regarding protists
(1) Group of unicellular eukaryotes
(2) They have diversified type of nutrition
(3) Flagella and cilia have 9 + 0 arrangment of microtubules
(4) They may have both plant and animal like characters

17. Match the following

	Column I (Nucleoid)		**Column II (Virus)**
a.	ds DNA	(i)	Hepatitis
b.	ss DNA	(ii)	Reo virus
c.	ds RNA	(iii)	Dengue
d.	ss RNA	(iv)	$\phi \times 174$

(1) a(i), b(iv), c(iii), d(ii) (2) a(i), b(iv), c(ii), d(iii)
(3) a(i), b(ii), c(iv), d(iii) (4) a(iv), b(i), c(ii), d(iii)

18. Basidiocarp of mushroom (*e.g. Agaricus*)
(1) Is made up of primary mycelium
(2) Produce exogenous meiospores
(3) Has upper part stipe and lower part pileus
(4) Has many vertically hanging gills which bears paraphyses only at their tips

19. Which of the following is common in murein and chitin?
(1) NAG (2) NAM
(3) Tetrapeptide (4) Teichoic Acid

20. Mycoplasma are / have
(1) Sensitive to penicillin
(2) Filterable through bacterial filters
(3) Non pathogenic organisms
(4) ss, circular DNA

21. A similarity between diatoms and dinoflagellate is
(1) Both are non-flagellated forms
(2) Both have chl-a and chl-c
(3) Both are sewage pollution indicator
(4) Both have diplontic life cycle

22. Site of karyogamy in ascomycetes is
(1) Ascogonia (2) Ascospore
(3) Ascus (4) Ascocarp

23. Match the column A and B

	Name of organism		**Disease**
a.	*Albugo*	(i)	Early blight
b.	*Claviceps*	(ii)	Wheat rust
c.	*Puccinia*	(iii)	White rust
d.	*Alternaria*	(iv)	Ergot

(1) a(iii), b(iv), c(i), d(ii) (2) a(iii), b(ii), c(i), d(iv)
(3) a(iii), b(iv), c(ii), d(i) (4) a(ii), b(iv), c(i), d(iii)

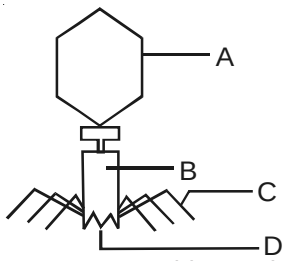
24. Which of the following amino acid is absent in tetrapeptide chain of cell wall of bacteria which also possess teichoic acid?
(1) L-lysine (2) Diaminopimellic acid
(3) D-glutamic acid (4) L-alanine

25. Bacteria utilising light and H_2S as electron and H^+ donor for CO_2 reduction are called
(1) Oxygenic photoautotrophs
(2) Photolithotrophs
(3) Photoheterotrophs
(4) Chemoautotrophs

26. Gram negative monerans with lamellasome show
(1) Absence of motile structure
(2) Presence of heterocyst with PS I and PS II
(3) Absence of peptidoglycan in cell wall
(4) Ability to form red tide by excessive cell division

27. Archaebacteria are able to grow in adverse conditions by decreasing membrane fluidity and increasing resistance to high temperature and low pH by the presence of
(1) Capsule
(2) Cell wall without peptidoglycan
(3) Branched chain lipid
(4) N-acetyltalosaminuronic acid

28. Observe the diagram of a bacteriophage. The following is/are non-contractile



(1) A, B, D (2) A only
(3) C and D (4) B only

29. Bordeaux mixture used as fungicide is

(1) $CuSO_4 + Ca(OH)_2 + H_2O$

(2) $CaSO_4 + Cu(OH)_2 + H_2O$

(3) $CaCO_3 + Cu(OH)_2 + H_2O$

(4) $CaCO_3 + Ca(OH)_2 + H_2O$

30. A **correct** match is

(1) *Trichophyton* - Athlete's foot

(2) *Phytophthora* - Early blight of potato

(3) *Erysiphe* - Damping off of seedlings

(4) *Protomyces* - Smut of bajra

31. In Whittaker system of classification, taxon *Chlamydomonas* and *Chlorella* were brought together in a kingdom with which one of the following group of members?

(1) *Spirogyra* and *Ulothrix*

(2) *Paramoecium* and *Amoeba*

(3) *Rhodospirillum* and *Spirulina*

(4) *Riccia* and *Tillandsia*

32. Which of the following feature is **not** possessed by diatoms?

(1) Movement is brought about by mucilage propulsion

(2) Serve as sewage pollution indicators

(3) Gamete grows into a rejuvenescent cell called auxospore

(4) Body covering is called frustule

33. Most primitive and ancient group of bacteria as living fossils show

(1) Peptidoglycan nature of cell wall

(2) Presence of branched chain lipids which increases membrane fluidity

(3) Reddish pigment in their membrane to trap light energy with chemoheterotrophic nutrition

(4) Exonic DNA only

34. Match the following

	Column I	**Column II**
a.	Algin	(i) *Funaria*
b.	Carrageenin	(ii) *Marchantia*
c.	Elater	(iii) *Chondrus*
d.	Peristome	(iv) *Laminaria*

(1) a(iii), b(iv), c(i), d(ii)

(2) a(iv), b(iii), c(ii), d(i)

(3) a(iii), b(iv), c(ii), d(i)

(4) a(iv), b(iii), c(i), d(ii)

35. They form a primitive group of bacteria and are oldest of the living fossils. What is **not correct** for these organisms?

(1) Their cell wall lacks muramic acid and peptidoglycan

(2) They all are obligate anaerobes

(3) Their membrane lipid contains phytanyl side groups

(4) Their ribosomal proteins are unusually acidic

36. Match the following and choose the **correct** answer

Column I **[Parasexual methods]**	**Column II** **[Example]**
a. Transformation	(i) T_4-bacteriophage
b. Conjugation	(ii) λ-bacteriophage
c. Generalised transduction	(iii) *Escherichia coli*
d. Restricted transduction	(iv) *Diplococcus pneumoniae*

(1) a(iii), b(iv), c(i), d(ii) (2) a(iii), b(iv), c(ii), d(i)

(3) a(iv), b(iii), c(i), d(ii) (4) a(iv), b(iii), c(ii), d(i)

37. In the life cycle of communal slime moulds, acrasin is secreted by

(1) Pseudoplasmodium (2) Myxamoebae

(3) Macrocyst (4) Sporangia

38. Which mycorrhiza forms hartig net in intercellular spaces of host plant?

(1) Endomycorrhiza

(2) Ectomycorrhiza

(3) VAM

(4) More than one option is correct

39. Vegetative reproduction using hormogones is common in certain members of

(1) Oxygenic photoautotrophs

(2) Non-oxygenic monerans

(3) Myxomycetes

(4) Mollicuta

40. Formation of red tides is related to _____ that produces _____

(1) *Gonyaulax*, aflatoxin

(2) *Gonyaulax,* saxitoxin

(3) *Gymnodinium,* astaxanthin

(4) *Noctiluca,* exotoxin

41. Select an **incorrect** statement w.r.t. life cycle of *Rhizopus*

(1) Occurence of four types of hypha

(2) Chemotactic stimulus of trisporic acid for attraction of asexual hypha

(3) Only one haploid nucleus survives after meiosis in zygote

(4) Vegetative hypha are of two types

42. Fertile layer of gill in *Agaricus* is

(1) Hymenium (2) Subhymenium

(3) Paraphyses (4) Trama

43. In addition to the normal chromosomal DNA, some extrachromosomal genetic elements are often found in bacteria. These elements are

(1) Not capable of autonomous replication

(2) Linear pieces of RNA

(3) Called mesosomes

(4) Circular pieces of ds-DNA

44. Which of the following category is made up of related orders?

(1) Genus (2) Family

(3) Class (4) Species

45. Gram positive as well as Gram negative eubacteria

(1) Make sphaeroplast on treating with lysozyme

(2) Produce exotoxins only

(3) Have similar type of linkage between the NAM and NAG

(4) Produce endotoxins only

46. Which structure holds the nucleoid and help in the separation of nucleoid and septa formation?

(1) Centriole

(2) Peripheral mesosome

(3) Central mesosome

(4) Slime layer

47. In bacteria, porins function as channels for the entry and exit of

(1) Hydrophilic low molecular weight substances

(2) Hydrophobic low molecular weight substances

(3) Hydrophilic high molecular weight substances

(4) Hydrophobic high molecular weight substances

48. If source of carbon and energy is CO_2 and sunlight respectively, then type of nutrition in this organism is

(1) Chemoautotrophic

(2) Photoautotrophic

(3) Photoheterotrophic

(4) Chemoheterotrophic

49. Prokaryotes those survive successfully in salt ponds and salted hides are also able to

(1) Digest cellulose in the rumen of cattle

(2) Reduce sulphur to H_2S at very low pH

(3) Synthesize cell wall with the help of muramic acid

(4) Synthesize ATP with the help of a reddish pigment

50. Diatomaceous earth is used for all, **except**

(1) Polishing of earth

(2) Filtration of oil

(3) Cleaning agent in tooth pastes

(4) Conductor in refrigerators

51. Select the **incorrect** statement (w.r.t. slime moulds)

(1) Spores are produced under unfavourable conditions

(2) Fruiting bodies bear spores at their tips

(3) True walls are absent in the spores

(4) Spores are dispersed by air currents

52. Read the statement carefully and choose the **incorrect** one for Ascomycetes

a. Mycelium is branched and septate

b. Plasmogamy is soon followed by meiosis

c. Conidia is produced exogenously

d. Dikaryophase is totally absent

(1) a, b are incorrect (2) a, d are incorrect

(3) b, c are incorrect (4) b, d are incorrect

53. Meiosis is absent in

(1) *Mucor* (2) *Rhizopus*

(3) *Alternaria* (4) *Ustilago*

54. Lichens are very good pollution indicators because

(1) They grow extensively in polluted area

(2) They don't grow in polluted area

(3) Their chemical composition changes in polluted area

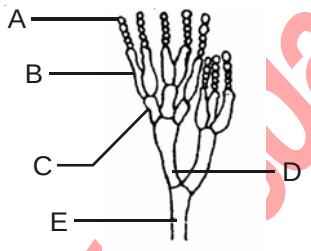
(4) Their absorbing capacity of water and minerals increases

55. What is **incorrect** for prions?
(1) Are sub-viral particles
(2) Have ssRNA as genetic material
(3) Causal agent of mad cow disease
(4) Resistant to high temperature and UV-radiation

56. In lytic cycle
a. Host DNA is degraded into fragments
b. Cellular machinery of host is completely taken over by viral genome
c. Prophage is formed
d. Virus is temperate and liberated rarely
(1) a and c are correct
(2) a and b are correct
(3) a, c and d are correct
(4) Only c is incorrect

57. Consider the following statements for *Agaricus*
a. Primary mycelium is monokaryotic
b. Buttons are formed by aggregation of primary mycelium
c. Undersurface of stipe bears gills or lamellae
d. Basidium is the site for both karyogamy and meiosis
e. Hymenium consists of both basidia and paraphyses
The **correct** statements are
(1) a, d, e
(2) a, b, e
(3) b, c, d
(4) a, c, d

58. Correct match for the diagram given below is



(1) A–Conidia, B–Rami, C–Metulae, D–Sterigmata, E–Conidiophore
(2) A–Conidia, B–Sterigmata, C–Metulae, D–Rami, E–Conidiophore
(3) A–Conidiophore, B–Sterigmata, C–Conidia, D–Rami, E–Metulae
(4) A–Conidia, B–Sterigmata, C–Rami, D–Metulae, E–Conidiophore

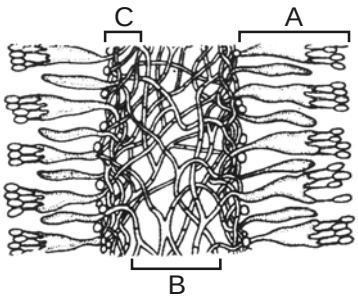
59. Out of the following statements
a. Production of uredospores on wheat plant
b. Formation of dikaryotic aeciospores on barberry leaf
c. Sexual reproduction by somatogamy
d. Production of basidiospores in soil
e. Secondary mycelium with dolipore septum
The **correct** statements for *Puccinia graminis tritici* are
(1) a & e (2) a, b & d
(3) b, d & e (4) a, c & d

60. Which of the following features is not related to heterocyst?
(1) Oxidation of atmospheric nitrogen
(2) Asexual reproduction
(3) Absence of photolysis of water
(4) Maintenance of anaerobic environment in the cell

61. The two kingdom classification of Linnaeus did not distinguish between
a. Photosynthetic and non-photosynthetic organisms
b. Eukaryotes and prokaryotes
c. Walled and wall-less organisms
(1) Only a is correct
(2) Only a & b are correct
(3) Only b & c are correct
(4) All of these are correct

62. *Rhodospirillum* is
(1) Purple non-sulphur bacteria
(2) Green sulphur bacteria
(3) Green non-sulphur bacteria
(4) Purple sulphur bacteria

63. What is **correct** for the diagram given below?



(1) A–Basidium, B–Monokaryotic mycelium, C–Dikaryotic mycelium
(2) A–Hymenium, B–Trama, C–Subhymenium
(3) A–Hymenium, B–Subhymenium, C–Trama
(4) A–Pileus, B–Gill, C–Stipe

64. Organism is aerobic but can live anaerobically also, is known as

(1) Obligate aerobe (2) Facultative aerobe

(3) Obligate anaerobe (4) Facultative anaerobe

65. Match the following

	Column I		**Column II**
a.	Algal fungi	(i)	Zygomycetes
b.	Conjugation fungi	(ii)	Ascomycetes
c.	Club fungi	(iii)	Basidiomycetes
d.	Sac fungi	(iv)	Phycomycetes

(1) a(ii), b(iii), c(iv), d(i) (2) a(iv), b(i), c(iii), d(ii)

(3) a(iii), b(ii), c(i), d(iv) (4) a(i), b(iv), c(ii), d(iii)

66. Generalized transduction involves

(1) Always the loss of transferred segment

(2) Transfer of nonspecific genes from donor to recipient using virus

(3) Transfer of a specific segment from donor to recipient cell using virus

(4) Transfer of a specific segment from donor to recipient using a passage formed by sex pili

67. Select a **correct** match

(1) PPLO - Obligate intracellular parasite

(2) *Mycobacterium* - Actinomycetes

(3) Halophiles - Peptidoglycans

(4) Microcystis - L-form bacteria

68. The causal agent of which of the following disease does not show dikaryophase in life cycle?

(1) Whip smut of sugarcane

(2) Powdery mildew of cereals

(3) Ergot of rye

(4) White rust of crucifers

69. Gram negative bacterium contains cell wall which has

(1) Low lipid content and teichoic acid

(2) High peptidoglycan content and hopanoids

(3) Low lipid and high peptidoglycan content

(4) High lipid and low peptidoglycan content

70. Archaebacteria live in some of the most harsh habitats such as extreme salty areas, hot springs and marshy areas. These bacteria differ from eubacteria in

(1) Absence of branched lipids in cell membrane

(2) Presence of peptidoglycan

(3) Presence of same cell wall structure

(4) Absence of NAM and D-amino acids in cell wall

71. Read the following conditions

a. Shortage of space

b. Lack of nutrient availability

c. Accumulation of waste products

d. Presence of bacteriophage and destroying bacteria

Under which conditions the process of asexual reproduction in bacteria gradually slows down and ultimately stops?

(1) Only b (2) a & b only

(3) a & c only (4) a, b, c & d

72. Which of the following activity is present in heterocyst of cyanobacteria?

(1) PS-II activities

(2) CO_2 fixation

(3) Photophosphorylation

(4) O_2 evolution

73. Which of the following fungus caused great Irish famine disease?

(1) *Helminthosporium oryzae*

(2) *Cystopus candidus*

(3) *Puccinia graminis tritici*

(4) *Phytophthora infestans*

74. Which of the following disease is caused by an algal fungi?

(1) Smut of corn

(2) Powdery mildew of cereals

(3) Stripe rust of wheat

(4) Downy mildew of cereals

75. Viroids

(1) Have circular ssRNA enclosed by an envelope

(2) Cause disease in plants and animals

(3) Have RNA of high molecular weight

(4) Cause chrysanthemum stunt disease

76. Which of the following is not absent in viruses?

(1) Growth

(2) Protein synthesis machinery

(3) Mutation

(4) Meiosis

77. Methanogens are
(1) Obligate aerobes
(2) Obligate anaerobes
(3) Facultative aerobes
(4) Facultative anaerobes

78. Swarm cells in acellular slime mould fuse in pairs at the _____ ends
(1) Posterior (2) Anterior
(3) Lateral (4) Any

79. Which one of the following is incorrect statement regarding cyanobacteria?
(1) Oxygenic photosynthesis
(2) Cell wall has NAG and NAM and are gram positive
(3) Contain pigments phycobilins
(4) Reserve food is cyanophycean starch

Chapter - 3 : Plant Kingdom

1. Which of the following is **correct** statement for pteridophytes?
(1) Vascular tissue is devoid of phloem, contain only xylem
(2) They represent first heterosporous group
(3) Archegonial neck is made up of 6 vertical rows of cells
(4) In xylem true vessels are present

2. Elaters in *Marchantia* are _____
(1) Diploid without any thickening
(2) Haploid with spiral thickening
(3) Diploid with spiral thickening
(4) Haploid without any thickening

3. A class of algae characterised by having spermatangia and carpogonia and non-flagellated gametes contain which of the following as photosynthetic pigment?
(1) Chlorophyll b (2) Chlorophyll c
(3) Phycoerythrins (4) Floridean starch

4. Which of the following is true for embryogeny of *Selaginella*?
(1) Embryo is exoscopic and meroblastic
(2) Embryo is endoscopic and holoblastic
(3) Embryo is endoscopic and meroblastic
(4) Embryo is exoscopic and holoblastic

5. Match the following

	Column-I		**Column-II**
a.	Ectophloic siphonostele	(i)	*Marsilea*
b.	Amphiphloic siphonostele	(ii)	*Botrychium*
c.	Actinostele	(iii)	*Selaginella*
d.	Polystele	(iv)	*Lycopodium serratum*

(1) a(i), b(ii), c(iii), d(iv) (2) a(ii), b(i), c(iv), d(iii)
(3) a(iii), b(ii), c(iv), d(i) (4) a(iv), b(iii), c(ii), d(i)

6. Which of the following statement is **incorrect**?
(1) In *Selaginella* exosporic 13-celled male gametophyte is produced
(2) The individual unit of the stele of *Dryopteris* is meristele
(3) False indusium is found in *Adiantum* species
(4) In the prothallus of *Dryopteris* the antheridia are present among rhizoids

7. Which of the following is **incorrect** w.r.t. *Pinus*?
(1) Male cones are homologous to dwarf branches
(2) Each ovuliferous scale bears only single ovule
(3) Each microsporophyll bears two microsporangia
(4) Male gametophyte has two prothalial cells

8. In the life cycle of angiosperms the meiosis occurs at the time of
(1) Gamete formation
(2) Spore formation
(3) Development of male gametophyte
(4) Germination of zygote

9. Which of the following is not true w.r.t. *Chlamydomonas*?
(1) Single cup shaped chloroplast contains single pyrenoid
(2) Each *Chlamydomonas* cell contains single contractile vacuole
(3) Life cycle is haplontic
(4) Cell wall is made up of glycoprotein

10. Choose **correct** statement
(1) *Harveyella* is red algae and it is parasitic on other red algae
(2) *Harveyella* is red algae and it is parasitic on green algae
(3) Carrageenin is thickening and binding agent found in the cell wall of brown algae
(4) Red rust of tea is caused by *Cephaleuros virescence* which is a red algae

11. When there is no pith in the centre and central most part is occupied by xylem which is present in the form of radiating arms. Such type of stele is called as _____ and is present in _____
(1) Plectostele, *Rhynia*
(2) Amphiphloic siphonostele, *Osmunda*
(3) Actinostele, *Lycopodium serratum*
(4) Haplostele, *Lycopodium clavatum*

12. Angiosperms differ from gymnosperms in the absence of
(1) Double fertilization
(2) Sieve tubes
(3) Companion cells
(4) Haploid endosperm

13. Out of the following which one is **correct**?
(a) *Batrachospermum* is a red algae but not red in colour
(b) *Chlamydomonas braunii* reproduces by anisogamy
(c) Chlorophyll 'e' is found in members of xanthophyceae and chlorophyll 'd' in members of rhodophyceae
(1) (a), (b) & (c) (2) Both (b) & (c)
(3) Both (a) & (b) (4) (b) only

14. Heterosporous non-archegoniate plants are characterized by the
(1) Direct fertilization (2) Double fertilization
(3) Zooidogamy (4) Haplontic life cycle

15. Red algae is different from brown algae
(1) In presence of chlorophyll - a
(2) In presence of phycocolloids
(3) In not having the isogamous and anisogamous reproduction
(4) In absence of phycoerythrin

16. The important characteristic feature of brown algae is/ are
(a) Laterally inserted flagella
(b) Heterokont condition
(c) Presence of fucoxanthin
(d) Isokont condition
(1) (a) and (d) (2) (b), (c) and (d)
(3) (a), (b) and (c) (4) Only (c)

17. Total number of zygospores required for the formation of 80 daughter filaments in *Spirogyra* are
(1) 20 (2) 80
(3) 40 (4) 320

18. Pollen grains of *Cycas* and *Pinus* are pollinated by air in
(1) 13 and 4 celled stage respectively
(2) 4 and 3 celled stage respectively
(3) 3 and 4 celled stage respectively
(4) 4 & 13 celled stage respectively

19. In *Funaria*, rhizoids are
(1) Tubular
(2) Tuberculate
(3) Tubular and tuburculate
(4) Multicellular, branched with oblique septa

20. Basal swollen part of ligule of *Selaginella* leaf is called
(1) Suspensor (2) Glossopodium
(3) Organ suigeneris (4) Tuber

21. *Pinus* ovule is
(1) Unitegmic and trilayered
(2) Unitegmic and tetralayered
(3) Bitegmic
(4) Tritegmic

22. In *Funaria hygrometrica*
(1) Apophysis has columella and air sacs
(2) Outer peristome teeth are hygroscopic in nature
(3) All cells of sporophyte undergo reduction division
(4) Protonema is formed when zygote develops

23. Oogamy is the most advanced type of sexual reproduction which is observed in all, **except**
(1) All atracheophytic embryophytes
(2) All atracheophytic non-embryophytes
(3) All tracheophytic embryophytes
(4) All marine rhodophytes

24. Find **odd** one w.r.t. laminarian starch
(1) *Fucus* (2) *Sargassum*
(3) *Ulva* (4) *Macrocystis*

25. During scalariform conjugation the entire conjugation tube is made by
(1) The cell containing male gamete
(2) The combined activity of both of the parental cells
(3) The cell containing female gamete
(4) The two cells of same filament

26. Bryophytes seldom grow tall. It is due to the absence of
(1) Xylem but not phloem
(2) Rhizoids
(3) Mechanical tissue
(4) Haplodiplontic life cycle

27. Pteridophytes, gymnosperms and angiosperms are embryophytic plants. All members of these groups have
(1) Seeds
(2) Heterosporous condition only
(3) Archegonia
(4) Stele

28. Which of the following feature is peculiar to *Selaginella* among the member of lycopsida?
(1) Rhizophore
(2) Biflagellate male gamete
(3) Root, stem & leaves
(4) Ligule

29. Match the following

	Column I		**Column II**
a.	Ciliated sperm	(i)	*Ephedra*
b.	No archegonium	(ii)	*Pinus*
c.	Cold resistant enzymes	(iii)	*Ginkgo*
d.	Largest pollen chamber	(iv)	*Gnetum*

(1) a-(i), b-(iii), c-(ii), d-(iv)
(2) a-(ii), b-(i), c-(iv), d-(iii)
(3) a-(iv), b-(iii), c-(i), d-(ii)
(4) a-(iii), b-(iv), c-(ii), d-(i)

30. Gemma found in *Marchantia* is meant for
(1) Absorption of nutrients from the soil
(2) Retaining moisture
(3) Protecting growing apex
(4) Vegetative reproduction

31. Select the **correct** order of arrangement
(1) Microsporophyll, Microsporangium, Microspore, Generative cell, Microgamete
(2) Microsporangium, Microsporophyll, Microspore, generative cell, Microgamete
(3) Microsporophyll, Microsporangium, Generative cell, Microspore, Microgamete
(4) Microsporophyll, Microsporangium, Microspore, Microgamete, Generative cell

32. *Dryopteris* differs from conifers in
(1) Showing asiphonogamy and zooidogamy
(2) Ploidy status of main plant body
(3) Presence of stele and sporic meiosis
(4) Having heteroxylous wood

33. Bryophytes are similar to pteridophytes in
(1) Having dominant sporophytic phase
(2) Having multi-celled parasitic gametophyte
(3) The production of two kinds of spores
(4) Having independent multi-celled gametophyte

34. What is **incorrect** for fern prothallus?
(1) Multicellular and photosynthetic
(2) Do not have rhizoids
(3) Monoecious and heart shaped
(4) Absence of vascular tissues

35. Which of these is **not** a feature of *Pinus*?
(1) Clear dimorphism in stem branches
(2) Absence of root cap and root hairs in mycorrhizal root
(3) Excurrent habit but not well adapted to xeric conditions
(4) Needle like leaves with thick cuticle and sunken stomata

36. Mature pollen grain at the time of its release from microsporangium in **Cycas** has
(1) Prothallial cell, tube cell and body cell
(2) Prothallial cell, tube cell and generative cell
(3) Two prothallial cells and one tube cell
(4) Prothallial cell, generative cell and body cell

37. The cell wall of green algae is composed of
(1) Cellulose and pectin
(2) Cellulose and NAM
(3) Pectin & phycocolloids
(4) Chitin

38. Smallest group of plant kingdom
a. Does not possess antheridia
b. Have direct pollination
c. Has porous wood always
d. Form haploid endosperm and fruit
(1) Only a, b are correct
(2) Only a and c are correct
(3) Only b and d are correct
(4) Only b and c are correct

39. Gymnosperms differ from pteridophytes like *Selaginella* in
(1) Presence of heterospory
(2) Absence of pollination
(3) Absence of ovules
(4) Absence of free living independent gametophyte

40. Male cones of *Pinus* are homologous to
(1) Shoot of unlimited growth
(2) Spur shoot
(3) Dwarf branches
(4) More than one option is correct

41. Members of class rhodophyceae

a. Are always multicellular

b. Are always photosynthetic

c. Are always devoid of flagella

d. Are always red in colour

(1) a and b are incorrect

(2) c and d are incorrect

(3) Only c is incorrect

(4) a, b, d are incorrect

42. In neuromotor apparatus of *Chlamydomonas*, rhizoplast

(1) Connects both blepharoplast

(2) Connects nucleus and centrosome

(3) Connects one blepharoplast with centrosome

(4) Connects blepharoplast with paradesmose

43. Which one is never found in algae?

(1) Sex organs (2) Parasitism

(3) Embryo (4) Gametic meiosis

44. A common feature of *Cycas* and *Dryopteris* is presence of

(1) Tap roots (2) Transfusion tissue

(3) Cone (4) Circinate ptyxis

45. Which of the following are demerits of Bentham and Hooker system of classification?

(1) Angiosperms were placed between dicot and monocot

(2) Orchidaceae have been considered as primitive

(3) Renales have been given a primitive position

(4) It has practical utility

46. The class Gymnospermae is characterised by all, **except**

(1) Heterosporous

(2) Ovule without integument

(3) Seeds are naked

(4) Endosperm is haploid

47. Choose **wrong** statement for Adansonian taxonomy

(1) It uses statistical methods

(2) All selected characters are given unequal importance

(3) Use of computers

(4) It is also known as taximetrics

48. Thallophyta possesses

(1) Undifferentiated plant body

(2) Jacketed reproductive organs

(3) Well developed embryo stage

(4) Asexual reproduction by meio spores

49. Among the following

a. Filamentous fresh water algae

b. Commonly known as frog spawn alga

c. Female sex organ is carpogonia

d. Male gametes are flagellated

e. Colour is blue-green to purple

The **correct** for *Batrachospermum* is

(1) a, b, c, d and e (2) a, b, c and d

(3) a, b, c and e (4) c, d and e

50. Gametes are pyriform and bear two laterally attached flagella in

(1) Chlorophyll-c containing multicellular algae

(2) Chlorophyll-c containing unicellular algae

(3) Chlorophyll-b containing fresh water algae

(4) Chlorophyll-a and b containing marine algae

51. Choose **incorrect** match

(1) *Spirogyra* – Ribbon like chloroplast

(2) *Ulothrix* – Girdle like chloroplast

(3) *Chara* – Star like chloroplast

(4) *Chlamydomonas* – Cup shaped chloroplast

52. Choose **correct** one from the main characteristics common in all divisions of algae

(1) Chlorophyll-a, chl. b and carotene

(2) Chlorophyll-a, chl. b and xanthophyll

(3) Carotenoids and chlorophyll-a

(4) Carotenoids and chlorophyll-b

53. Sexual reproduction by oogamy that is accompanied by complex post fertilization development is the feature of

(1) Blue green algae (2) Green algae

(3) Brown algae (4) Red algae

54. Choose **wrong** statement

(1) The plant body of bryophytes is less differentiated than that of algae

(2) The main plant body of bryophyte is haploid

(3) The sporophyte in moss is partially dependent on gametophyte

(4) Rhizoids in liverworts are unicellular

55. The specialized structures called gemmae are

(1) Green, multicellular asexual bodies

(2) Non-green, unicellular asexual bodies

(3) Non-green, multicellular, sexual structures present in male as well as female thalli

(4) Formed in small closed cavity called gemma cup

56. Choose **incorrect** statement regarding leafy liverworts
(1) Male gametes are biflagellate and spirally coiled
(2) Sporophyte depends on gametophyte
(3) Juvenile gametophyte, formed by germination of spore is filamentous structure called protonema
(4) Fertilization is called syngamy

57. The positive evidence to aquatic ancestry of bryophytes is
(1) Green diploid main plant body
(2) Heterosporous condition
(3) Ciliated sperms
(4) Presence of saprophytic forms

58. Which of the given algal masses is specifically called coenobium, and have a fix number of members in a colony?
(1) *Volvox* (2) *Spirogyra*
(3) *Chlamydomonas* (4) *Ulva*

59. Hypnospores of *Chlamydomonas* causes _____; while *Cephaleuros* causes _____.
(1) Red rust, red snow (2) Red snow, red rust
(3) Red tide, red rot (4) Red rot, red snow

60. Elaters of *Marchantia* are responsible for spore dispersal and these structures are
(1) 2n and develop from cells of archegonia
(2) 2n and develop from zygote directly
(3) 2n and develop from spore mother cells
(4) n and develop from rhizoids

61. What will be the number of chromosomes in theca cells, operculum cells, apophysis cells and columella cells, if the cell of neck canal has 20 chromosomes?
(1) 20, 20, 20, 20 (2) 40, 40, 40, 40
(3) 20, 20, 40, 40 (4) 40, 40, 20, 20

62. None of the member of cryptogamae show
(1) Heterospory
(2) Diplontic life cycle
(3) Integumented megasporangium
(4) Xylem with vessels

63. What is **correct** for the non-vascular amphibians of plant kingdom?
(1) Gametophyte completely or partly dependent upon sporophyte
(2) First spermatophytes
(3) Sperms show chemotropic movement
(4) Have great ecological importance but little economic importance

64. The most advanced group of plants have seeds present inside the pericarp. Out of the following features
a. Monoecious gametophyte
b. Pistil as female sex organ
c. Phloem with sieve cells only
d. Diplontic life cycle
e. Pollination mostly through wind

The **correct** ones for these plants are
(1) b, d & e (2) Only b & d
(3) a, d & e (4) Only a & c

65. A plant that forms yellow clouds in the forest is also found to produce
(1) Winged pollen, winged seed, multicotyledonary embryo
(2) Largest ovule, largest egg, coralloid root
(3) Heteroxylous wood, bitegmic ovule, absence of archegonia
(4) Closed vascular bundle, mycorrhizal root, diploid endosperm

66. In *Pinus*
(1) Seeds are winged
(2) Fruits are winged
(3) Pollen are winged
(4) More than one option is correct

67. Isomorphic diplo-haplontic life cycle is shown by
(1) Bryophytes, pteridophytes and some algae
(2) Some green and brown algae
(3) All brown and red algae
(4) Some bryophytes and algae

68. Out of the following statements
a. Food reserve is laminarin starch and mannitol
b. Plant body in several members divided into hold fast, stipe and frond
c. Presence of phycobilin pigments
d. Gametes have two anteriorly placed whiplash flagella
e. Female sex organ is called carpogonium

The **correct** statements for algae that possess non-sulphated phycocolloids in their cell wall are
(1) a & b (2) c & e
(3) a, c & d (4) b, d & e

69. A characteristic feature present in true mosses but not found in other bryophytes is
(1) Independent gametophyte
(2) Presence of leafy shoot
(3) Protonemal stage in life-cycle
(4) Gemma formation

70. Match the column

Column I		Column II	
a.	Sporocarp	(i)	*Dryopteris*
b.	Rhizophore	(ii)	*Marsilea*
c.	True indusium	(iii)	*Adiantum*
d.	False indusium	(iv)	*Selaginella*

(1) a(ii), b(iv), c(i), d(iii) (2) a(ii), b(iv), c(iii), d(i)

(3) a(iv), b(i), c(iii), d(ii) (4) a(iv), b(i), c(ii), d(iii)

71. A pair of characteristics not associated with *Selaginella* are

(1) Cespitose habit, heterospory

(2) Chemotaxis, seed habit

(3) Exosporic male gametophyte, holoblastic embryogeny

(4) Bulbil formation, heterophilly

72. Haploid stage formed in *Pinus* male cone

(1) Has wings formed by ovuliferous scale

(2) Forms the sulphur shower

(3) Produces flagellated sperms

(4) Forms compact strobili

73. A characteristic feature of gymnosperms is production of pollination drop. It is required to facilitate

(1) Anemophily

(2) Entomophily

(3) Rapid pollen germination

(4) Siphonogamy

74. Zooidogamous type of fertilization is shown by

(1) Bryophytes and angiosperms

(2) Bryophytes and pteridophytes

(3) Pteridophytes and gymnosperms

(4) Gymnosperm and angiosperm

75. Choose the **odd** out w.r.t. liverworts

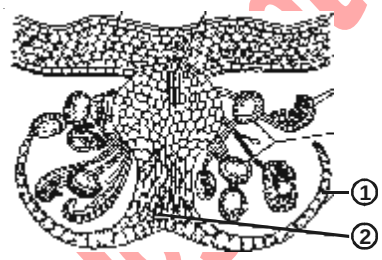
(1) Multicellular, branched rhizoids

(2) Possess scales on ventral surface

(3) Reproduce through progressive death and decay

(4) Sporophyte is completely dependent

76. Label 1 and 2 in the figure of T.S. of sorus



(1) Sporangium, Mesophyll cells

(2) Indusium, Placenta

(3) Placenta, Indusium

(4) Mesophyll cells, Sporangium

77. The feature of *Cycas* which resembles the dicots is

(1) Reticulate venation

(2) Seeds with 2 cotyledons

(3) Presence of vessels

(4) Top-shaped multicilliate male gamete

78. The most accepted natural system of classification

(1) Is post-Darwinian in concept

(2) Dicotyledons are placed after monocotyledons

(3) Dicotyledons are divided into 3 sub-classes : Polypetalae, Gamopetalae and Monochlamydeae

(4) Monocotyledons end with microspermae including orchidaceae

ZOOLOGY

Chapter 1 : Animal Kingdom

1. Insects have

(1) Head, thorax and abdomen, three pairs of jointed appendages which arise from abdomen

(2) Cephalothorax, one pair of antenna and chitinous exoskeleton

(3) Head, thorax and abdomen, one pair of antenna and 3 pairs of jointed legs which arise from thoracic segments

(4) No antennae

2. Which of the following animal has green glands and biramous appendages?

(1) Cray fish (2) Silver fish

(3) Scorpion (4) Mosquito

3. The body symmetry and coelom are similar in
   (1) Annelids and sponges
   (2) Annelids and liver fluke
   (3) Annelids and arthropods
   (4) Mollusca and echinodermata

4. Osphradium of *Pila* is
   (1) Tangoreceptor (2) Photoreceptor
   (3) Masticatory apparatus (4) Chemoreceptor

5. Which of the following is **not** a character of echinoderms?
   (1) Larvae are bilaterally symmetrical but the adults have radial symmetry
   (2) Presence of water vascular system which is a part of coelom
   (3) Tube feet also serve as equivalents to gills during respiration
   (4) All marine, triploblastic with schizocoelom

6. Which of the following is not a character of hemichordata?
   (1) Open circulatory system
   (2) Stomochord present which is mesodermal in origin
   (3) Excretory organ is proboscis gland
   (4) Respiration takes place through the gills

7. Which of the following is a characteristic feature of cnidoblasts?
   a. They are used for anchorage, defense and for the capture of the prey
   b. Are absent in the region of basal disc
   c. Once discharged cannot be reused
   d. New cnidoblasts are formed from interstitial cells
   (1) a only (2) a and d
   (3) a, b and c (4) a, b, c and d

8. Retrogressive metamorphosis is exhibited by
   (1) Ammocoete larva (2) Tornaria larva
   (3) Ascidian tadpole (4) Trochophore larva

9. Mark the **incorrect** match w.r.t. excretory organ
   (1) Urochordates – Neural gland
   (2) Cephalochordates – Solenocytes
   (3) Cyclostomes – Proboscis gland
   (4) Osteichthyes – Kidney

10. There are ampullary pores on the snout of *Scoliodon*. Each pore leads to ampullary duct and then into Ampulla of *Lorenzini*. They have
   (1) Olfactoreceptors (2) Thermoreceptors
   (3) Chemoreceptors (4) Rheoreceptors

11. Pigeons milk is
   (1) Secreted by pigeon only
   (2) Secreted by crop in birds through out the year
   (3) Nutritive secretion produced by crop glands in birds during breeding season
   (4) Oily secretion secreted by uropygial gland present at tail base

12. Mark the **correct** statement
   (1) Cranium (Brain box) is present in all chordates
   (2) Metamerism is found in chordates
   (3) Two pairs of pentadactyl limb present in all tetrapods
   (4) Dissection of vertebrates is always from dorsal site

13. Given below are four matchings of an animal and its kind of excretory organ
   a. Insects – Malpighian tubules
   b. *Planaria* – Flame cells
   c. Cray fish – Green glands
   d. *Achatina* – Organ of Bojanus
   The correct matchings are
   (1) a and d (2) a, b and c
   (3) b and d (4) a, b, c and d

14. The appropriate sequence of numbered animals from column II matching with the sequence of characteristics in column I is

Column I	**Column II**
❖ The mouth contains a file-like rasping organ	a. *Ancylostoma*
❖ Dioecious, possess lateral appendages parapodia which help in swimming	b. *Pheretima*
❖ Monoecious, botryoidal tissue	c. *Pila*
❖ Triploblastic, pseudoc-oelomate	d. *Hirudinaria*
	e. *Nereis*

   (1) c, a, d, e (2) c, a, e, d
   (3) c, e, d, a (4) a, c, b, e

15. Which of the following is **not** a characteristic of phylum ctenophora?
   (1) They are exclusively marine, radially symmetrical animals
   (2) They move by cilia, which join together to form eight median comb plates
   (3) When the tentacles are present they are two in number and contain cnidoblasts
   (4) Reproduction takes place only by sexual means

16. Which one of the following phylum is **correctly** matched with its general characteristics?

(1) Porifera – Choanocytes or collar cells line spongocoel and canals. Sexes are usually separate, fertilisation external.

(2) Mollusca – Mollusca are basically oviparous and development is through planula larva

(3) Arthropoda – They have a segmented body. The body consists of head, thorax and abdomen, in same cases, head and thorax may be fused to form cephalothorax.

(4) Echinodermata – Sexes are separate. Reproduction is sexual. Fertilization is usually internal.

17. Aristotle's lantern in *Echinus* is

(1) Photoreceptor

(2) Masticatory apparatus

(3) Bioluminescent structure

(4) Locomotory structure

18. Which of the following **incorrect** match between disease, casual organism, medium of transfer and symptoms?

Disease	Causal organism	Medium of transfer	Symptoms
(1) Ascariasis	*Ascaris*	Through contaminated vegetables fruits and water	Internal bleeding/ Muscular pain/ Anaemia/ Fever and blockage of intestine.
(2) Amoebiasis	*Entamoeba histolytica*	Drinking water and food contaminated with faecal matter.	Stools with excess of mucous and blood.
(3) Malaria	*Plasmodium vivax*	Female *Anopheles*	Chill and high fever recurring after 48 hours
(4) Elephantiasis	*Wuchereria*	Round worm	Lymphatic vessels of lower limb affected.

19. Mark the incorrect one w.r.t. phylum and typical larvae

(1) Glochidium – Mollusca

(2) Trochophore – Annelida

(3) Parenchymula – Coelenterata

(4) Bipinnaria – Echinodermata

20. Tissue level of organisation with division of labour appears first in phylum?

(1) Porifera (2) Cnidaria

(3) Annelida (4) Platyhelminthes

21. Cartilaginous fishes have to swim continuously to avoid sinking but the bony fishes do not face this problem due to presence of

(1) Stream lined body

(2) Operculum

(3) Swim bladder (air bladder)

(4) Terminal mouth

22. Match the columns

	Column I	Column II
a.	*Neopilina*	(i) Connecting link between annelida and mollusca
b.	*Peripatus*	(ii) Connecting link between annelida and Arthropoda
c.	*Lepidosiren*	(iii) South American lung fish
		(iv) African lung fish
d.	*Protopterus*	(v) Australian lung fish

(1) a(ii), b(i), c(iii), d(iv) (2) a(i), b(ii), c(iii), d(iv)

(3) a(ii), b(i), c(v), d(iii) (4) a(i), b(ii), c(iv), d(v)

23. Some comparison between protostomes and deuterostomes is given below, which one is wrong?

	Protostomes		Deuterostomes
(1)	Blastopore forms mouth	–	Blastopore forms anus
(2)	Pattern of cleavage is radial	–	Pattern of cleavage is spiral
(3)	Fate of cleavage can be determinate	–	Fate of cleavage is indeterminate
(4)	Schizocoel coelom	–	Enterocoel coelom

24. Find out the incorrect statement

(1) *Fasciola* causes a disease known as liver rot

(2) In *Fasciola*, metacercaria is the infective stage for the secondary host

(3) In *Taenia*, shedding of gravid proglottids is termed as apolysis

(4) Rostellum and hooks are absent in *T. saginata*

25. The class cephalopoda amongst molluscs is known for bearing all the given features listed below except one

(1) Presence of closed circulatory system

(2) Presence of internal shell

(3) Presence of ink sac

(4) Presence of hectocotylised arm, used by female to transfer zygotes in water

26. Female *Ascaris* differs from male *Ascaris* in all the following features except one
(1) Presence of anus
(2) Absence of pineal spicules
(3) Absence of pre and post anal papillae
(4) Presence of amphids on ventrolateral lips

27. Cestodes differ from other classes of platyhelminthes in showing property of
(1) Ladder like nervous system
(2) Pseudometamerism
(3) Absence of cephalisation
(4) Presence of incomplete digestive system

28. Arthropods show a number of structures in different classes meant for the purpose of respiration mentioned below except one
(1) Book lungs (2) Gill books
(3) Trachae (4) Ctenidia

29. One of the following statements given below is not related with success of reptiles on land
(1) Internal fertilisation
(2) Development of amniotic cavity around the embryo
(3) Laying of cleidoic eggs
(4) Presence of long tail

30. One of the following features of aves may not be considered as a contributory factor in reducing the weight of body
(1) Presence of single ovary
(2) Presence of four chambered heart
(3) Absence of urinary bladder
(4) Pneumatic bones

31. Presence of single median nostril is a characteristic feature of
(1) Chondrichthyes (2) Osteichthyes
(3) Cyclostomes (4) Lung fishes

32. Common feature of earthworm and cockroach is
(1) Hermaphroditism
(2) Ventral nerve cord
(3) Excretion by nephridia
(4) Moulting of cuticle

33. Bidder's canal is found in
(1) Spiracles of Cockroach
(2) Kidney of frog
(3) Kidney of rat
(4) Malpighian tubules of cockroach

34. Mark the correct statement :
(1) All chordates are vertebrates
(2) All vertebrates are chordates
(3) All triploblastic are coelomates
(4) Haemocoel and pseudocoel is a type of eucoelom

35. Connecting link between amphibia and reptilia was
(1) Lycaenops (2) Seymouria
(3) Synapsida (4) Anapsida

36. Lateral line system is well developed in bony fishes, formed by sensory neuromast cells. These are
(1) Tactoreceptor
(2) Chemoreceptor
(3) Similar to Jacobson's organ in function
(4) Rheoreceptor

37. Tube feet/podia of the echinoderm is related to
(1) Locomotion
(2) Respiration
(3) Excretion
(4) All of these

38. Which of the following is not the characteristic of open circulatory system?
(1) Low pressure system
(2) Blood conveyed directly to the organs without formation of capillaries
(3) Blood returns to the heart rapidly
(4) Found in most arthropod and non-cephalopod molluscs

39. Vertebrate with monocondylic skull, 12-pairs cranial nerves, amniote and only right systemic arch present are
(1) Pisces (2) Aves
(3) Amphibians (4) Reptiles

40. All of the following are characters of cephalochordates except
(1) Members are commonly called as *Lancelets*
(2) Filter feeder, no scales over the body
(3) Numerous gonads with long gonoduct
(4) Excretory organs-Protonephridia with solenocytes

41. Find out the incorrect statement w.r.t. flatworms
(1) Lack of alimentary canal in all
(2) Mouth ventral and the pharynx is protrusible in *Planaria*
(3) Redia and metacercaria stages are absent in *Schistosoma*
(4) Triploblastic, acoelomate

42. The hypothetical ancestor of sponge is
(1) *Scypha* (2) *Euplectella*
(3) *Olynthus* (4) *Cliona*

43. Cerebral or fatal malignant malaria is caused by
(1) *Plasmodium vivax* (2) *P. ovale*
(3) *P. malariae* (4) *P. falciparum*

44. Which of the following is **not** a character of amphibians?
(1) Body is divided into head and trunk there is no neck
(2) A tympanum is present in place of external ear
(3) The amphibian skin is moist and naked (without scales)
(4) Pentadactyl limbs with claws

45. Which of the following statement is **wrong** about mammals?
A. External ears or pinnae are present in all mammals without exception
B. Teeth are present in sockets
C. The most advanced mammals are the primates and they have opposable thumb
D. Testis are present in scrotal sacs in monotremes
(1) A only (2) A and B
(3) A and D (4) D only

46. Which of the following phase of schizogony does not take place inside RBC in the asexual life cycle of *Plasmodium*?
(1) Pre erythrocytic schizogony
(2) Exo erythrocytic schizogony
(3) Post erythrocytic schizogony
(4) All of these

47. Mark the correct match w.r.t. types of amoebocytes and their function in poriferans.
(1) Archaeocytes - Undifferentiated 'totipotent' cells
(2) Trophocytes - Store food granules
(3) Collenocytes - Closing and opening of osculum
(4) Myocytes - Secrete collagen fibres

48. Unsegmented worm like body, triploblastic nature of body wall, complete alimentary canal, bilateral symmetry and excretion by renette cell are the characteristic features of which phylum?
(1) Platyhelminthes (2) Aschelminthes
(3) Ctenophora (4) Coelenterata

49. Mammilated egg of *Ascaris* of oval in shape with three protective covering. Mark the correct sequence from outer to inner
(1) Chitnous shell, protein, esterified glycosides
(2) Protein, chitinous shell, esterified glycosides
(3) Esterified glycosides, protein, chitinous shell
(4) Protein, esterified glycosides chitinous shell

50. In ascon type of canal system the course of water is as follows:
Water $\rightarrow$ ostia $\rightarrow$ X $\rightarrow$ Y $\rightarrow$ outside.
X and Y are respectively
(1) Osculum, spongocoel
(2) Spongocoel, osculum
(3) Radial canal, osculum
(4) Spongocoel, radial canal

51. Protozoans differ from poriferans on the basis of following points except one. Mark the **except** one
(1) Sub-cellular level of organisation
(2) Absence of canal system
(3) Intracellular digestion
(4) Presence of contractile vacuole in fresh water protozoans

52. Mark the feature which can't be associated with *Paramecium*
(1) Surface feeder
(2) Asexual reproduction occurs by longitudinal binary fission
(3) Shows nuclear dimorphism
(4) Two contractile vacuoles

53. Mark the characters which evolved for the first time in Annelida
a. Mesoderm
b. True coelom
c. Metamerism
d. Closed blood circulation
(1) b & c (2) a, b & c
(3) b, c & d (4) a, b, c & d

54. Match the animal of column I with the suitable of column II

Column I	**Column II**
a. *Nereis*	(i) Botryoidal tissue
b. *Chaetopterus*	(ii) Blood worm
c. *Tubifex*	(iii) Bioluminescence
d. Leech	(iv) Trochophore

(1) a(iv), b(ii), c(iii), d(i) (2) a(iv), b(iii), c(ii), d(i)
(3) a(iv), b(i), c(iii), d(ii) (4) a(ii), b(iv), c(iii), d(i)

55. Mark the characters which suggest that molluscs have descended from the annelids
a. Presence of trochophore larva in some molluscs
b. Presence of ganglia, nerve ring and nerve cord
c. Presence of haemocoel
d. Segmentation in some molluscs
(1) Only a (2) b & c
(3) a & d (4) a, c & d

56. *Peripatus* (walking worm) is connecting link between Annelida and Arthropoda and sharing the characters of both. Choose the annelidan characters present in *Peripatus*
a. Segmentally arranged nephridia
b. Unjointed, stumpy legs
c. Ciliated genital duct
d. Haemocoel
(1) Only a (2) a & d
(3) a, b & c (4) a, b & d

57. Choose correct statements regarding *Latimeria* (coelacanth)

a. A living fossil

b. Oldest among living fishes

c. Connecting link between fish and amphibia

d. Belongs to group crossopterygii from which perhaps amphibian have evolved

(1) a & b (2) Only c

(3) a, b & c (4) a, b, c & d

58. Reptiles are the first true land vertebrates. Mark the characters which help the reptiles in leading successful land life

a. Dry, scaly and glandless skin

b. Internal fertilization

c. Presence of amnion

d. Leathery shelled calcareous eggs

(1) Only c (2) b & c

(3) a, b & c (4) a, b, c & d

59. Birds are truly flying vertebrates characterised by following characters except

(1) Are feathered bipeds

(2) Forelimbs are modified into wings and each foot usually bears four clawed toes

(3) Exoskeleton consists of feathers, scales and claws which are dermal derivatives

(4) Synsacrum is a fused bone formed by fusion of posterior thoracic, lumbar, sacral and anterior caudal vertebrae.

60. Mark the correct statements related to birds

a. Bones spongy and pneumatic

b. Developed marrow canal

c. Monocondylic skull

d. Opisthocoelous centrum

(1) a & b (2) a & c

(3) a, b & c (4) a, b, c & d

61. Amphibia represents

(1) Reduced hepatic portal and developed renal portal systems

(2) Reduced renal portal and developed hepatic portal systems

(3) Well developed both hepatic portal and renal portal systems

(4) Absence of both hepatic portal and renal portal systems

62. Mollusca represents 2nd largest phylum of animalia. From given statements mark incorrect w.r.t. mollusca

a. All have soft segmented body which is differentiated into head, foot and visceral mass

b. Visceral mass covered by mantle/pallium

c. Generally open type blood vascular system, except cephalopods

d. Eucoelomate with enterocoel coelom

(1) a & c

(2) a & d

(3) c & d

(4) All statements are correct

63. Quill feathers at the base of quill wings are called _____ and help in _____

(1) Barbules ; flying

(2) Rectrices ; insulation

(3) Remiges ; flying

(4) Rectrices ; covering body

64. Birds and mammals have many similarities between their blood vascular system but in birds blood circulation can be identified by

a. Four chambered heart

b. Only left systemic arch persists

c. Small, oval and nucleated RBC

d. Maximum RBC/mm^3 of blood

(1) Only b (2) b and c

(3) b, c and d (4) c and d

65. Which of the follwing can be taken as the distinct character of krait (the poisonous snake)?

(1) Third supralabial scale is largest

(2) Fourth infralabial scale is largest

(3) Single row of hexagonal ventrals

(4) Both (2) & (3)

66. Double vagina and uterus are characteristic of

(1) Egg laying mammals

(2) Eutherian mammals

(3) Marsupial mammals

(4) Placental mammals

67. Which of the following acts as the link between air bladder and internal ear in osteichthyes?

(1) Neuromast organ (2) Maltase cross

(3) Ampulla of Lorenzini (4) Weberian ossicles

68. Amphibia represents smallest vertebrate class with fresh water inhabitants and called dual life vertebrates, characterised by

(1) Reduced hepatic portal and developed renal portal

(2) Reduced renal portal and developed hepatic portal

(3) Both hepatic portal and renal portal system are well developed

(4) Both hepatic portal and renal portal system are absent

69. Features which make reptiles truly land vertebrates is/are

a. Development of ribs and scales
b. Development of amnion
c. Development of internal fertilisation
d. Monocondylic skull

(1) a, b and c (2) a and b
(3) b and c (4) a, b, c and d

70. Bird's lungs are provided with additional air sacs which are related with all of the following **except** one. Mark it

(1) Increase area for gaseous exchange
(2) Provide fresh air to lung both during inspiration and expiration
(3) Reduce body weight
(4) Provide internal cooling

71. Which of the statement regarding digestive tract and urinogenital tract related to prototherian, metatherian and eutherian is correct?

(1) In prototheria, a single aperture of digestive and urinogenital tract called cloaca
(2) In metatherian, separate anus and urinogenital aperture with separate sphincter
(3) In eutherian, separate anus and urinogenital aperture but with common sphincter
(4) In all of the above three anus and urinogenital apertures are separate with separate sphincter

72. Type of digestion that occurs in the coelentrates is

(1) First intra and then, extracellular digestion
(2) First extra and then, intracellular digestion
(3) Only extracellular digestion
(4) Only intracellular digestion

73. Which of the following character can't be related to phylum **Ctenophora**?

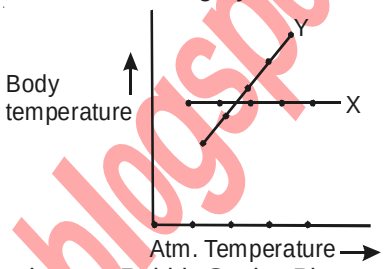
(1) Exclusively marine
(2) Well marked power of regeneration
(3) Well marked bioluminescence
(4) Asexual reproduction by budding

74. Find out the correct statement w.r.t. bony fishes

a. Mesonephric kidneys and mainly ammonotelic
b. Four pairs of gills, covered by operculum
c. Mouth is ventrally placed
d. Swim bladder, arising from dorsal wall of oesophagus

(1) a and c (2) a, b and d
(3) c and d (4) a, b, c and d

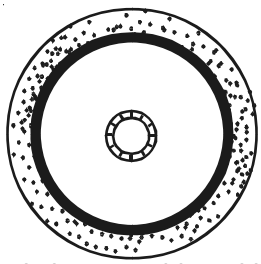
75. Given below are few animals which are categorised as X and Y in a given graph. Short list those animals which fall under the category of X.



Frog, Earthworm, Rabbit, Snake, Pigeon, Cow, Lizard, Tiger.

(1) Pigeon, rabbit, frog, cow
(2) Tiger, cow, earthworm, pigeon
(3) Lizard, snake, cow, tiger
(4) Rabbit, pigeon, cow, tiger

76. The figure represents the internal body plan of which phylum ?



(1) Platyhelminthes (2) Cnidaria
(3) Annelida (4) Echinodermata

77. The internal buds of freshwater sponges are otherwise called

(1) Choanocyte (2) Gemmule
(3) Osculum (4) Blastula

78. *Ascaris lumbricoid* shows

(1) Absence of sexual dimorphism but sexes are separate
(2) Digenetic endoparasite
(3) Body covered with cellular epithelium, having mononucleated condition
(4) Males are monorchic whereas females are didelphic

❑ ❑ ❑

ANSWERS

[PHYSICS]

Chapter 1.a) : Mathematical Tools

1. (2) 2. (1) 3. (3) 4. (3)

Chapter 1.b) : Units and Measurements

1. (3) 2. (2) 3. (2) 4. (1) 5. (1) 6. (4) 7. (3)
8. (2) 9. (1) 10. (3) 11. (1) 12. (3) 13. (4) 14. (4)
15. (4)

Chapter 2.a) :Motion in a Straight Line

1. (2) 2. (4) 3. (1) 4. (2) 5. (2) 6. (4) 7. (3)
8. (1) 9. (4) 10. (2) 11. (3) 12. (4) 13. (1) 14. (2)
15. (2) 16. (4) 17. (1) 18. (1) 19. (1) 20. (3) 21. (4)
22. (3) 23. (1) 24. (4)

Chapter 2.b) : Motion in a Plane

1. (3) 2. (2) 3. (2) 4. (1) 5. (1) 6. (4) 7. (2)
8. (2) 9. (1) 10. (4) 11. (3) 12. (2) 13. (2) 14. (1)
15. (1) 16. (3) 17. (3)

Chapter 3 : Laws of Motion(including Circular Motion)

1. (2) 2. (1) 3. (2) 4. (1) 5. (1) 6. (2) 7. (3)
8. (2) 9. (1) 10. (3) 11. (4) 12. (3) 13. (2) 14. (4)
15. (3) 16. (4) 17. (1) 18. (4) 19. (4) 20. (1) 21. (2)
22. (2) 23. (3) 24. (2) 25. (2) 26. (2) 27. (4) 28. (4)
29. (3) 30. (2) 31. (3) 32. (2) 33. (3) 34. (3) 35. (3)
36. (4) 37. (3) 38. (2) 39. (3) 40. (3) 41. (2) 42. (3)
43. (4)

Chapter 4 : Work, Energy and Power

1. (1) 2. (1) 3. (3) 4. (3) 5. (2) 6. (2) 7. (3)
8. (4) 9. (4) 10. (1) 11. (1) 12. (3) 13. (3) 14. (1)
15. (2) 16. (3) 17. (4) 18. (4) 19. (4) 20. (4) 21. (3)
22. (4) 23. (2) 24. (3) 25. (3) 26. (1)

[CHEMISTRY]

Chapter 1 : Some Basic Concepts of Chemistry

1. (4) 2. (4) 3. (2) 4. (3) 5. (2) 6. (4) 7. (4)
8. (3) 9. (2) 10. (2) 11. (2) 12. (4) 13. (2) 14. (2)
15. (3) 16. (3) 17. (2) 18. (2) 19. (1) 20. (3) 21. (3)
22. (1) 23. (1) 24. (2) 25. (2) 26. (2) 27. (3) 28. (2)
29. (1) 30. (4) 31. (2) 32. (3) 33. (2) 34. (4) 35. (3)
36. (1)

Chapter 2 : Structure of Atom

1.	(3)	2.	(2)	3.	(3)	4.	(1)	5.	(2)	6.	(2)	7.	(4)
8.	(1)	9.	(1)	10.	(2)	11.	(2)	12.	(4)	13.	(3)	14.	(1)
15.	(3)	16.	(2)	17.	(4)	18.	(1)	19.	(2)				

Chapter 3 : Classification of Elements and Periodicity

1.	(1)	2.	(2)	3.	(1)	4.	(4)	5.	(1)	6.	(3)	7.	(1)

Chapter 4 : Chemical bonding and Molecular Structure

1.	(2)	2.	(2)	3.	(4)	4.	(2)	5.	(1)	6.	(2)	7.	(4)
8.	(1)	9.	(3)	10.	(2)	11.	(1)	12.	(3)	13.	(4)	14.	(4)
15.	(4)	16.	(2)	17.	(3)	18.	(1)	19.	(4)				

Chapter 5 : States of matter Gases & Liquids

1.	(1)	2.	(2)	3.	(2)	4.	(3)	5.	(3)	6.	(3)	7.	(2)
8.	(2)	9.	(3)	10.	(4)	11.	(3)	12.	(3)	13.	(4)	14.	(1)
15.	(3)	16.	(2)	17.	(3)	18.	(2)	19.	(2)	20.	(1)	21.	(2)
22.	(2)	23.	(1)	24.	(3)	25.	(3)	26.	(3)	27.	(1)	28.	(1)
29.	(1)	30.	(1)	31.	(4)								

[BOTANY]

Chapter 1 : Living World

1.	(4)	2.	(1)	3.	(2)	4.	(3)	5.	(3)	6.	(3)	7.	(3)
8.	(1)	9.	(4)										

Chapter 2 : Biological Classification

1.	(1)	2.	(4)	3.	(3)	4.	(3)	5.	(3)	6.	(4)	7.	(3)
8.	(4)	9.	(3)	10.	(4)	11.	(2)	12.	(3)	13.	(3)	14.	(2)
15.	(2)	16.	(3)	17.	(2)	18.	(2)	19.	(1)	20.	(2)	21.	(2)
22.	(3)	23.	(3)	24.	(2)	25.	(2)	26.	(1)	27.	(3)	28.	(1)
29.	(1)	30.	(1)	31.	(2)	32.	(3)	33.	(3)	34.	(2)	35.	(2)
36.	(3)	37.	(2)	38.	(2)	39.	(1)	40.	(2)	41.	(2)	42.	(1)
43.	(4)	44.	(3)	45.	(3)	46.	(3)	47.	(1)	48.	(2)	49.	(4)
50.	(4)	51.	(3)	52.	(4)	53.	(3)	54.	(2)	55.	(2)	56.	(2)
57.	(1)	58.	(2)	59.	(2)	60.	(1)	61.	(2)	62.	(1)	63.	(2)
64.	(4)	65.	(2)	66.	(2)	67.	(2)	68.	(4)	69.	(4)	70.	(4)
71.	(4)	72.	(3)	73.	(4)	74.	(4)	75.	(4)	76.	(3)	77	(2)
78	(1)	79	(2)										

Chapter 3 : Plant Kingdom

1.	(2)	2.	(3)	3.	(3)	4.	(3)	5.	(2)	6.	(1)	7.	(2)
8.	(2)	9.	(2)	10.	(1)	11.	(3)	12.	(4)	13.	(1)	14.	(2)
15.	(3)	16.	(3)	17.	(2)	18.	(3)	19.	(4)	20.	(2)	21.	(1)
22.	(2)	23.	(2)	24.	(3)	25.	(2)	26.	(3)	27.	(4)	28.	(1)
29.	(4)	30.	(4)	31.	(1)	32.	(1)	33.	(4)	34.	(2)	35.	(3)

36.	(2)	37.	(1)	38.	(1)	39.	(4)	40.	(4)	41.	(4)	42.	(3)
43.	(3)	44.	(4)	45.	(2)	46.	(2)	47.	(2)	48.	(1)	49.	(3)
50.	(1)	51.	(3)	52.	(3)	53.	(4)	54.	(1)	55.	(1)	56.	(3)
57.	(3)	58.	(1)	59.	(2)	60.	(3)	61.	(2)	62.	(3)	63.	(4)
64.	(2)	65.	(1)	66.	(4)	67.	(2)	68.	(1)	69.	(3)	70.	(1)
71.	(3)	72.	(2)	73.	(1)	74.	(2)	75.	(1)	76	(2)	77	(2)
78	(3)												

[ZOOLOGY]

Chapter 1 : Animal Kingdom

1.	(3)	2.	(1)	3.	(3)	4.	(4)	5.	(4)	6.	(2)	7.	(4)
8.	(3)	9.	(3)	10.	(2)	11.	(3)	12.	(2)	13.	(4)	14.	(3)
15.	(3)	16.	(3)	17.	(2)	18.	(4)	19.	(3)	20.	(2)	21.	(3)
22.	(2)	23.	(2)	24.	(2)	25.	(4)	26.	(4)	27.	(2)	28.	(4)
29.	(4)	30.	(2)	31.	(3)	32.	(2)	33.	(2)	34.	(2)	35.	(2)
36.	(4)	37.	(4)	38.	(3)	39.	(2)	40.	(3)	41.	(1)	42.	(3)
43.	(4)	44.	(4)	45.	(3)	46.	(4)	47.	(1)	48.	(2)	49.	(2)
50.	(2)	51.	(3)	52.	(2)	53.	(3)	54.	(2)	55.	(3)	56	(3)
57.	(4)	58.	(3)	59.	(3)	60.	(2)	61.	(3)	62.	(2)	63.	(3)
64.	(4)	65.	(2)	66.	(3)	67.	(4)	68.	(3)	69.	(1)	70.	(1)
71.	(1)	72.	(2)	73.	(4)	74.	(2)	75.	(4)	76.	(2)	77.	(2)
78.	(4)												

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CONTENTS

2012-13

PHYSICS

[Chapter-5 : System of Particles and Rotational Motion]

1. A person of mass m stands at the centre of a table moment of intertia I and rotating with angular velocity ω. If the person moves distance 'a' from the centre along the diameter, what will be the new angular velocity of rotating table?

(1) $\frac{I\omega}{ma^2}$ (2) Remain same

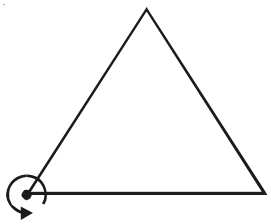
(3) $\frac{I\omega}{2ma^2}$ (4) $\frac{I\omega}{I+ma^2}$

2. A particle of mass 500 gm, having position vector $\vec{r} = (2\hat{i} + 6\hat{j})$ metre starts moving with speed 3 m/s parallel to positive x-axis. Its angular momentum about origin is

(1) $9\hat{k}$ J-s (2) $-9\hat{k}$ J-s

(3) $3\hat{k}$ J-s (4) $-3\hat{k}$ J-s

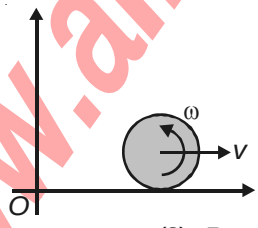
3. Three identical rods each of mass m and length ℓ are forming an equilateral triangle. The moment of inertia of rod about an axis through its one vertex and perpendicular to the plane is



(1) $\frac{m\ell^2}{3}$ (2) $\frac{m\ell^2}{12}$

(3) $\frac{3}{2}m\ell^2$ (4) $\frac{m\ell^2}{4}$

4. A disc of radius R is moving with velocity of centre of mass v and angular speed ω as shown in the figure. The angular momentum of disc about point O is



(1) Iω (2) Rmv

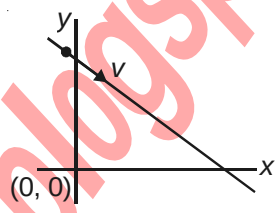
(3) Iω + Rmv (4) Iω – Rmv

5. In case of pure rolling of a disc on a rough ground. The ratio of speed at topmost point and at the centre of mass is

(1) 2 : 1 (2) 1 : 2

(3) 1 : 1 (4) $\sqrt{2}$: 1

6. The angular momentum of particle about origin moving with uniform velocity moving along straight line as shown in the figure is



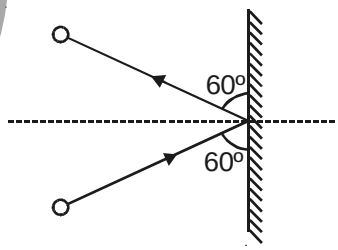
(1) Constant

(2) First increases then decreases

(3) First decreases then increases

(4) Decreases continuously

7. A ball of mass 1 kg moving with a velocity of 100 ms^{-1}, strikes a wall at an angle 60° (as shown in figure). If the ball rebounds with same speed, the impulse acted on it is



(1) 100 N-s (2) $100\sqrt{3}$ N-s

(3) 200 N-s (4) $200\sqrt{3}$ N-s

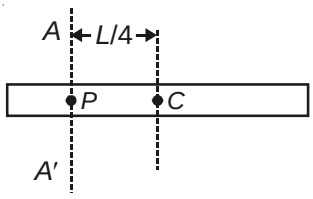
8. Moment of inertia of rod about an axis AA′ passing through point P according to diagram (mass of rod = M, length of rod = L) is

(1) $\frac{ML^2}{12}$

(2) $\frac{ML^2}{3}$

(3) $\frac{7ML^2}{48}$

(4) $\frac{5ML^2}{48}$



9. Which of the following statement is incorrect? (symbols have usual meanings)

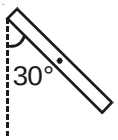
(1) K.E. of a point mass body in motion is always $\frac{1}{2}mv^2$

(2) K.E. of a rigid body in translatory motion is $\frac{1}{2}mv_{cm}^2$

(3) K.E. of a rigid body in pure rotatory motion is $\frac{1}{2}I\omega^2$

(4) K.E. of a point mass revolving about an axis is $\frac{1}{2}I\omega^2$ which is different from $\frac{1}{2}mv^2$

10. A rod of one metre is initially at rest and makes an angle 30° with vertical as shown in figure. The angular acceleration of rod, just after it is released, is



(1) $\frac{g}{4}$ (2) $\frac{3g}{2}$

(3) $\frac{3g}{4}$ (4) $\frac{g}{2}$

11. A solid cylinder of mass M and radius R rolls down an inclined plane of height h. The angular velocity of the cylinder when it reaches the bottom of the plane will be

(1) $\frac{1}{2R}\sqrt{gh}$ (2) $\frac{2}{R}\sqrt{gh}$

(3) $\frac{2}{R}\sqrt{\frac{gh}{3}}$ (4) $\frac{2}{R}\sqrt{\frac{gh}{2}}$

12. A disc, sphere, ring and hollow spherical shell all are rolling without slipping on a horizontal planes. The ratio of linear translational kinetic energy to rolling kinetic energy is minimum for

(1) Disc (2) Sphere

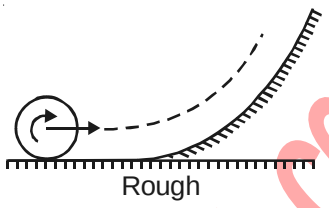
(3) Ring (4) Hollow spherical shell

13. Moment of inertia of a thin rod of length L mass M about its perpendicular bisector axis is I. If the rod is bend through 60º about midpoint on a plane perpendicular to the axis, then new moment of inertia of the rod will be

(1) I (2) $\frac{I}{2}$

(3) 3 I (4) $\frac{3I}{2}$

14. A solid sphere is rolling without slipping on a rough horizontal surface. The horizontal surface ends up as a rough inclined plane as shown. As the sphere rolls up on the plane, the force of friction on the sphere is



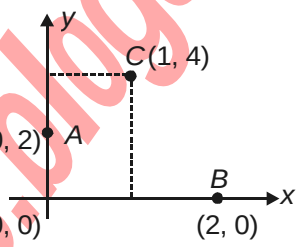
(1) Along the plane upward

(2) Along the plane downward

(3) Zero

(4) Along horizontal, backward

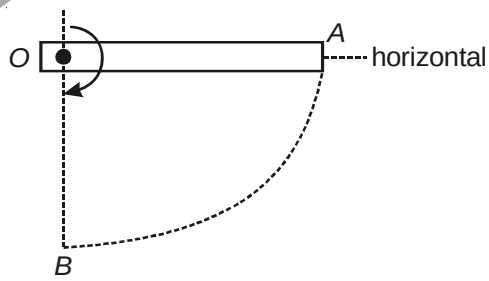
15. Three particles A, B and C each of mass 2 kg are kept in xy plane as shown in figure. The coordinates of their centre of mass are



(1) (1, 1) (2) (1, 2)

(3) $\left(\frac{1}{2}, 1\right)$ (4) $\left(\frac{1}{2}, \frac{3}{2}\right)$

16. A uniform thin rigid rod is free to rotate about the horizontal axis passing perpendicularly to its length through its one end. When released from rest from position OA, then during the journey from OA to OB position [$\omega \rightarrow$ angular speed]



(1) ω increases

(2) ω decreases

(3) ω remains constant

(4) ω may increase or decrease

17. A uniform thin circular ring of mass M and radius R is bend in 8 shaped planar loop. Assuming the two smaller loops to be identical, what is the moment of inertia of this system about an axis passing through their common point and perpendicular to their plane?

(1) $\frac{MR^2}{2}$ (2) $\frac{3}{4}$ MR^2

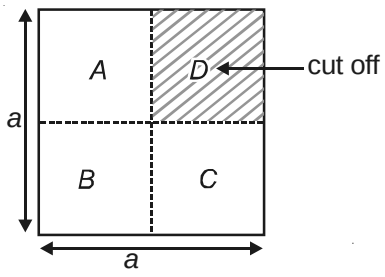
(3) $\frac{4}{3}$ MR^2 (4) 2 MR^2

18. A uniform circular ring is rolling on a horizontal surface without slipping. If its total kinetic energy is E, then its rotational and translational kinetic energies are respectively

(1) $\frac{E}{2}, \frac{E}{2}$ (2) $\frac{2E}{3}, \frac{E}{3}$

(3) $\frac{3E}{4}, \frac{E}{4}$ (4) $\frac{E}{3}, \frac{2E}{3}$

19. From a uniform square lamina a quarter lamina is cut off as shown in figure. Then the position of centre of mass of remaining portion with respect to original centre of mass lies in the region



(1) A (2) C

(3) B (4) D

20. Six identical rods each of mass m and length ℓ are arranged to form a regular hexagon. Then the moment of inertia of arrangement about axis passing through centre and perpendicular to the plane

(1) $5m\ell^2$ (2) $\frac{9}{2}m\ell^2$

(3) $2m\ell^2$ (4) $\frac{m\ell^2}{2}$

21. Two perfectly smooth (no friction) disc of moment of inertia I_1 and I_2 are rotating about their axis with angular velocity ω_1 and ω_2 in same sence. If they are placed in contact with each other so that their axes are common, then their new angular velocity will be

(1) $\frac{I_1\omega_1 + I_2\omega_2}{I_1 + I_2}$

(2) They will exchange their angular velocity

(3) There will be no change in their respective angular velocities as these are perfectly smooth

(4) They can't be placed in contact as they will push each other

22. Two discs made up of same sheet which is of uniform thickness. Masses of discs are in the ratio of 1 : 4. If particle on outer peripheri of both disc have same linear velocity when discs are in pure rotational motion about their axis then the ratio of their angular momentum will be

(1) 1 : 2 (2) 1 : 4

(3) 1 : 8 (4) 1 : 16

23. A uniform disc of mass M is rotating about its axis with angular velocity ω. Now four identical masses each $\frac{M}{4}$ are placed gently at the ends of two mutually perpendicular diameters of disc. The new angular velocity will be

(1) ω (2) $\frac{\omega}{2}$

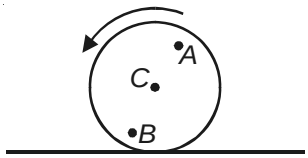
(3) $\frac{\omega}{3}$ (4) 2ω

24. A solid cylinder in rolling down on a rough inclined plane. Angle of inclination of plane is 30°. The acceleration of solid cylinder is

(1) g (2) gsin30°

(3) $\frac{g}{3}$ (4) g + gsin30°

25. A disc is rolling without slipping on horizontal surface as shown in figure. Point C is the centre of disc. Point A and B are equidistant from centre of disc. Let V_A, V_C and V_B are linear velocities of points A, B and C respectively. Then the relation between V_A, V_B and V_C is



(1) $V_A > V_B > V_C$ (2) $V_A > V_C > V_B$

(3) $V_B > V_C > V_A$ (4) $V_A < V_B < V_C$

26. Power of the body in rotational motion (symbols have their usual meaning)

(1) $\vec{\tau}.\vec{\omega}$ (2) $\tau^2\omega$

(3) $\vec{\tau}.\vec{a}$ (4) $\tau.a^2$

27. If two particles are moving in coplanar and concentric circular path with angular velocities $\overrightarrow{\omega_A}$ and $\overrightarrow{\omega_B}$, then relative angular velocity of B w.r.t. A when observer is at centre

(1) $\overrightarrow{\omega_A} - \overrightarrow{\omega_B}$ (2) $\overrightarrow{\omega_B} - \overrightarrow{\omega_A}$

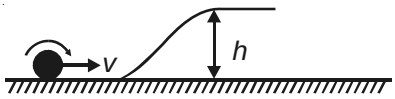
(3) $\overrightarrow{\omega_A} + \overrightarrow{\omega_B}$ (4) $\vec{\omega} + 2\overrightarrow{\omega_A}$

28. The instantaneous angular acceleration is defined as

(1) $\alpha = \lim_{\Delta t \to 0} \frac{\Delta\omega}{\Delta t}$ (2) $\frac{d^2\theta}{dt^2}$

(3) $\frac{d^2\omega}{dt^2}$ (4) Both (1) & (2)

29. A solid disc is rolling without slipping on a frictionless surface shown in figure with translational velocity v m/s. If it is just to climb the inclined frictionless surface, then v should be



(1) $\sqrt{2gh}$ (2) $\sqrt{\frac{4}{3}gh}$

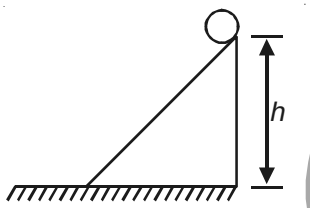
(3) $\sqrt{gh}$ (4) $\sqrt{\frac{1}{3}gh}$

30. The velocity of centre of mass of disc rolling on an inclined plane changed from v to 2v, then increase in its kinetic energy will be (m - mass of disc)

(1) $\frac{9}{4}mv^2$ (2) $\frac{mv^2}{2}$

(3) mv^2 (4) $3mv^2$

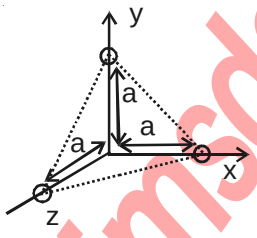
31. There is sufficient friction between the ring and incline so that when the ring released, moves under pure rolling. The velocity of centre of ring at bottom is



(1) $\sqrt{2gh}$ (2) $\sqrt{gh}$

(3) $\sqrt{\frac{1}{3}gh}$ (4) $\sqrt{\frac{2}{3}gh}$

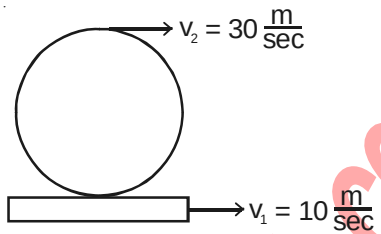
32. Three particles are placed at the corners of a triangle as shown in figure. Their centre of mass is at a position



(1) $\left(\frac{a}{3},\frac{a}{2},\frac{a}{2}\right)$ (2) $\left(\frac{a}{2},\frac{a}{2},\frac{a}{2}\right)$

(3) $\left(\frac{a}{3},\frac{a}{3},\frac{a}{3}\right)$ (4) (a, a, a)

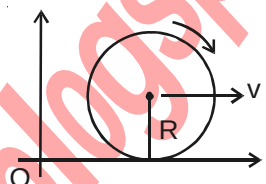
33. A disc is in pure rolling on the plank which is moving with 10 $\frac{m}{sec}$. as shown. The uppermost point of the disc has a speed of 30 $\frac{m}{sec}$. Radius of the disc is 1 m. Its angular speed is



(1) 30 rad/sec (2) 10 rad/sec

(3) 20 rad/sec (4) 40 rad/sec

34. In the shown figure, the disc is in pure rolling motion with velocity of centre of mass is v.

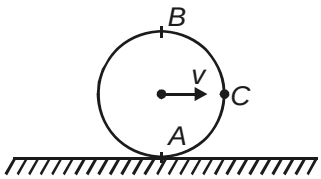


The angular momentum of the disc about origin

(1) $\frac{mvR}{2}$ (2) mvR

(3) $\frac{3}{2}$mvR (4) 2 mvR

35. A wheel is in uniform pure rolling along a level road. The speed of translational motion of the wheel axis is v. What is the speeds of the points A, B and C on the wheel rim relative to the road at the instant shown in the figure?



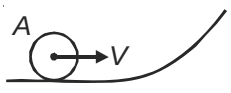
(1) $v_A = 0, v_B = 2v, v_C = v$

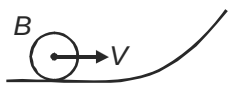
(2) $v_A = 0, v_B = 2v, v_C = \sqrt{2}v$

(3) $v_A = v, v_B = v, v_C = v$

(4) $v_A = \frac{v}{2}, v_B = 2v, v_C = v$

36. Two balls moving with same speed starts to move on a rough inclined plane. Ball A is solid and ball B is hollow. There is sufficient friction for pure rolling. If maximum height attained by balls A and B are h_1 and h_2 respectively, then which of the following relation is correct?

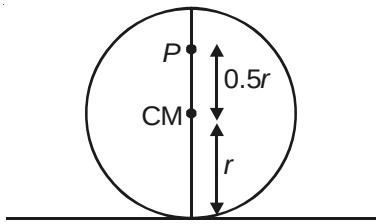




(1) $h_1 = h_2$ (2) $h_1 > h_2$

(3) $h_2 > h_1$ (4) $h_2 >> h_1$

37. A coin of radius r rolls without slipping on smooth horizontal floor. If velocity of centre of mass is 10 m/s, then linear velocity of point P is



(1) 15 ms^{-1} (2) 5 ms^{-1}

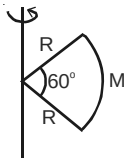
(3) 20 ms^{-1} (4) 10 ms^{-1}

38. The position vector of two particles of mass m_1=1kg, m_2=2kg are $\vec{r}_1=\left(\hat{i}+4\hat{j}+\hat{k}\right)m$, $\vec{r}_2=\left(\hat{i}+\hat{j}+\hat{k}\right)m$ respectively. The position vector of their centre of mass

(1) $\hat{i}+2\hat{j}+\hat{k}$ (2) $2\hat{i}+5\hat{j}+2\hat{k}$

(3) $\hat{i}+4\hat{j}+\hat{k}$ (4) $\hat{i}+\hat{j}+\hat{k}$

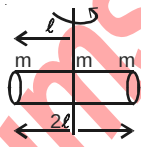
39. The figure is a part of disc. Mass of this part is M and radius is R. The moment of intertia about the given axis is



(1) $\frac{MR^2}{6}$ (2) $\frac{MR^2}{2}$

(3) $\frac{MR^2}{3}$ (4) $\frac{3MR^2}{4}$

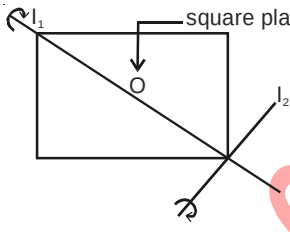
40. The moment of inertia of a uniform rod of mass m and length 2ℓ with two particles of mass m each at its ends. Find the MOI of the system about the shown axis



(1) $\frac{1}{3}ml^2$ (2) $\frac{2}{3}ml^2$

(3) $\frac{5}{3}ml^2$ (4) $\frac{7}{3}ml^2$

41. Let I_1 and I_2 be the moment of inertia of a uniform square plate about axes shown in the figure. Then the rate $I_1 : I_2$ is



(1) $1:\frac{1}{7}$ (2) $1:\frac{12}{7}$

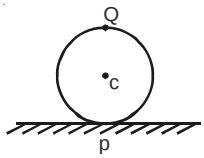
(3) $1:\frac{7}{12}$ (4) 1 : 7

42. The moment of inertia in terms of angular momentum (L) and kinetic energy (K) is

(1) $\frac{L^2}{K}$ (2) $\frac{L^2}{2K}$

(3) $\frac{L}{2K^2}$ (4) $\frac{L}{2K}$

43. A disc is rolling (without slipping) on a frictionless surface about its centre C and Q and P are two points equidistant from C. Let V_P, V_Q and V_C be the magnitudes of velocities of points P, Q and C respectively, then



(1) $V_Q > V_C > V_P$ (2) $V_Q < V_C < V_P$

(3) $V_Q = V_P$, $V_C = \frac{1}{2}V_P$ (4) $V_Q < V_C > V_P$

44. A rigid body rotates about a fixed axis with variable angular velocity given as(α-βt) at time t, where α and β are constants. The angle through which it rotates before it comes to rest is

(1) $\frac{\alpha^2}{2\beta}$ (2) $\frac{\alpha^2-\beta^2}{2\alpha}$

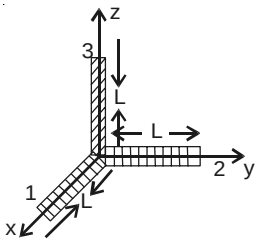
(3) $\frac{\alpha^2-\beta^2}{2\beta}$ (4) $\frac{\alpha(\alpha-\beta)}{2}$

45. The speed of a homogeneous solid sphere after rolling down an inclined plane of vertical height h from rest without sliding is

(1) $\sqrt{gh}$ (2) $\sqrt{\left(\frac{6}{5}\right)gh}$

(3) $\sqrt{\left(\frac{4}{3}\right)gh}$ (4) $\sqrt{\left(\frac{10}{7}\right)gh}$

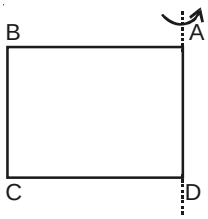
46. Three thin rods each of length L and mass M are placed along x, y and z-axes in such a way that one end of each of the rods is at the origin. The moment of inertia of this system about z-axis is



(1) $\frac{2ML^2}{3}$ (2) $\frac{4ML^2}{3}$

(3) $\frac{5ML^2}{3}$ (4) $\frac{ML^2}{3}$

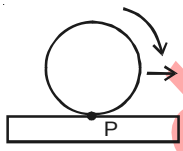
47. Four identical thin rods each having mass m and length ℓ are arranged in the form of square. Find out the moment of inertia of the system about an axis AD.



(1) $\frac{2m\ell^2}{3}$ (2) $\frac{m\ell^2}{3}$

(3) $\frac{5m\ell^2}{3}$ (4) $\frac{7m\ell^2}{5}$

48. The disc in the figure is in pure rolling, with respect to the plank which is moving with V. The velocity of point P on the disc with respect to ground is



(1) Zero (2) V

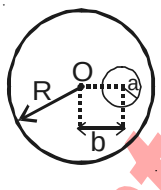
(3) 2V (4) $\frac{v}{2}$

49. The position of centre of mass of a system consisting of two particles of masses m_1 and m_2 seperated by distance L apart, from m_1 will

(1) $\frac{m_1L}{m_1+m_2}$ (2) $\frac{m_2L}{m_1+m_2}$

(3) $\frac{m_2}{m_1}$ (4) $\frac{L}{2}$

50. A hole of radius a is cut in a uniform circular plate of radius R as shown. Find out the distance of the centre of mass of the residual plate from the centre of the original plate is



(1) $\frac{ab}{R}$ (2) $\frac{a^2b}{b^2-a^2}$

(3) $\frac{a^2b}{R^2-b^2}$ (4) $\frac{a^2b}{R^2-a^2}$

51. A uniform rod of length 2L has a constant mass per unit length (μ). The moment of inertia of the rod about an axis which is a perpendicular be-sector of the rod is

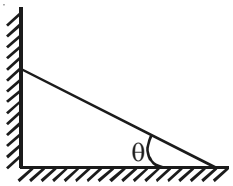
(1) $\frac{2}{3}\mu L^2$ (2) $\frac{2}{3}\mu L^3$

(3) $\frac{8}{3}\mu L^3$ (4) $\frac{4}{3}\mu L^3$

52. A uniform rod of length L and mass M is resting on a vertical wall and horizontal surface

The vertical wall is smooth and co-efficient of friction between the rod and horizontal surface is μ

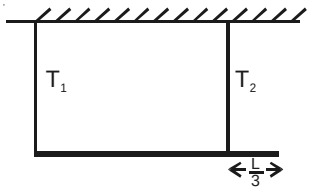
For equilibrium of rod, what is the minimum value of θ



(1) $\tan^{-1}\left(\frac{1}{\mu}\right)$ (2) $\tan^{-1}\left(\frac{2}{\mu}\right)$

(3) $\tan^{-1}\left(\frac{1}{2\mu}\right)$ (4) $\tan^{-1}\left(\frac{\mu}{2}\right)$

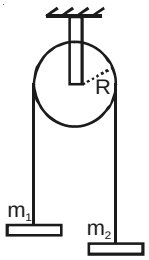
53. A uniform rod of length L is kept horizontal by two vertical strings as shown. If tensions in the left and right strings are T_1 and T_2 respectively then $\frac{T_1}{T_2}$ is equal to



(1) $\frac{1}{3}$ (2) $\frac{1}{6}$

(3) 3 (4) 6

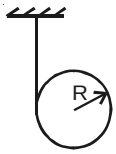
54. In the figure, $m_1 > m_2$. The connecting string is ideal and does not slip over pulley. Moment of inertia of pulley is I. Acceleration of the blocks has magnitude



(1) $\frac{(m_1-m_2)g}{m_1+m_2}$ (2) $\frac{(m_1-m_2)g}{m_1+m_2+\frac{I}{R^2}}$

(3) $\frac{\left(m_1-m_2+\frac{I}{R^2}\right)g}{\left(m_1+m_2+\frac{I}{R^2}\right)}$ (4) $\frac{(m_1-m_2)g}{\left(m_1+m_2-\frac{I}{R^2}\right)}$

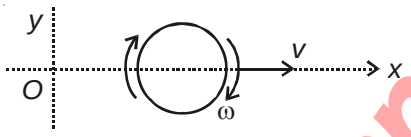
55. A string is wrapped over the edge of a uniform disc and free end is fixed with the ceiling. The disc moves down, unwinding the string. Then find out the downward acceleration of the disc.



(1) g (2) $\frac{g}{3}$

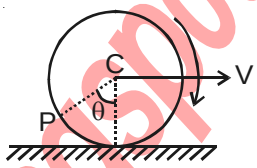
(3) $\frac{g}{2}$ (4) $\frac{2g}{3}$

56. The diagram shows the top view of a cricket ball moving in the right side along x-axis and spinning clockwise. The ball will



(1) Swing toward +ve y-axis
(2) Swing toward –ve y-axis
(3) Continue to move along x-axis
(4) Any of the above depending on the ratio v/ω

57. A disc is rolling on a horizontal surface with its linear speed v. Velocity of point P at the instant shown in figure is



(1) $2v\cos\left(\frac{\theta}{2}\right)$ (2) $2v\sin\left(\frac{\theta}{2}\right)$

(3) $v\cos\left(\frac{\theta}{2}\right)$ (4) $v\sin\left(\frac{\theta}{2}\right)$

58. A cubical block of mass M and edge 'a' slides down on an rough inclined plane of inclination θ with uniform velocity. The torque of friction force on the block about its centre has a magnitude of

(1) Zero (2) mg a sinθ

(3) $mg\frac{a}{2}\sin\theta$ (4) $mg\frac{a}{2}\cos\theta$

59. A particle of mass m is projected with a velocity $(a\vec{i}+b\vec{j})$ from ground. The angular momentum of particle about point of projection when particle is at topmost point

(1) $\frac{ma^2b}{2g}$ (2) $\frac{mab^2}{2g}$

(3) $\frac{2ma^2b}{g}$ (4) $\frac{mab^2}{g}$

[Chapter-6 : Gravitation]

1. If g is acceleration due to gravity and –gR is gravitation potential on the surface of earth [R is radius of the earth], then gravitational potential at the centre of the earth will be

(1) –gR (2) $\frac{g}{R}$

(3) –1.5 gR (4) $\frac{1.5g}{R}$

2. The angular momentum about the centre of earth of a satellite of mass m revolving around earth in a circular orbit of radius r will be (M → mass of the earth)

(1) Zero (2) $\sqrt{GMr}$

(3) $m\sqrt{GMr}$ (4) $m^2\sqrt{\frac{GM}{r}}$

3. If angular momentum of a satellite of mass m revolving around earth in a circular orbit of radius r is L, then its total energy is

(1) $\frac{L^2}{2m}$ (2) $-\frac{L^2}{2mr^2}$

(3) $-\frac{L^2}{2m^2r}$ (4) $-\frac{L^2}{mr}$

4. A satellite of mass m revolving around the earth in a circular orbit of radius 2R has to be shifted to another circular orbit of radius 4R. The energy required for this process will be (M → mass of earth, R → radius of the earth)

(1) $\frac{GMm}{8R}$ (2) $\frac{2GMm}{3R}$

(3) $\frac{GMm}{4R}$ (4) $\frac{GMm}{6R}$

5. Select the correct relation between areal velocity $\frac{d\vec{A}}{dt}$ and angular momentum $\vec{L}$ of a planet revolving around the sun

(1) $\frac{d\vec{A}}{dt}=\frac{\vec{L}}{4m}$ (2) $\frac{d\vec{A}}{dt}=\frac{2\vec{L}}{m}$

(3) $\frac{d\vec{A}}{dt}=\frac{\vec{L}}{m}$ (4) $\frac{d\vec{A}}{dt}=\frac{\vec{L}}{2m}$

6. If a satellite revolves around the earth in a circular orbit of radius r and density of earth is ρ, then its time period is directly proportional to

(1) $\frac{r^3}{\rho}$ (2) $r^{-3/2}\,\rho^{-1/2}$

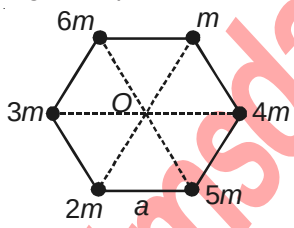
(3) $r^{3/2}\,\rho^{-1/2}$ (4) $r^{1/2}\,\rho^{1/2}$

7. If earth suddenly shrinks keeping mass constant and its volume becomes $\frac{1}{8}$ of its present volume, the acceleration due to gravity on the surface of earth will increase by

(1) 50% (2) 100%

(3) 200% (4) 300%

8. Six particles of different masses are placed at the vertices of a regular hexagon as shown in figure. The magnitude of gravitational intensity at centre O is (side of hexagon = a)



(1) Zero (2) $\frac{Gm}{a^2}$

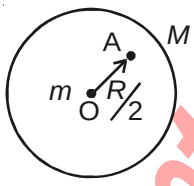
(3) $\frac{3Gm}{a^2}$ (4) $\frac{4Gm}{a^2}$

9. A body is dropped from a height equal to the radius of earth R. If acceleration due to gravity on the surface of earth is g and air resistance is neglected, then velocity with which it hits the ground is

(1) $\sqrt{2gR}$ (2) $\sqrt{gR}$

(3) $\sqrt{\frac{gR}{2}}$ (4) $\sqrt{\frac{2gR}{3}}$

10. Isolated uniform hollow sphere of mass M and radius R has a point mass m placed at its centre as shown in figure. Find out the work done in moving the point mass from the centre to a point A



(1) Gm M/R (2) 2 Gm M/R

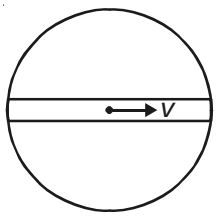
(3) –2 Gm M/R (4) Zero

11. A planet is moving in an elliptical orbit of eccentricity e around the sun. In the orbit if the maximum speed of the planet is v_1 and the minimum speed is v_2, then the ratio $\frac{v_1}{v_2}$ is

(1) e (2) $\left(\frac{1+e}{1-e}\right)$

(3) $\frac{e^2+1}{e^2-1}$ (4) $\frac{e+1}{e}$

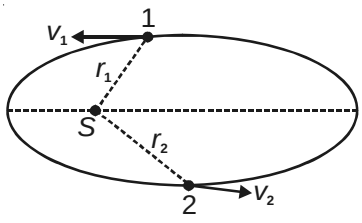
12. Suppose a narrow tunnel is dug along a diameter of earth. A particle kept at the centre of the tunnel is projected with speed v in such a way that the particle escapes earth's gravitational field. The minimum value of v should be



(1) $\sqrt{gR}$ (2) $\sqrt{2gR}$

(3) $\sqrt{3gR}$ (4) $\sqrt{\frac{gR}{2}}$

13. The following diagram shows the elliptical orbit of a planet moving around the sun. If r, v, L and K are the distance of planet from sun, speed, angular momentum and kinetic energy respectively. Then for the positions '1' and '2' of the planet which of the following is correct?



(1) $v_1r_2 = v_2r_1$ (2) $L_1 = L_2$

(3) $K_1 = K_2$ (4) All of these

14. If a man at the equator would weight $\left(\frac{3}{5}\right)^{th}$ of his weight at pole, then the angular speed of earth is

(1) $\sqrt{\frac{2}{5}\frac{g}{R}}$ (2) $\sqrt{\frac{g}{R}}$

(3) $\sqrt{\frac{R}{g}}$ (4) $\sqrt{\frac{2}{5}\frac{R}{g}}$

15. The gravitational field due to mass distribution is $E = \frac{A}{x^2}$ in x-direction. Here, A is constant. Taking the gravitational potential to be zero at infinity, potential at x is

(1) $\frac{2A}{x}$ (2) $\frac{2A}{x^3}$

(3) $\frac{A}{x}$ (4) $\frac{A}{2x^2}$

16. If a rocket is fired with a speed $v = 2\sqrt{gR}$ near the earth's surface, then its speed in the interstellar space is

(1) $14\sqrt{gR}$ (2) $\sqrt{2gR}$

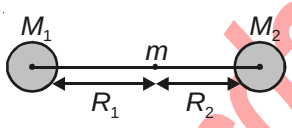
(3) $\sqrt{gR}$ (4) $\sqrt{4gR}$

17. With what kinetic energy a particle of mass m must be thrown vertically up from earth surface so that it rises upto a maximum height of h = R, where R is radius of earth? Acceleration due to gravity near earth surface is g

(1) 2 mgR (2) mgR

(3) 0.5 mgR (4) 0.25 mgR

18. A body of mass m is located in between two heavy body (planets) of masses M_1 and M_2 as shown in figure



Value of escape velocity for body (m) will be

(1) $\sqrt{\frac{2G(M_1R_2 + M_2R_1)}{R_1R_2}}$ (2) $\sqrt{\frac{2G(M_1R_1 + M_2R_2)}{R_1R_2}}$

(3) $\sqrt{\frac{2G(M_1 + M_2)}{R_1 + R_2}}$ (4) $\sqrt{\frac{2GM_1M_2}{R_1R_2}}$

19. The radius of a black hole is given by [where M is mass of black hole and c is speed of light in vacuum]

(1) $\frac{3GM}{2c^2}$ (2) $\frac{GM}{2c^2}$

(3) $\frac{GM}{c^2}$ (4) $\frac{2GM}{c^2}$

20. If the escape speed of an object of mass 2 kg is 20 km/s on the surface of a planet, then the gravitational potential energy of the object on the surface of planet is

(1) –200 MJ (2) –400 MJ

(3) –600 MJ (4) –800 MJ

21. A body of mass M is divided into two parts of mass m_1 and m_2 such that gravitational force between them for a given separation r is maximum. Ratio $\frac{m_1}{m_2}$ is equal to

(1) 1 : 2 (2) 2 : 3

(3) 4 : 5 (4) 1 : 1

22. A tunnel is dug in the earth which passes through the centre of the earth and crosses the earth. If a particle of mass m is dropped in the tunnel from the earth surface, then kinetic energy of the particle as it reaches the centre of the earth is (M = mass and R = radius of the earth)

(1) $\frac{GMm}{R}$ (2) $\frac{2GMm}{R}$

(3) $\frac{GMm}{2R}$ (4) $\frac{3GMm}{2R}$

23. If gravitational force between satellite and planet is directly proportional to r^n, where r is orbital radius of satellite, then the time period of satellite is directly proportional to

(1) r^{n-1} (2) $r^{\frac{1-n}{2}}$

(3) $r^{\frac{n}{2}}$ (4) $r^{\frac{3n}{2}}$

24. A planet revolves in an elliptical orbit around the sun. In which the semi-major and semi-minor axes have lengths a and b respectively. Then time period T is

(1) $T^2 \alpha \left(\frac{a+b}{2}\right)^3$ (2) $T^2 \alpha b^3$

(3) $T^2 \alpha a^3$ (4) $T^2 \alpha \left(\frac{a-b}{2}\right)^3$

25. A satellite which is geostationary in a particular orbit is taken to another orbit. It's distance from center of the earth in its new orbit is 2 times that of the earlier orbit. The time period in the new orbit is

(1) 4.8 hours (2) $48\sqrt{2}$ hrs

(3) 24 hrs (4) $24\sqrt{2}$ hrs

26. Two point masses m_1 and m_2 are initially rest at infinite distance apart. They start moving towards each other under their mutual gravitational forces. Their relative speed when they are at a distance d apart is

(1) $\sqrt{\frac{G(m_1+m_2)}{d}}$ (2) $\sqrt{\frac{2G(m_1+m_2)}{d}}$

(3) $\sqrt{\frac{2G(m_1m_2)}{d}}$ (4) $\sqrt{\frac{2Gd}{(m_1+m_2)}}$

27. A satellite of mass m initially at rest on the surface of the earth is to be launched into a circular orbit at a height equal to the radius R of the earth. The minimum energy required is : (M = mass of earth)

(1) $\frac{GMm}{2R}$ (2) $\frac{GMm}{R}$

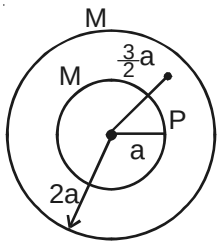
(3) $\frac{GMm}{4R}$ (4) $\frac{3}{4}\frac{GMm}{R}$

28. A tunnel is dug along a diameter of the earth. The gravitational force on a particle of mass m placed in the tunnel at a distance x from center is
(M_e = Mass of earth, R = radius of earth)

(1) $\frac{GM_em}{R^3}x$ (2) $\frac{GM_em}{R^2}\times x$

(3) $\frac{GM_emx^2}{R^3}$ (4) $\frac{GM_emR}{R^3}$

29. A uniform solid sphere of mass M and radius a is surround symmetrically by a uniform thin spherical shell of equal mass and radius 2a shown in figure. The gravitational field at a distance $\frac{3}{2}a$ from the centre is



(1) Zero (2) $\frac{25GM}{36a^2}$

(3) $\frac{4GM}{9a^2}$ (4) $\frac{GM}{4a^2}$

30. The period of revolution of a certain planet in a orbit of radius R is T. Its period of revolution in an orbit of radius 4R will be

(1) 2T (2) $2\sqrt{2}T$

(3) 4T (4) 8T

31. The self-gravitational potential energy of a uniform spherical of mass M and radius R is

(1) $-\frac{GM^2}{R}$ (2) $-\frac{GM^2}{2R}$

(3) $-\frac{3}{5}\frac{GM^2}{R}$ (4) $-\frac{GM^2}{4R}$

32. If a body be projected vertically upward from the surface of the earth so as to reach a height nR above the surface, the increase in its potential energy is

(1) (n)mgR (2) $\left(\frac{n-1}{n}\right)$mgR

(3) $\left(\frac{n}{n+1}\right)$mgR (4) (n+1)mgR

33. A spherically symmetric gravitational system of particles has a mass density $\rho = \begin{cases}\rho_o & \text{for } r \le R \\ 0 & \text{for } r > R\end{cases}$. Then choose the correct statement for E = gravitational field intensity

(1) for r > R, E = 0 (2) for r ≤ R, E ≠ 0

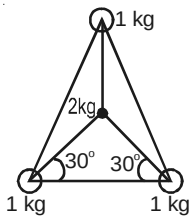
(3) for r ≤ R, E = 0 (4) E = 0, everywhere

34. Choose the correct relationship for a model in which a lighter particle is moving around a heavier particle only under the influence of gravitational field. Here K=kinetic energy, U=potential energy, E=total energy of the revolving particle

(1) $K = \frac{|U|}{2} = |E|$ (2) $\frac{K}{2} = |U| = |E|$

(3) $K = |U| = \left|\frac{E}{2}\right|$ (4) K=|U|=|E|

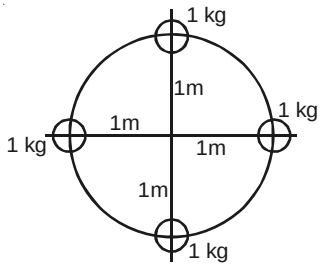
35. Three masses each of 1 kg are placed at the corners of an equilateral triangle of side 1m. The force on the mass of 2kg which is placed at the centre of the triangle (G = 6.67 × 10^{-11} Nm^2/kg)



(1) G(3) N (2) G N

(3) $\frac{\sqrt{3}}{2}$GN (4) Zero

36. The potential energy of the system as shown in figure



(1) $-G\left(2\sqrt{2}\right)J$ (2) $-G\left(2\sqrt{2}+1\right)J$

(3) $+G\left(2\sqrt{2}\right)J$ (4) $+G\left(2\sqrt{2}+1\right)J$

37. Two masses of 1kg and 2kg are separated by a distance of 100 m and released under the influence of mutual gravitational attractive force. They will meet at

(1) At a distance of 50m from 1 kg

(2) At a distance of 50m from 2 kg

(3) At a distance of 33.3m from 2 kg

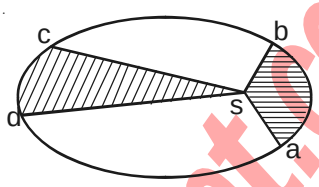
(4) At a distance of 33.3m from 1 kg

38. If the acceleration due to gravity at the surface of the earth is g, the work done in slowly lifting a body of mass m from the earth's surface to a height equal to the radius of earth is (R = radius of the earth)

(1) mgR (2) 2mgR

(3) $\frac{1}{4}$mgR (4) $\frac{1}{2}$mgR

39. Figure shows the elliptical path of a planet around the sun. The two shaded parts have equal area. If t_1 and t_2 be the time taken by the planet to go from a to b and from c to d respectively



(1) $t_1 < t_2$

(2) $t_1 = t_2$

(3) $t_1 > t_2$

(4) Insufficiant information to deduce the relation between t_1 and t_2

[Chapter-7 : Mechanical Properties of Solids]

1. A uniform wire fixed at one end has length ℓ. If it is stretched by applying an external force F on its other end due to which its length becomes ℓ', then work done by external force will be

(1) $F(\ell' - \ell)$ (2) $\frac{F\ell'}{\ell}$

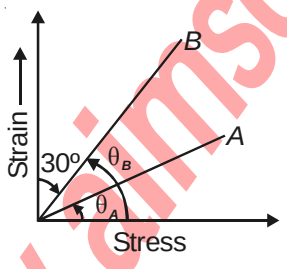
(3) $\frac{F\ell'}{2\ell}$ (4) $\frac{1}{2}F(\ell' - \ell)$

2. If a circular beam of radius r and length L is loaded by weight at middle due to which depression S is produced in it, then

(1) $S \propto r^3$ (2) $S \propto L^3$

(3) $S \propto \frac{1}{r^3}$ (4) $S \propto L^{-2}$

3. The stress strain curve for two wires A and B are shown in figure. If $\theta_B - \theta_A = 30^o$ and Y_A and Y_B are Young's moduli of wire A and B respectively, then



(1) $Y_A \cdot Y_B = 1$ (2) $Y_A < Y_B$

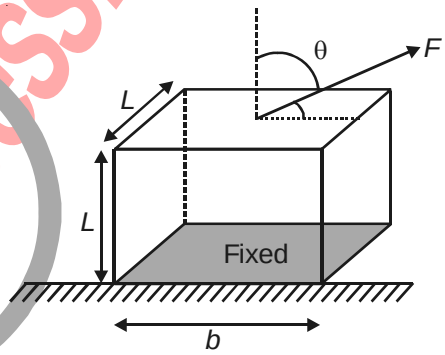
(3) $Y_A = 2Y_B$ (4) $Y_A = Y_B$

4. A long spring when stretched by 1 mm stores potential energy U. If it is further stretched by 4 mm, then change in its potential energy will be

(1) 4 U (2) 16 U

(3) 24 U (4) 25 U

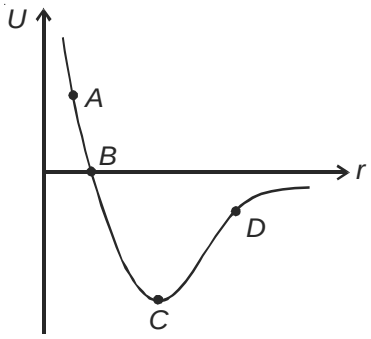
5. The tangential stress developed in block due to force F shown in figure is



(1) $\frac{F\cos\theta}{L^2}$ (2) $\frac{F\cos\theta}{Lb}$

(3) $\frac{F\sin\theta}{L^2}$ (4) $\frac{F\sin\theta}{Lb}$

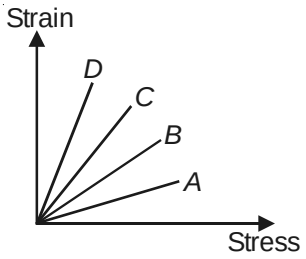
6. The variation of potential energy U between two atoms of a diatomic molecule with separation between atoms r is shown in figure. If F_A, F_B, F_C and F_D are magnitude of force between atoms corresponding to points A, B, C and D on curve, then



(1) $F_A < 0$ (2) $F_B = 0$

(3) $F_B > F_C$ (4) $F_C > F_D$

7. Stress-strain curve for four metals are shown in figure. The maximum young modulus of elasticity is for metal



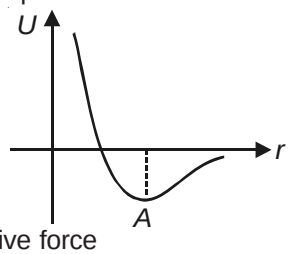
(1) A (2) B
(3) C (4) D

8. A given metal is drawn in four types of wires having different dimensions. If same load is hung from each wire, then, which of the following has minimum elongation? (L = length, D = diameter)

(1) L, D (2) $\frac{L}{2}, 2D$

(3) $2L, \frac{D}{2}$ (4) $\sqrt{2}L, \frac{D}{\sqrt{2}}$

9. Potential energy versus position curve is given for a molecule. What type of force is acting on the molecule at position A?



(1) Attractive force
(2) Repulsive force
(3) May be attractive or repulsive force
(4) At A force is zero

10. A wire of mass M and length l and area of cross section A is hanging vertically. What is the extention produced in the wire due to it's own weight?

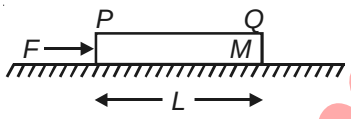
(1) $\frac{Mgl}{YA}$ (2) $\frac{Mgl}{3YA}$

(3) $\frac{Mgl}{2YA}$ (4) $\frac{Mgl}{4YA}$

11. The ratio of lengths of two steel rods P and Q is 2 : 3 and the ratio of their radii is 3 : 2, then the ratio of their Young's modulus is

(1) 2 : 3 (2) 4 : 9
(3) 8 : 27 (4) 1 : 1

12. A uniform beam PQ of mass M, cross-section A and length L is placed on a horizontal smooth surface (see diagram). A constant force F acts at one end and is uniformly distributed over the section. If Young's modulus of the beam material is Y, then the compression in the beam is



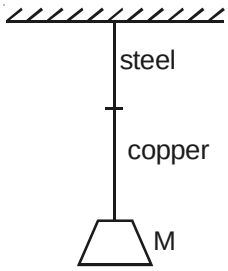
(1) $\frac{4FL}{YA}$ (2) $\frac{FL}{YA}$

(3) $\frac{FL}{2YA}$ (4) Zero

13. Under the application of a load, the volume of a wire remains constant. The value of the Poisson's ratio of the material of the wire is

(1) –1.0 (2) 0.5
(3) 0.2 (4) Zero

14. In figure the upper wire is made of steel and the lower of copper. The wires have equal cross section. The ratio of the longitudinal strains developed in copper and steel wires (Y of steel=2 × 10^{11} Nm^{-2}, Y of copper = 1.3 × 10^{11} Nm^{-2})



(1) 1.54 (2) 0.64
(3) 2.6 (4) Data insufficiant

15. One end of uniform bar of weight w_1 is suspended from the roof and a weight w_2 is suspended from the other end. The area of cross-section is A. What is the stress at the mid-point of the rod?

(1) $\frac{w_1 + w_2}{A}$ (2) $\frac{w_1 - w_2}{A}$

(3) $\frac{\left(\frac{w_1}{2}\right) + w_2}{A}$ (4) $\frac{\left(\frac{w_2}{2}\right) + w_1}{A}$

16. If ρ is the density of the material of a wire and σ the breaking stress, then the greatest length of the wire that can hang freely without breaking is

(1) $\frac{2\sigma}{\rho g}$ (2) $\frac{\rho}{\sigma g}$

(3) $\frac{\rho g}{2\sigma}$ (4) $\frac{\sigma}{\rho g}$

17. A rubber cord of length L and area of cross-section A is suspended from the ceiling of a room. What is the elongation in the cord due to the self weight if density of the rubber is ρ and Young's modulus is Y?

(1) $\frac{\rho g L^2}{Y}$ (2) $\frac{\rho g L^2}{2Y}$

(3) $\frac{\rho g L^2}{3Y}$ (4) $\frac{\rho g L^2}{4Y}$

18. A steel ring of radius r and cross-sectional area A is fitted on to a wooden disc of radius (R > r). If Young's modulus be Y, then the force with which the steel ring is expanded is

(1) $\frac{AYR}{r}$ (2) $\frac{AY(R-r)}{r}$

(3) $\frac{Y}{A}\frac{(R-r)}{r}$ (4) $\frac{Yr}{AR}$

19. When the tension in a metal wire is T_1, its length is l_1. When the tension is T_2, its length is l_2. The natural length of wire is

(1) $\frac{T_2}{T_1}(l_1+l_2)$ (2) $T_1l_1 + T_2l_2$

(3) $\frac{l_1T_2 - l_2T_1}{T_2 - T_1}$ (4) $\frac{l_1T_2 + l_2T_1}{T_2 + T_1}$

20. Young's modules of a wire of length L and radius r is Y. If the length is reduced to $\frac{L}{2}$ and radius to $\frac{r}{2}$, its young's modules will be

(1) $\frac{Y}{2}$ (2) Y

(3) 2Y (4) 4Y

21. In a wire stretched by a hanging weight from its end, the elastic potential energy per unit volume in terms of longitudinal strain E and modulus of elasticity Y is

(1) $\frac{YE^2}{2}$ (2) $\frac{YE}{2}$

(3) $\frac{YE^2}{A}$ (4) $\frac{Y^2E}{2}$

22. The young modulus of a wire is Y. If the energy per unit volume is E, then the strain will be

(1) $\sqrt{\frac{2E}{Y}}$

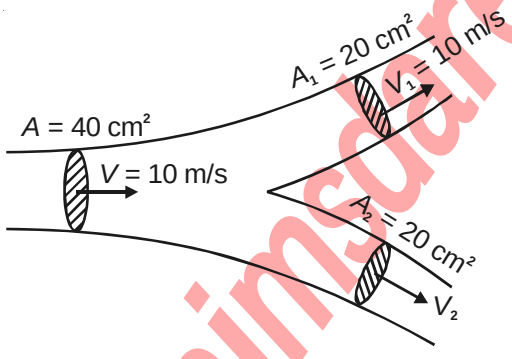
(2) $\sqrt{2EY}$

(3) EY

(4) $\frac{E}{Y}$

[Chapter-8 : Mechanical Properties of Fluids]

1. An incompressible liquid is flowing through a tube as shown in figure.



A, A_1 and A_2 are area of crossection of tube at different parts as shown and V, V_1 and V_2 are respective velocities of liquid at these points, then V_2 =

(1) 20 m/s (2) 10 m/s

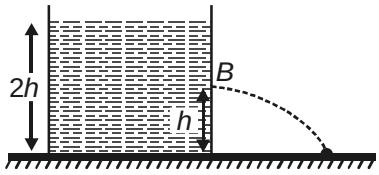
(3) 5 m/s (4) 15 m/s

2. A body of mass M and volume V is floating in a liquid of density σ. When an excess mass m is placed on the body, then it just sinks in the liquid. The value of excess mass is

(1) Vσ + M (2) Vσ – M

(3) M – Vσ (4) $\left(\frac{V\sigma + M}{M}\right)V\sigma$

3. The ratio of the velocity of a freely falling body after falling through h depth, to the velocity of efflux of the water from the orifice on the wall of beaker at point B is



(1) $1:\sqrt{2}$ (2) $\sqrt{2}:1$

(3) 1 : 1 (4) 4 : 1

4. If the soap solution has surface tension T and a bubble of diameter d is blown from it, then the work done to blow the bubble is

(1) $8\pi d^2T$ (2) $4\pi d^2T$

(3) πd^2T (4) $2\pi d^2T$

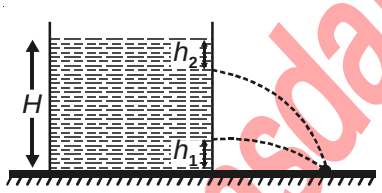
5. An ice cube is kept a gravity free room in vacuum. If the ice cube melts, then
   (1) It remains cubical
   (2) It spreads on the floor of room
   (3) It becomes spherical
   (4) If becomes oval

6. The top surface of an incompressible liquid is open to the atmosphere. The pressure at depth h_1 below the surface is P_1. Pressure P_2 at depth $h_2 = 2h_1$ compared with P_1 is
   (1) $P_2 > 2P_1$ (2) $P_2 = 2P_1$
   (3) $P_2 < 2P_1$ (4) $P_2 = P_1$

7. When a body of mass 10 kg is placed on a floating platform, then the platform sinks by 2 cm. If another body is placed on platform after removing the body then platform sinks by 5 cm, then the mass of the another body is
   (1) 250 kg (2) 25 kg
   (3) 10 kg (4) 20 kg

8. A swimmer of mass m rests on the top of a slab, having thickness h and density ρ_s. If the slab floats in water with its upper surface just awash, then the area of slab is (density of water = ρ_w)
   (1) $\frac{m}{h(\rho_w + \rho_s)}$ (2) $\frac{m}{h\rho_w}$
   (3) $\frac{m}{h(\rho_s - \rho_w)}$ (4) $\frac{m}{h(\rho_w - \rho_s)}$

9. Two orifice are made such that one at height h_1 from bottom and other at depth h_2 from free surface. If the horizontal range of the water from them are equal then what is the relation between h_1 and h_2?

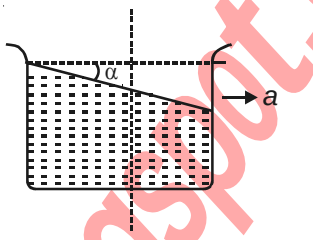


   (1) $h_1 = 2h_2$ (2) $h_1 = h_2$
   (3) $2h_1 = h_2$ (4) $h_1 + h_2 = H$

10. How does the critical velocity v of a liquid through a narrow tube depend on radius of the tube (r), density of liquid (ρ) and viscosity of liquid (η)?
   (1) $v \propto \frac{\rho}{\eta r}$ (2) $v \propto \frac{\rho\eta}{r}$
   (3) $v \propto \frac{\eta}{\rho r}$ (4) $v \propto \frac{\eta r}{\rho}$

11. Force required to pull a ring from surface of water is 1500 π dyne. What is radius of ring if (surface tension of water is 75 dyne/cm and mass of the ring is negligible)
   (1) 5 cm (2) 10 cm
   (3) 20 cm (4) 15 cm

12. A fluid container containing a liquid of density ρ is accelerating with acceleration 'a' toward east. If angle of inclination α of free surface is 37° then the value of 'a' will be

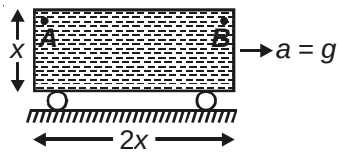


   (1) $\frac{3g}{5}$ (2) $\frac{4g}{3}$
   (3) $\frac{4g}{5}$ (4) $\frac{3g}{4}$

13. If equal masses of water and a liquid of relative density d are mixed together then mixture will have density of
   (1) $\frac{2d}{1+d}$ (2) $\frac{d}{1+d}$
   (3) $\frac{2(1+d)}{d}$ (4) $\frac{1+d}{2d}$

14. An incompressible and non viscous fluid flows through a horizontal pipe. At one point in the pipe the pressure in the fluid is p_1 and the fluid speed is v_1. At other point in the pipe the pressure is p_2 and the fluid speed is $2v_1$. What is the relation between p_1 and p_2?
   (1) $p_1 > p_2$ (2) $p_1 = 2p_2$
   (3) $p_1 = 4p_2$ (4) $p_1 < p_2$

15. A closed vessel shown below is completely filled with a liquid of density ρ. When the vessel is accelerated horizontally with constant acceleration g, what will be the pressure difference at the point A and B?



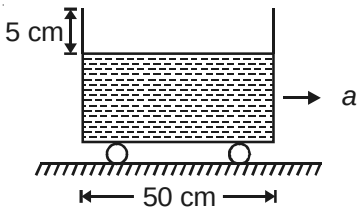
   (1) $2\rho gx$ (2) ρgx
   (3) $\frac{1}{2}\rho gx$ (4) Zero

16. A steel wire is suspended vertically from a rigid support. When loaded with a weight in air, it extends by x and when the weight is immersed completely in water, the extension is reduced to x′. The relative density of the material of the weight is

(1) $\frac{x}{x'}$ (2) $\frac{x'}{x}$

(3) $\frac{x}{x-x'}$ (4) $\frac{x+x'}{x}$

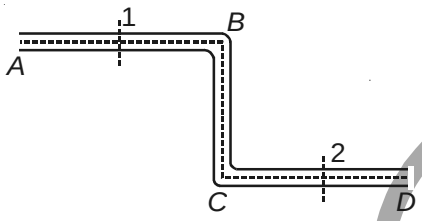
17. What can be the maximum horizontal acceleration of the vessel so that the liquid does not come out? (g = 10 m/s^2)



(1) 1 m/s^2 (2) 2 m/s^2

(3) 4 m/s^2 (4) 5 m/s^2

18. A pipe of uniform cross-section carries a non-viscous liquid in steady state. The part CD of the pipe is 20 cm below the level of the part AB



The velocities at the section 1 and 2 are related as

(1) $v_2 = v_1 + 20$ (2) $v_2 = v_1$

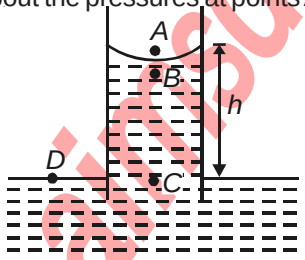
(3) $v_2 = v_1 - 20$ (4) $v_2 > v_1$

19. A rain drop falling with a terminal velocity v_0 splits into eight identical parts. The each part will fall finally with a constant velocity of

(1) $4v_0$ (2) $2v_0$

(3) $\frac{v_0}{2}$ (4) $\frac{v_0}{4}$

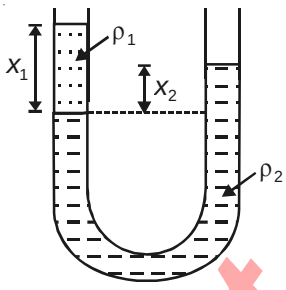
20. The following diagram shows a capillary tube in which water is risen upto height h. Select the correct alternative about the pressures at points A, B, C and D



(1) $p_A = p_B$ (2) $p_A = p_C$

(3) $p_A = p_B = p_C = p_D$ (4) $p_C > p_D$

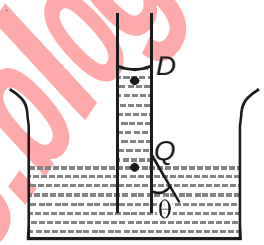
21. In the U-tube shown below two immiscible liquids have densities ρ_1 and ρ_2. Which of the following is correct?



(1) $x_1\rho_2 = x_2\rho_1$ (2) $x_1\rho_1 = x_2\rho_2$

(3) $x_1^2\rho_1 = x_2^2\rho_2$ (4) $x_1\rho_1^2 = x_2\rho_2^2$

22. Liquid reaches in equilibrium as shown in capillary tube of radius r. If surface tension is T, angle of contact is θ and density of liquid is ρ, then pressure difference between the point just below the meniscus D and Q is



(1) $\frac{2T\cos\theta}{r}$ (2) $\frac{T}{r\cos\theta}$

(3) $\frac{2T}{r\cos\theta}$ (4) $\frac{4T}{r}\cos\theta$

23. The density ρ of a sphere of bulk modulus B at depth y in the ocean is related to the density ρ_0 at surface by (σ_0 = density of water)

(1) $\rho = \rho_0\left(1-\frac{\sigma_0 gy}{B}\right)$ (2) $\rho = \rho_0\left(1+\frac{\sigma_0 gy}{B}\right)$

(3) $\rho = \rho_0\left(1+\frac{B}{\sigma_0 gy}\right)$ (4) $\rho = \rho_0\left(1-\frac{B}{\sigma_0 gy}\right)$

24. A piece of wax weight x g in air. A piece of metal is found to weight y g in water. It is tied to the wax and both together weight z g in water. Then specific gravity of wax is (z > y)

(1) $\frac{x}{y}$ (2) $\frac{y}{x}$

(3) $\frac{x}{x-(z-y)}$ (4) $\frac{x}{(x-z)}$

25. A beaker is filled with a liquid of density d upto a height h. If the beaker is at rest, then the mean pressure on the wall is

(1) Zero (2) hdg

(3) $\frac{hdg}{2}$ (4) 2hdg

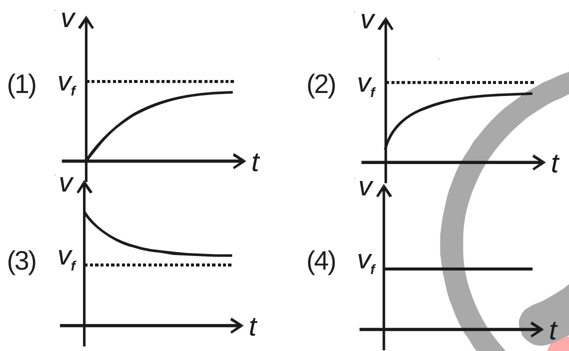
26. A concrete block with a cavity floats in water completely immersed. If relative density of concrete is 5 then find the ratio of the outer volume of the block and volume of the cavity

(1) 5/4 (2) 5/3
(3) 4/3 (4) 6/5

27. A cylindrical container filled with water upto the top is emptied in time t when a small hole is made at the bottom. If the container were filled upto half of the height when time taken to empty the container will be

(1) $\frac{t}{\sqrt{2}}$ (2) $\frac{t}{2}$
(3) $\sqrt{2}\,t$ (4) $\frac{t}{2\sqrt{2}}$

28. A steel ball is thrown downward with speed v_0 into water. The ball finally moves with speed $v_f < v_0$. The correct variation of the speed of the ball with time will be



29. A viscous liquid flows in a capillary at a rate of 10 cc per minute. If radius of the capillary is doubled and the other parameters remaining the same, rate of flow will become

(1) 160 cc/minute (2) 80 cc/minute
(3) 40 cc/minute (4) 20 cc/minute

30. Eight rain drops each of same size fall with terminal speed v_0. What will the terminal speed of the new drop formed when all the eight drops merge together?

(1) $2v_0$ (2) $4v_0$
(3) $6v_0$ (4) $8v_0$

31. A barometer kept in an elevator accelerating upward reads 76 cm. The air pressure in the elevator is

(1) 76 cm (2) < 76 cm
(3) > 76 cm (4) Zero

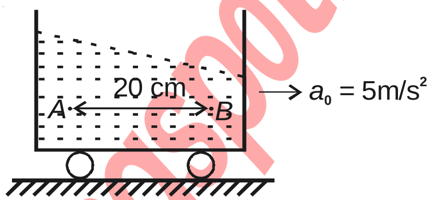
32. If two liquids of same masses but densities ρ_1 & ρ_2 respectively are mixed, then density of the mixture is given by

(1) $\frac{\rho_1+\rho_2}{2}$ (2) $\frac{\rho_1+\rho_2}{2\rho_1\rho_2}$
(3) $\frac{2\rho_1\rho_2}{\rho_1+\rho_2}$ (4) $\frac{\rho_1\rho_2}{\rho_1+\rho_2}$

33. Two stretched membranes of area 2 cm^2 and 3 cm^2 are placed in a liquid at the same depth. Ratio of hydrostatic pressure due to liquid column pressures on them

(1) 1 : 1 (2) 2 : 3
(3) 3 : 2 (4) $2^2 : 3^2$

34. The container of water (ρ = 1000 kg/m^3) shown in the diagram is moved horizontally with acceleration a_0. Find the pressure difference between the points A and B

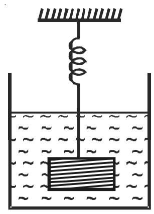


(1) 1000 Pa (2) 1500 Pa
(3) 2000 Pa (4) 2500 Pa

35. A cubical block floats in water with its 40% volume immersed in it. If container is placed in a lift which is accelerating in upward direction with acceleration g/4, then the percentage of volume of block outside the water will be

(1) 40% (2) 50%
(3) 60% (4) 30%

36. A heavy block of mass 4 kg is attached to a spring of spring constant k = 200 N/m and is completely dipped in water. If the extension in the spring is 2 cm then upthrust on the block by water is

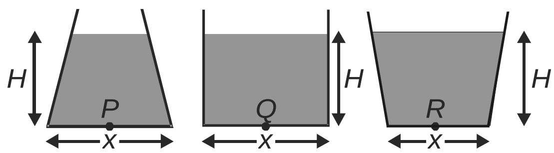


(1) 18 N (2) 36 N
(3) 40 N (4) 22.5 N

37. Work done in blowing a soap bubble of volume V is W. What will be the work done in blowing a soap bubble of volume 8V?

(1) 2 W (2) 4 W
(3) 8 W (4) 16 W

38. W_P, W_Q and W_R are the pressures of the same liquid at point P, Q and R respectively in different container as shown in the figure. The relation between them is



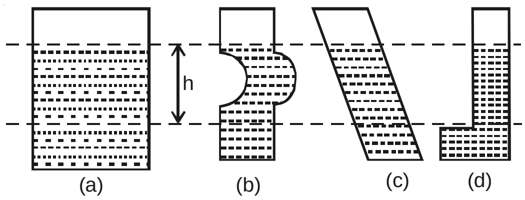
(1) $W_P > W_Q > W_R$ (2) $W_P < W_Q < W_R$
(3) $W_P = W_Q = W_R$ (4) $W_P = W_Q > W_R$

39. A solid of density D is floating in a liquid of density d. If v is volume of solid submerged, then total volume of solid is

(1) $\frac{D}{d}v$ (2) $\sqrt{\frac{D}{d}}v$

(3) $\frac{d}{D}v$ (4) $\frac{d+1}{D}v$

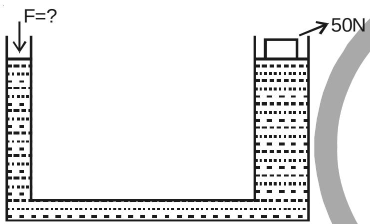
40. The figure shows four containers of olive oil. The order of pressure at the given height(h) is



(1) $P_A>P_B>P_C>P_d$ (2) $P_B>P_A>P_C>P_d$

(3) $P_A=P_B=P_C=P_d$ (4) $P_A=P_D=P_C>P_d$

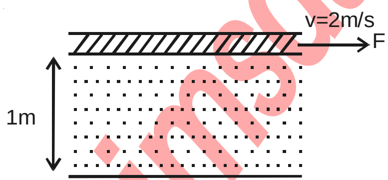
41. The area of cross section of two arms of a hydraulic press are $1 cm^2$ and $10 cm^2$ respectively. If a load of 50N is put on the wider side then force required to keep the load in equilibrium on the other side



(1) 50 N (2) 5 N

(3) 500 N (4) 55 N

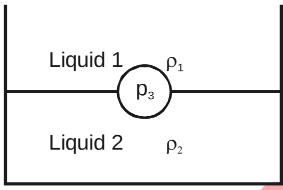
42. A plate of area $2 m^2$ is made to move horizontally with a speed of 2m/s by applying a horizontal tangential force over the free surface of a liquid. If depth is 1m and the liquid in contact with the bed is stationary. (η=0.01 poise). The tangential force



(1) 2×10^{-3} N (2) 2×10^{-2} N

(3) 4×10^{-2} N (4) 4×10^{-3} N

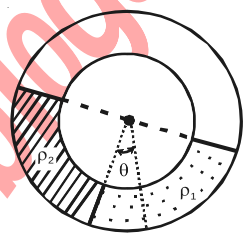
43. A jar is filled with two non mixing liquids 1 and 2 having densities ρ_1 and ρ_2 respectively. A solid ball, made of material of density ρ_3, is dropped in the jar. It comes equilibrium in the position shown in the figure which of the following is true for ρ_1, ρ_2, ρ_3



(1) $\rho_3<\rho_1<\rho_2$ (2) $\rho_2<\rho_3<\rho_1$

(3) $\rho_1<\rho_2<\rho_3$ (4) $\rho_1<\rho_3<\rho_2$

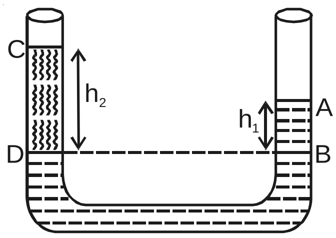
44. A small uniform tube is bent into a circle of radius r whose plane is vertical. Eqval volumes of two immiscible liquids whose demities are ρ_1 and ρ_2 ($\rho_1 > \rho_2$) fill half the circle. The angle between radius passing through interface and vertical axis is given by



(1) $\tan^{-1}\left(\frac{\rho_1}{\rho_2}\right)$ (2) $\tan^{-1}\left(\frac{\rho_2}{\rho_1}\right)$

(3) $\tan^{-1}\left(\frac{\rho_1-\rho_2}{\rho_1+\rho_2}\right)$ (4) $\tan^{-1}\left(\frac{\rho_1+\rho_2}{\rho_1-\rho_2}\right)$

45. In a U-tube, a column AB of water is balanced by column CD of paraffin. The relative density of paraffin is



(1) $\frac{h_2}{h_1}$ (2) $\frac{h_1}{h_2}$

(3) $\frac{h_2-h_1}{h_1}$ (4) $\frac{h_2}{h_1+h_2}$

46. An open vessel containing water is given a constant acceleration 'a' in the horizontal direction. Then the surface of water gets slopped with horizontal at an angle θ given by

(1) $\theta = \tan^{-1}(a/g)$ (2) $\theta = \tan^{-1}(g/a)$

(3) $\theta = \sin^{-1}(a/g)$ (4) $\theta = \cos^{-1}(g/a)$

CHEMISTRY

[Chapter-6 : Thermodynamics]

1. The intensive properties among the following is

(1) Normality (2) pH

(3) E_{cell} (4) All of these

2. ΔH may be equal to zero in

(1) Adiabatic process (2) Isothermal process

(3) Isochoric process (4) Irreversible process

3. The correct relation is

(1) $\Delta H_{hydration} = \Delta H_{solution}$(Anhyd. comp.) $- \Delta H_{solution}$ (hydrated comp.)

(2) $\Delta H_{hydration} = \Delta H_{solution}$(Anhyd. comp.) $+ \Delta H_{solution}$ (hydrated comp.)

(3) $\Delta H_{hydration} = \Delta H_{solution}$(Hydrated comp.) $- \Delta H_{solution}$ (Anhydrated comp.)

(4) $\Delta H_{hydration} = \Delta H_{solution}$(Anhyd. comp.) $- 2 \times \Delta H_{solution}$ (hydrated comp.)

4. The dissociation energy of methane and propane are x and y kJ/mol respectively. The bond energy of C—C bond would be

(1) $\left(\frac{y + 2x}{2}\right)$ kJ (2) $\left(\frac{y - x}{2}\right)$ kJ

(3) $\left(\frac{y - 2x}{2}\right)$ kJ (4) $\left(\frac{y + x}{2}\right)$ kJ

5. Entropy change (ΔS) for isochoric process is given by

(1) $\Delta S = 2.303\ nC_V \log \frac{T_2}{T_1}$

(2) $\Delta S = 2.303\ nC_V \log \frac{P_1}{P_2}$

(3) $\Delta S = 2.303\ nC_P \log \frac{T_2}{T_1}$

(4) $\Delta S = 2.303\ nC_P \log \frac{P_2}{P_1}$

6. If 'a' ml of an acid and 'b' ml of a base is mixed then increase in temperature by x°C what would be the increase in temperature when 2a ml of same acid and 2b ml of same base is mixed?

(1) 2x°C (2) 4x°C

(3) $\frac{x}{2}$ °C (4) x°C

7. If 1500 cal of heat is added to a system while the system does work equivalent to 2500 cal by expanding against the surrounding atmosphere. The change in internal energy of the system is

(1) – 1000 cal (2) 1000 cal

(3) 4000 cal (4) – 4000 cal

8. The enthalpy of solution of MSO_4 and $MSO_4.x\ H_2O$ are –p and q kJ respectively. The enthalpy of hydration of MSO_4 to $MSO_4.x\ H_2O$ will be

(1) – (p + q) kJ (2) (p + q) kJ

(3) (p – q) kJ (4) (q – p) kJ

9. Molar heat capacity for a gas at constant temperature and pressure is

(1) 3/2R

(2) 5/2R

(3) Depends on atomicity of gas

(4) Infinity (∞)

10. The magnitude of work done in an open vessel at 300 K, when 112 g zinc reacts with dil. HCl is

(1) 1022 cal (2) 642 cal

(3) 382 cal (4) 200 cal

11. What is enthalpy change of the following reaction?

$CH_2{=}CH_2 + H_2(g) \rightarrow CH_3{-}CH_3$

Given, C–H, C–C, C=C, H–H an 414, 347, 615 and 435 kJ $mole^{-1}$ respectively

(1) –100 kJ (2) –125 kJ

(3) –150 kJ (4) –175 kJ

12. Combustion of 4 g of methane produces 220 kJ heat. The enthalpy of combustion and calorific values of CH_4 in kJ are respectively

(1) 220 and 440 (2) 440 and 55

(3) 880 and 220 (4) 880 and 55

13. Standard enthalpies of formation of CO_2, H_2O and CH_4 are respectively, –398.8, –241.6 and –76.2 kJ mol^{-1}. The heat produced on combustion of 40 g CH_4 will be nearly

(1) 0.8×10^3 kJ (2) 1.6×10^3 kJ

(3) 2×10^3 kJ (4) 3.2×10^3 kJ

14. For the reaction $\frac{1}{8}S_{8(s)} + \frac{3}{2}O_{2(g)} \rightarrow SO_{3(g)}$, the difference of heat change at constant pressure and constant volume at 27°C will be

(1) +150 R (2) –150 R

(3) +450 R (4) –450 R

15. The incorrect statement among the following is
(1) For an ideal gas, the internal energy depends only on temperature and pressure
(2) For isothermal process, change in internal energy (ΔU) = 0
(3) In thermodynamic reversible process the driving force is infinitesimally greater than the opposing force
(4) 1 litre - atm = 101.3 J

16. If a system at 127°C emit 50 kJ, energy to atmosphere, which is at 27°C. The change in entropy of universe is
(1) $+\frac{1}{24}$kJ (2) $-\frac{1}{24}$kJ
(3) $-\frac{1}{8}$kJ (4) $+\frac{1}{6}$kJ

17. The heats of neutralization of four acids A, B, C, D are –13.7, –9.4, –11.2 and –12.4 kcal respectively. When they are neutralized by a common base. The acidic character obey the order
(1) A > B > C > D (2) A > D > C > B
(3) D > C > B > A (4) B > C > D > A

[Chapter-7 : Equilibrium]

1. Solutions A and B contain one and two moles of CH_3COONH_4 in one litre respectively. The hydrolysis will be
(1) More in A (2) More in B
(3) Same in A and B (4) Very little in A

2. For preparing a buffer solution of pH = 6 by mixing sodium acetate and acetic acid, the ratio of the concentration of salt and acid should be ($K_a = 10^{-5}$)
(1) 1 : 10 (2) 10 : 1
(3) 100 : 1 (4) 1 : 100

3. For a chemical reaction :
$3X(g) + Y(g) \rightleftharpoons X_3Y(g)$; ΔH = –11.2 kcal/mole.
The amount of X_3Y at equilibrium is affected by
(1) Temperature and pressure
(2) Pressure only
(3) Temperature only
(4) Temperature, pressure and catalyst

4. In a closed system
$A(s) \rightleftharpoons 2B(g) + 3C(g)$
If partial pressure of C is doubled, then partial pressure of B will be
(1) $2\sqrt{2}$ times the original value
(2) $\frac{1}{2}$ times the original value
(3) 2 times the original value
(4) $\frac{1}{2\sqrt{2}}$ times the original value

5. Consider the following equilibria at 300 K and 400 K with their K_{eq}.
I. $A(g) \rightleftharpoons 2B(g)$; $K_{eq}^{300\,K} = 10$, $K_{eq}^{400\,K} = 5$
II. $C(g) \rightleftharpoons D(g)$; $K_{eq} = 2$, $K_{eq} = 5$
Which of the following statement is correct?
(1) I is endothermic, II is exothermic
(2) I is exothermic, II is endothermic
(3) I and II both are endothermic
(4) I and II both are exothermic

6. Solubility of $BaSO_4$ in aq. solution is 1×10^{-5} M. Hence solubility in 0.1M $BaCl_2$ is
[K_{sp} $BaSO_4 = 4 \times 10^{-4}$]
(1) 1×10^{-5} (2) 1×10^{-10}
(3) 4×10^{-4} (4) 4×10^{-9}

7. The equilibrium constant K_c of the reaction
$A_2(g) + B_2(g) \rightleftharpoons 2AB(g)$ is 50. If 1 mole of A_2 and 1 mole of B_2 are mixed, the amount of AB at equilibrium would be
(1) 0.467 mol (2) 0.934 mol
(3) 1.55 mol (4) 1.866 mol

8. In which case change in pH is maximum?
(1) 1 ml of pH = 2 is diluted to 100 ml
(2) 0.01 mol of NaOH is added into 100 ml of 0.01 M NaOH solution
(3) 100 ml of H_2O is added to 900 ml of 10^{-6} M HCl
(4) 100 ml of pH = 2 is mixed with 100 ml of pH = 12

9. K_a of Acetic acid is 1.8×10^{-5}. What is $[H_3O^+]$ in a solution which is 0.01 M acetic acid and 0.005 M calcium acetate?
(1) 1.8×10^{-5} M (2) 3.6×10^{-5} M
(3) 0.9×10^{-5} M (4) 0.005 M

10. The partial pressure of NH_3 in the following equilibrium system will be
$NH_2COONH_4(s) \rightleftharpoons 2NH_3(g) + CO_2(g)$;
($K_p = 3.2 \times 10^{-5}$ atm^3)
(1) 2.0×10^{-2} atm (2) 4.0×10^{-2} atm
(3) 3.2×10^{-2} atm (4) 6.4×10^{-2} atm

11. For the equilibrium reaction $AB_2(g) \rightleftharpoons AB(g) + B(g)$ if the initial pressure of AB_2 is 500 torr and equilibrium pressure is 600 torr. The K_p in term of torr for the reaction will be

(1) 20 (2) 50

(3) 25 (4) 100

12. At temperature T K, PCl_5 is 50% dissociated at an equilibrium pressure of 4 atm. At what pressure it would dissociate to the extent of 80% at the same temperature?

(1) 0.05 atm (2) 0.60 atm

(3) 0.75 atm (4) 2.50 atm

13. For the equilibrium,

$CH_3CH_2CH_2CH_{3(g)} \rightleftharpoons$ $CH_3-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH_{3(g)}$

iso-butane

If the value of K_C is 3.0, the percentage by mass of iso-butane in the equilibrium mixture would be

(1) 75% (2) 90%

(3) 30% (4) 60%

14. The dissociation constant of a weak acid HA and weak base BOH are 2×10^{-5} and 5×10^{-6} respectively. The equilibrium constant for the neutralization reaction of the two is

(1) 1.0×10^{-4} (2) 1.0×10^{-10}

(3) 2.5×10^{-1} (4) 1.0×10^{4}

15. The pH of a solution obtained by mixing 100 ml of 0.2 M CH_3COOH with 100 ml of 0.2 M NaOH will be (pK_a for CH_3COOH = 4.74 and log 2 = 0.301)

(1) 4.74 (2) 8.87

(3) 9.10 (4) 8.57

16. In a reaction : $A(g) + 2B(g) \rightleftharpoons 2C(g)$ 2.0 mole of 'A', 3.0 mole of 'B' and 2.0 mole of 'C' are placed in a 2.0 L closed flask, if equilibrium concentration of 'C' is 0.5 mol L^{-1}, the equilibrium constant for the dissociation of C is

(1) 5.0 (2) 20.0

(3) 7.3 (4) 10.0

17. 1.0 mole of $AB_5(g)$ is placed in a closed container under 1 atm. and at 300 K. It is heated to 600 K when 20% by mass of it dissociates as

$AB_5(g) \rightleftharpoons AB(g) + 2B_2(g)$. The resultant pressure is

(1) 1.2 atm (2) 2.4 atm

(3) 2.8 atm (4) 1.4 atm

18. If K_1 and K_2 are respective equilibrium constant for the two reactions

$XeF_6(g) + H_2O(g) \rightleftharpoons XeOF_4(g) + 2HF(g)$

$XeO_4(g) + XeF_6(g) \rightleftharpoons XeOF_4(g) + XeO_3F_2(g)$

the equilibrium constant for the reaction

$XeO_4(g) + 2HF(g) \rightleftharpoons XeO_3F_2(g) + H_2O(g)$ will be

(1) $\frac{K_1}{K_2^2}$ (2) $K_1 \times K_2$

(3) $\frac{K_1}{K_2}$ (4) $\frac{K_2}{K_1}$

19. One mole of N_2 and 3 moles of H_2 are mixed in a litre flask. If 50% N_2 is converted into ammonia by the reaction $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$, then total number of moles of gases at equilibrium is

(1) 1.5 (2) 3.0

(3) 4.5 (4) 6.0

20. The equilibrium constant for the reaction,

$H_{2(g)} + I_{2(g)} \rightleftharpoons 2HI_{(g)}$

is 32 at a given temperature. The equilibrium concentration of I_2 and HI are 0.5×10^{-3} and 8×10^{-3} M respectively. The equilibrium concentration of H_2 is

(1) 1×10^{-3} M (2) 0.5×10^{-3} M

(3) 2×10^{-3} M (4) 4×10^{-3} M

21. The pH of a solution containing 0.1 mol of CH_3COOH, 0.2 mol of CH_3COONa and 0.05 mol of NaOH in 1 L mixture will be (pK_a for CH_3COOH = 4.74)$\log 5 \approx 0.7$

(1) 4.74 (2) 7.0

(3) 5.44 (4) 6.20

22. The dissociation constant of acetic acid is 1.8×10^{-5} and that of NH_4OH is 1.8×10^{-5} at 25°C. The aqueous solution of ammonium acetate is

(1) Acidic (2) Basic

(3) Neutral (4) Slightly acidic

23. If the K_b value in the hydrolysis reaction

$B^+ + H_2O \rightleftharpoons BOH + H^+$

is 1.0×10^{-6}, then the hydrolysis constant of the salt would be

(1) 1×10^{-6} (2) 1×10^{-7}

(3) 1×10^{-8} (4) 1×10^{-9}

24. The concentration of (H^+) and (OH^-) of a 0.1 M aqueous solution of 2% ionised weak acid at 25°C is

(1) 0.2×10^{-3} M and 5×10^{-11} M

(2) 1×10^{-3} M and 3×10^{-11} M

(3) 2×10^{-3} M and 5×10^{-12} M

(4) 3×10^{-2} M and 4×10^{-13} M

1. The oxidation number of S in H_2SO_5 and oxidation number of Cr in CrO_5 is
   (1) +6, +6 (2) +8, +10
   (3) –2, +6 (4) +8, +6

2. What conclusion about the compound Na_4XeO_6 can be drawn from the reaction?
   $XeO_6^{4-}(aq) + 2F^-(aq) + 6H^+(aq) \rightarrow XeO_2(g) + 3H_2O(l) + F_2(g)$
   (1) F_2 is stronger oxidising agent than Na_4XeO_6
   (2) Na_4XeO_6 is stronger oxidising agent than F_2
   (3) Both F_2 and Na_4XeO_6 are equally strong oxidising agents
   (4) Neither F_2 nor Na_4XeO_6 behaves as oxidising agent

3. The correct order of increasing oxidation number of iodine in the compounds is
   (1) HI < I_2 < ICl < HIO_2 < KIO_3
   (2) I_2 < ICl < HI < HIO_2 < KIO_3
   (3) ICl < HIO_2 < HI < KIO_3
   (4) HI < I_2 < ICl < KIO_3 < HIO_2

4. Which of the following are the examples of disproportionation reactions?
   (1) $[Ag(NH_3)_2]^+ + 2H^+ \rightarrow Ag^+ + 2NH_4^+$
   (2) $Cl_2 + 2OH^- \rightarrow Cl^- + ClO^- + H_2O$
   (3) $NaOH + HCl \rightarrow NaCl + H_2O$
   (4) $SnCl_2 + 2HgCl_2 \rightarrow SnCl_4 + Hg_2Cl_2$

5. The standard reduction potentials E^o for the half reactions are as
   $Zn \rightarrow Zn^{2+} + 2e^-$; $E^o = 0.76V$
   $Fe \rightarrow Fe^{2+} + 2e^-$; $E^o = 0.41V$
   The EMF for the cell reaction
   $Fe^{2+} + Zn \rightarrow Zn^{2+} + Fe$ is
   (1) – 0.35 V (2) 0.35 V
   (3) 1.17 V (4) – 1.17 V

6. $K_2Cr_2O_7 + 14HCl \rightarrow 2KCl + 2CrCl_3 + 7H_2O + 3Cl_2$
   In this reaction, equivalent weight of HCl becomes
   (1) 36.5 (2) 71
   (3) 85 (4) Can't be predicted

7. The oxidation number of Cr in K_3CrO_8 is
   (1) +13 (2) +7
   (3) +6 (4) +5

8. Which of the following type of reaction is not always redox reaction?
   (1) Combination reaction
   (2) Displacement reaction
   (3) Decomposition reaction
   (4) All of these

9. A gas X at 1 atm is bubbled through a solution containing a mixture of 1 M Y^- and 1 M Z^- at 25°C. If the reduction potential of Z > Y > X then
   (1) Y will oxidise X and not Z
   (2) Y will oxidise Z and not X
   (3) Y will oxidise both X & Z
   (4) Y will reduce both X and Z

10. The species oxidised and reduced respectively in the reaction $2ClO_3^- + SO_2 + H^+ \rightarrow 2ClO_2 + HSO_4^-$ are
    (1) SO_2 and ClO_3^- (2) ClO_3^- and SO_2
    (3) SO_2 and H^+ (4) ClO_3^- and H^+

11. What is the equivalent weight of I_2 when it is converted into IO_4^-?
    (1) $\frac{\text{Molecular weight}}{2}$ (2) $\frac{\text{Molecular weight}}{7}$
    (3) $\frac{\text{Molecular weight}}{5}$ (4) $\frac{\text{Molecular weight}}{14}$

12. The highest known positive oxidation state of oxygen is
    (1) +6 (2) +4
    (3) +2 (4) +1

13. The oxidation number of two nitrogen atoms in NH_4NO_3 are
    (1) +3 and –3 (2) +5 and –3
    (3) +3 and +3 (4) –3 and –3

14. The equivalent weight of $Na_2S_2O_3$ in the reaction $2Na_2S_2O_3 + I_2 \rightarrow 2NaI + Na_2S_4O_6$ is (M is molecular weight of $Na_2S_2O_3$)
    (1) $\frac{M}{4}$ (2) $\frac{M}{3}$
    (3) $\frac{M}{2}$ (4) M

15. Which of the following reaction is intramolecular redox reaction?
    (1) $Cl_2 + H_2O \rightarrow HCl + HOCl$
    (2) $2Cu^+ \rightarrow Cu + Cu^{+2}$
    (3) $Cu + 2H_2SO_4 \rightarrow CuSO_4 + SO_2 + 2H_2O$
    (4) $2KClO_3 \rightarrow 2KCl + 3O_2$

[Chapter-9 : Hydrogen]

1. Which of the following is not true?
   (1) Hardness of water depends on its behaviour towards soap
   (2) The temporary hardness of water is due to the presence of Ca and Mg bicarbonates
   (3) Permanent hardness is due to the presence of soluble Ca and Mg sulphates and chlorides
   (4) Permanent hardness can be removed by boiling the water
2. One ml of H_2O_2 solution gives 10 ml of O_2 at STP on complete decomposition. It is
   (1) 1 vol. H_2O_2 (2) 10 vol. H_2O_2
   (3) 30 vol. H_2O_2 (4) 20 vol. H_2O_2
3. $H_2O_2 \rightarrow 2H^+ + O_2 + 2e^-$; $E^o = -0.68$ V
   The above equation represents which of the following behaviour of H_2O_2?
   (1) Reducing (2) Oxidising
   (3) Acidic (4) Catalytic
4. In which of the following reaction H_2O_2 neither acts as oxidising agent nor reducing agent?
   (1) $Na_2CO_3 + H_2O_2 \rightarrow$
   (2) $PbS + H_2O_2 \rightarrow$
   (3) $Cr_2O_7^{2-} + H^+ + H_2O_2 \rightarrow$
   (4) $KI + H_2O_2 \rightarrow$
5. Isotope of hydrogen having highest melting point is
   (1) Protium
   (2) Deuterium
   (3) Tritium
   (4) All have same melting point
6. $2NaZ + Ca^{2+} \longrightarrow CaZ_2 + 2Na^+$
   Above reaction is involved in removal of hardness by
   (1) Calgon's method
   (2) Ion exchange method
   (3) Synthetic resin method
   (4) Clark method
7. Last traces of water from H_2O_2, to get pure H_2O_2 is removed by
   (1) Distillation under reduced pressure
   (2) Dehydration in vacuum desiccator
   (3) Freezing
   (4) All of these are possible

[Chapter-10 : s-Block Elements]

1. Which of the following is not a characteristic of electron rich hydrides?
   (1) Elements of group 15 -17 form such hydrides
   (2) Some electrons are present as lone pairs on highly electronegative atom
   (3) The type of hydrides may have unusual high boiling points
   (4) They have expanded octet
2. The incorrect order
   (1) $Li^+ > Na^+ > K^+ > Rb^+$ (hydration)
   (2) Li < Na < K < Rb (ionisation energy)
   (3) Li < K < Na < Rb (density)
   (4) Li < Na < K < Rb (atomic radius)
3. The blue colour of solution of sodium metal in liquid ammonia is due to
   (1) Ammoniated cation (2) Ammoniated electron
   (3) Ammoniated sodium (4) All of these
4. Which of the following alkaline earth metal does not give flame colouration?
   (1) Li (2) Mg
   (3) Ca (4) Ba
5. Incorrect order is
   (1) Be < Mg < Ca < Sr < Ba (electropositive character)
   (2) $Mg^{2+} < Ca^{2+} < Ba^{2+}$ (hydration)
   (3) $Be(OH)_2 < Mg(OH)_2 < Ca(OH)_2$ (basic strength)
   (4) Be > Mg > Ca > Sr (ionisation energy)
6. Ingredients of portland cement are
   (1) Dicalcium silicate, tricalcium silicate, tricalcium aluminate
   (2) Dialuminium silicate, trialuminium silicate, dicalcium silicate
   (3) Dicalcium silicate, tricalcium aluminate, zinc sulphate
   (4) Gypsum, limestone, iron oxide
7. Incorrect statement is
   (1) The electropositive character of alkali metals decreases with increase in atomic number
   (2) Lithium is a hard metal and cannot be cut with a knife
   (3) Alkali metals are strong reducing agents
   (4) Flame colouration is shown by all alkali metals
8. If NaOH is added to an aqueous solution of $ZnSO_4$ white ppt. appears and on adding excess NaOH, the precipitate dissolves due to formation of complex. In solution zinc is in the
   (1) Cationic part of complex
   (2) Anionic part of complex
   (3) Both in cationic and anionic part of complex
   (4) Solution as free Zn^{2+}

9. Considering greater polarisation of Cl^- in LiCl compared to that in NaCl, which of the following statement is wrong?
   (1) LiCl has lower melting point than NaCl
   (2) LiCl dissolves more in organic solvent than NaCl
   (3) LiCl is more covalent than NaCl
   (4) Aqueous LiCl would be less conducting than aqueous NaCl

10. Which compound will show the highest lattice energy?
   (1) RbF (2) CsF
   (3) NaF (4) KF

11. Pick up the wrong statement
   (1) Be like Al dissolve in alkalies
   (2) Oxides of Be and Al are amphoteric
   (3) Beryllium chloride is covalent like aluminium chloride
   (4) Be is more abundant in nature than

12. In oxygen masks for emergency breathing, source of oxygen used is
   (1) Li_2O (2) Na_2O_2
   (3) KO_2 (4) Sr_2O

13. Which of the following is not possible?
   (1) $LiCl \cdot 8H_2O$ (2) $MgCl_2 \cdot 6H_2O$
   (3) $[BeF_4]^{2-}$ (4) $[Al(OH)_4]^-$

14. Correct sequence of density of alkali metal is
   (1) Li < Na < K < Cs (2) Cs < Li > K > Na
   (3) Li < K < Na < Cs (4) Li > Na > K > Cs

15. At absolute zero
   (1) Only para hydrogen exists
   (2) Only ortho hydrogen exists
   (3) Both are present in equal amount
   (4) Ortho present in more amount

16. Bleaching powder on long standing converted into
   (1) $CaCl_2$ and CaO (2) $Ca(ClO_3)_2$ and $CaCl_2$
   (3) $CaCO_3$ and $CaCl_2$ (4) $CaCl_2$ and $CaSO_4$

[Chapter-11 : Some p-Block Elements]

1. The correct order is
   (1) B < Al < Ga (atomic radii)
   (2) B > Al < Ga (ionisation energy)
   (3) B > Al > Ga (metallic character)
   (4) B > Al > Ga (density)

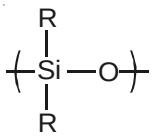
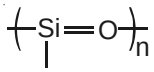
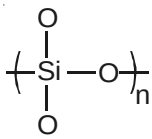
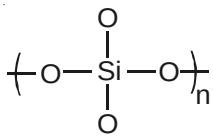
2. Standard electrode potential of Al^{3+}/Al is –1.66 V and that of Tl^{3+}/Tl is 1.26 V correct statement on the basis of above data is
   (1) Tl^{3+} is unstable in solution
   (2) Aluminium metal has high tendency to form Al^{3+} ions
   (3) Tl^{3+} is a powerful oxidising agent
   (4) All of these

3. Diborane cannot be prepared by
   (1) $BF_3 + LiAlH_4 \longrightarrow$
   (2) $NaBH_4 + I_2 \longrightarrow$
   (3) $BF_3 + NaH \xrightarrow{450}$
   (4) By heating boron in N_2 followed by hydrolysis

4. How many banana bonds are present in diborane?
   (1) One (2) Two
   (3) Three (4) Four

5. Which element of group 14 cannot decompose steam?
   (1) Sn (2) Si
   (3) C (4) Pb

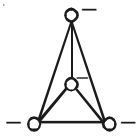
6. Incorrect statement about fullerenes is
   (1) Fullerenes are made by strong heating of graphite in an electric arc
   (2) Fullerens are the most stable allotrope of carbon
   (3) C_{60} contains 20 six membered ring
   (4) All the carbon atoms are sp^2 hybridised in fullerenes

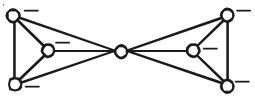
7. The repeating units of silicones are
   (1) 
   (2) 
   (3) 
   (4) 

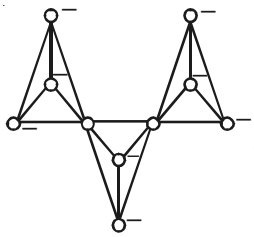
8. On strong heating boric acid yields
   (1) B (2) B_2H_6
   (3) B_2O_3 (4) BO_2

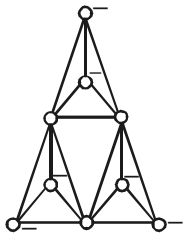
9. The correct acidic nature order is
   (1) $BF_3 > BCl_3 > BBr_3 > BI_3$
   (2) $BCl_3 > BF_3 > BBr_3 > BI_3$
   (3) $BI_3 > BBr_3 > BCl_3 > BF_3$
   (4) $BBr_3 > BI_3 > BCl_3 > BF_3$

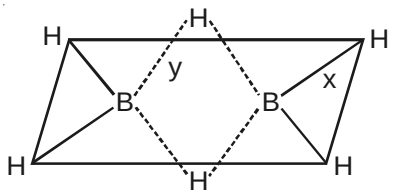
10. Which of the following structure is anion of ortho silicate?

(1) 

(2) 

(3) 

(4) 

11. 

Bond length B – H correctly represented as

(1) x = y (2) x > y

(3) x < y (4) x >> y

12. When Borax is heated in a Bunsen burner flame with CoO on a loop of wire, a _____ coloured $Co(BO_2)_2$ bead is formed

(1) Blue (2) Green

(3) Violet (4) Brown

13. Boric acid is a _____, _____ acid

(1) Strong, monobasic (2) Strong, tribasic

(3) Weak, monobasic (4) Weak, tribasic

14. Producer gas is

(1) $CO + CO_2$ (2) $CO + N_2$

(3) $CO_2 + H_2$ (4) $CO + H_2$

15. Silica can be attacked by

(1) HCl (2) HF

(3) F_2 (4) H_2

16. Number of B – H and B – N – B bonds in borazine respectively is

(1) 4, 4 (2) 3, 3

(3) 6, 2 (4) 6, 3

17. Corundum is

(1) SiC

(2) $Al_2O_3 \cdot 2H_2O$

(3) Al_2O_3

(4) Clay

18. Trisilyl amine is

(1) Pyramidal in shape

(2) Tetrahedral in shape

(3) Trigonal planar in shape

(4) Trigonal bipyramidal in shape

BOTANY

[Chapter - 4 : Morphology of Flowering Plants]

1. Match the following

	Column I	Column II
a.	Marginal placentation	(i) Cucurbitaceae
b.	Axile placentation	(ii) Leguminosae
c.	Basal placentation	(iii) Liliaceae
d.	Parietal placentation	(iv) Poaceae

(1) a(iv), b(iii), c(ii), d(i)

(2) a(i), b(ii), c(iii), d(iv)

(3) a(iii), b(ii), c(i), d(iv)

(4) a(ii), b(iii), c(iv), d(i)

2. What type of tree habit is seen in *Dalbergia*?

(1) Caudex (2) Excurrent

(3) Columnar (4) Deliquescent

3. Disc-stem is the characteristic feature of

(1) Culms (2) Reduced stems

(3) Twiners (4) Lianas

4. Rachis bears a number of lateral leaflets. It is

(1) Simple leaf

(2) Palmately compound leaf

(3) Multifoliate compound leaf

(4) Pinnately compound leaf

5. Which of the following special type of inflorescence is/are derived from cymose inflorescence?

(1) Hypanthodium

(2) Capitate

(3) Cyathium

(4) More than one option is correct

6. In spikelet, flowers are present in axil of

(1) Spathe (2) Involucre

(3) Petaloid bract (4) Lemma

7. In china rose, cotton and lady's finger mode of arrangement of petals is

(1) Valvate (2) Twisted

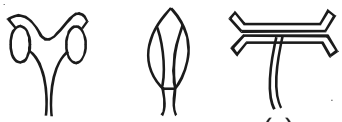
(3) Imbricate (4) Vexillary

8. Versatile type of attachment of anther to the filament is basically
(1) Adnate type
(2) Dorsifixed type
(3) Basifixed type
(4) More than one are correct

9. In syconus type of fruit, small fruitlet (may or may not be formed by female flower) is
(1) Drupe (2) Berry
(3) Achene (4) Regma

10. Aggregate fruits develop from
(1) Polycarpellary syncarpous ovary
(2) Polycarpellary apocarpous ovary
(3) Monocarpellary flower
(4) Complete inflorescence

11. Which of the following condition/s of attachment between anther lobes and filament is/are most advanced ?



(1) a (2) a and b
(3) b (4) c

12. According to the histogen theory extrasteler and steler part is mainly formed respectively by the
(1) Periblem & plerome (2) Plerome & periblem
(3) Both from periblem (4) Both from plerome

13. Short horizontal branch producing a cluster of leaves above, the cluster of roots below is
(1) Runner (2) Sucker
(3) Offset (4) Stolon

14. Male flower is represented by a single stamen in
(1) Cyathium inflorescence
(2) Verticillaster inflorescence
(3) Hypanthodium inflorescence
(4) Corymb inflorescence

15. The floral formula of solanaceae is
(1) $\oplus\ ♀\ K_{(5)}\overset{\frown}{C_{(5)}A_5}\ \underline{G_{(2)}}$
(2) $\%\ ♀\ P_{2\text{ or }3(\text{lodicules})}\ A_{3\text{ or }6\text{ or }\infty}\ \underline{G_1}$
(3) $\%\ ♀\ K_{(5)}\ C_{1+2+(2)}\ A_{1+(9)}\ \underline{G_1}$
(4) $\oplus\ ♀\ \overset{\frown}{P_{3+3}\ A_{3+3}}\ \underline{G_{(3)}}$

16. Syngenesious condition of the stamen refers to
(1) Stamens are free
(2) Anthers are united but filaments are free
(3) Anthers as well as filaments of stamens are united throughout their whole length
(4) When filaments are united in two bundles but anthers are free

17. Which structure is not present in maize seed?
(1) Shield shaped cotyledon
(2) Aleurone layer
(3) Epiblast
(4) Ex-albuminous condition

18. In _____ and _____, the lateral branches originate from the basal and underground portion of the main stem, grow horizontally beneath the soil and then come out obliquely upward giving rise to leafy shoots
(1) Mint, *Chrysanthemum*
(2) *Pistia, Eichhornia*
(3) Mint, Jasmine
(4) Grass, Strawberry

19. Select **incorrect** match
(1) Anthophore - *Silene*
(2) Androphore - *Passiflora*
(3) Gynophore - *Capparis*
(4) Carpophore - Cucurbits

20. Each successive pair of leaves stands at right angles to the next one in
(1) Alternate phyllotaxy (2) Whorled phyllotaxy
(3) Opposite phyllotaxy (4) Spiral phyllotaxy

21. Glumes (modified bracts) are special feature of flowers in family
(1) Cruciferae (2) Malvaceae
(3) Liliaceae (4) Poaceae

22. Racemose inflorescence is an indeterminate inflorescence which shows indefinite growth and bears a number of flowers due to the presence of
(1) Terminal flower
(2) Inactive apical bud
(3) Active growing point
(4) More than one option is correct

23. $\overset{\frown}{C_{(5)}\ A_{(5)}}$ condition is concerned with the members of
(1) Solanaceae (2) Liliaceae
(3) Compositae (4) Brassicaceae

24. Which of the following plants show the fusion of filaments in androecium?
(1) Sunflower (2) *Cucurbita*
(3) Mustard (4) Potato

25. Which one of the floral formula is represented by *Smilax* family?
(1) $\text{Br}\ \%\ ♀\ P_{3+3}\ A_{3+3}\ \underline{G_3}$
(2) $\oplus\ ♀\ K_{(5)}\ C_{(5)}\ A_5\ \underline{G_{(2)}}$
(3) $\text{Br}\ \%\ ♀\ P_3\ \text{lodicules}\ A_6\ \underline{G_1}$
(4) $\text{Br}\oplus\ ♀\ \overset{\frown}{P_{3+3}\ A_{3+3}}\ \underline{G_{(3)}}$

26. Corm is a short, thick, swollen, spherical or subspherical underground and
(1) Horizontal structure
(2) Vertical structure
(3) Green structure
(4) Perennial structure present in Onion

27. Cladode is different from phylloclade in absence of
(1) Spines and branches of unlimited growth
(2) Internode
(3) Chlorophyll
(4) Limited growth

28. Apple and pear fruits are
(1) Eucarpic type
(2) With edible part as fleshy mesocarp
(3) Parthenocarpic type
(4) Pseudocarpic type

29. Mark the **incorrect** statement (w.r.t stem)
(1) Underground modifications act as organ of perennation to tide over conditions unfavourable for growth
(2) Axillary buds develop into thorns, not stem tendrils
(3) Modified aerial stem in *Opuntia* contains chlorophyll
(4) It conducts water, minerals and photosynthates

30. Phyllode of Australian *Acacia* and Phylloclade of *Opuntia*
(1) Are non-green structures
(2) Are sickle shaped structures
(3) Contain spines
(4) Are modification of stems

31. In racemose branching
(1) Terminal bud as well as lateral branches have limited growth
(2) Branches develop from the axillary buds in acropetal succession
(3) Terminal bud remains inactive
(4) Main axis shows limited growth

32. If posterior petal is overlapping the margins of lateral petals. The lateral petals are in turn overlapping the two anterior petals. This aestivation is called as
(1) Vexillary (2) Contorted
(3) Ascending imbricate (4) Valvate

33. Tulip, *Gloriosa, Aloe,* and *Asparagus* are concerned with
(1) $\underline{G}\,1$ (2) $\underline{G}\,(3)$
(3) $\overline{G}\,(2)$ (4) $\underline{G}\,(2)$

34. Which of the following type of corolla and androecium are present in the plant having replum or false septa in ovary?
(1) $C_{1+2+(2)}$ (2) $C_{x4}\,A_{2+4}$
(3) $C_{(5)}\,A_0$ (4) $\overset{\frown}{C_{(5)}\;A_5}$

35. Most common and advanced type placentation are found in the family _____ and _____ respectively
(1) Asteraceae, Solanaceae
(2) Solanaceae, Liliaceae
(3) Liliaceae, Asteraceae
(4) Poaceae, Malvaceae

36. Which of the following inflorescence is a spike with fleshy axis and having both male and female flowers?
(1) Catkin (2) Spadix
(3) Umbel (4) Corymb

37. Basipetal type of flower development & centrifugal opening of flowers are concerned with _____
(1) Raceme (2) Head
(3) Cymose (4) Spike

38. Pappus is the modification of _____ which helps in _____
(1) Bract, autochory (2) Calyx, zoochory
(3) Calyx, anemochory (4) Pericarp, hydrochory

39. In polygamous condition
(1) Male, female and bisexual flowers are present on different plants
(2) Intersexual and male flowers are present on same plant
(3) Intersexual and female flowers are present on same plant
(4) Male, female and bisexual flowers are present on the same plant

40. Read the following statements carefully
(a) One internode long horizontal nonarched stem branch
(b) The branch creeps below the soil surface and grows obliquely upward and produce new shoot
(c) It first grows obliquely upward and then bends down to touch the ground surface
Which of the above statement is concerned with stolon?
(1) a, b and c (2) b and c
(3) Only c (4) a and b

41. How many chromosomes are present in the epithelium layer of barley seed if aleurone layer having 12 chromosomes?
(1) 12 (2) 8
(3) 24 (4) 18

42. Mark the **incorrect** statement
(1) Caruncle is helpful in seed germination
(2) Most of the dicot seeds are non-endospermic
(3) Always 1 cotyledon is present in seed of spermatophytes
(4) Ex-albuminous seeds are present in sem and cucumber

43. Palmately compound leaves can be differentiated from pinnately compound leaves due to
(1) Presence of petiole
(2) Absence of rachis
(3) Presence of leaflets
(4) Absence of buds in the axil of leaflets

44. A_{2+2} and A_{2+4} condition respectively represent
(1) Monoadelphous and didynamous androecium
(2) Polyadelphous and diadelphous androecium
(3) Didynamous and tetradynamous androecium
(4) Tetradynamous and diadelphous androecium

45. Gynobasic type of style is present in _____
(1) *Ocimum* (2) China rose
(3) Mango (4) *Petunia*

46. Match the following

Common Name	**Botanical Name**
(a) Ashwagandha	(i) *Abrus pecatorius*
(b) Jowar	(ii) *Solanum melongina*
(c) Ratti	(iii) *Withania somnifera*
(d) Brinjal	(iv) *Sorghum vulgare*

(1) a(ii), b(i), c(iii), d(iv) (2) a(iii), b(iv), c(i), d(ii)
(3) a(iv), b(ii), c(iii), d(i) (4) a(i), b(iii), c(ii), d(iv)

47. Mark the **correct** one w.r.t. bulbils
(1) Fleshy bud not performing vegetative reproduction
(2) Non-fleshy buds performing vegetative reproduction
(3) Fall from the plant and germinate into new plant
(4) Absent in *Agave*

48. Rhizome is an underground, generally fleshy stem which forms aerial shoots every year during favourable season. It
(1) Lacks axillary buds
(2) Is not horizontal in *Saccharum*
(3) Bears dry cataphylls
(4) Lacks node and internode

49. Proteinaceous layer around endospermic seed is
(1) Seen in dicots (2) Aleurone layer
(3) Epithelial layer (4) Piliferous layer

50. Epiphytes are able to stick to the branches of their supporting plant by
(1) Hygroscopic roots
(2) Spongy velamen tissue
(3) Clinging roots
(4) Absorbing roots

51. Basal placentation develops in
(1) Multilocular ovary
(2) Unilocular ovary with single ovule
(3) Trilocular superior ovary only
(4) Unilocular ovary having ovule on central axis

52. Which of the following are monocarpic plants?
(1) *Capparis*, *Rosa* (2) *Agave*, Bamboo
(3) Bamboo, *Pinus* (4) *Pinus*, *Casuarina*

53. In some plants, growing in swampy areas, many roots come out of the ground and grow vertically upwards. These roots help to get oxygen for respiration. These plants are
(1) *Rhizophora,* Orchids
(2) Orchids, *Jussiaea*
(3) *Bombax*, *Salvinia*
(4) *Rhizophora*, *Sonneratia*

54. In which of the following plants, the modified stem carry out the process of photosynthesis?
(1) *Opuntia, Agave* (2) *Euphorbia*, Lily
(3) *Michelia*, *Crocus* (4) *Opuntia*, *Euphorbia*

55. Venation in leaves of Bamboo and grass is
(1) Unicostate parallel venation
(2) Multicostate, Convergent type of parallel venation
(3) Palmate, divergent type parallel venation
(4) Multicostate, divergent type parallel venation

56. A whorl of more than two leaves at each node is found in
(1) *Nerium*, *Psidium* (2) *Alstonia*, *Calotropis*
(3) *Ocimum*, *Alstonia* (4) *Alstonia*, *Nerium*

57. Select the **correct** statement/s (w.r.t. racemose type of inflorescence)
(i) Main axis terminates into flower
(ii) The development of flowers is acropetal
(iii) The opening of flowers is centripetal
(1) Both (i) and (iii) (2) Both (ii) and (iii)
(3) Both (i) and (ii) (4) All are correct

58. Match the following

Column I (Cohesion of Stamens)	**Column II (Example)**
a. Monadelphous	(i) Lemon
b. Diadelphous	(ii) Sunflower
c. Polyadelphous	(iii) Bean
d. Syngenesious	(iv) Cotton

(1) a(i), b(ii), c(iii), d(iv) (2) a(iv), b(iii), c(ii), d(i)
(3) a(iii), b(iv), c(i), d(ii) (4) a(iv), b(iii), c(i), d(ii)

59. Syngenesious and synandrous condition of stamens (cohesion) are characteristically found in families ____ respectively
(1) Malvaceae and Cucurbitaceae
(2) Compositae and Malvaceae
(3) Cucurbitaceae and Compositae
(4) Compositae and Cucurbitaceae

60. In succulent/fleshy fruits
(1) Undifferentiated pericarp in attached with seed coat
(2) Edible part is never pericarp
(3) Pericarp become fleshy
(4) Pericarp is dry and membranous

61. Edible part of jack fruit is
(1) Fleshy axis, bracts, perianth and seeds
(2) Fleshy receptacle or thalamus
(3) Fleshy axis, cotyledons and pericarp
(4) Succulent perianth and fleshy axis

62. The white spongy structure in castor seed formed by proliferation of outer integument is called
(1) Endosperm (2) Caruncle
(3) Tigellum (4) Hilum

63. Which is not a character associated with stilt root?
(1) Develop from basal node of main stem in grasses
(2) Provide support to the plant like pillars
(3) Develop obliquely at an angle to the stem in *Pandanus*
(4) Have multiple root cap in screwpine

64. Match the following

	Column - I	**Column - II**
a.	Phylloclade	(i) Photosynthetic modified branch
b.	Corm	(ii) One internode long runner
c.	Cladode	(iii) Indefinite photosynthetic stem
d.	Offset	(iv) Vertical underground stem

(1) a(iv), b(ii), c(iii), d(i)
(2) a(iii), b(iv), c(i), d(ii)
(3) a(ii), b(i), c(iii), d(iv)
(4) a(iii), b(ii), c(i), d(iv)

65. All given statements are correct regarding modified subaerial stems, **except**
(1) Suckers never comes out of soil after growing obliquely upward
(2) Offset bears a tuft of leaves above and a tuft of roots below
(3) Stolons are arch forming long lateral branches
(4) Runners have long internodes and roots at nodes

66. Maximum growth and water absorption occur in which regions of the root?
(1) Meristematic, elongation zone
(2) Elongation, root hair zone
(3) Maturation, meristematic zone
(4) Elongation, apical zone

67. Basipetal type of flower development & centrifugal opening of flowers are concerned with _____
(1) Raceme (2) Head
(3) Cymose (4) Spike

68. When ovules are borne on central axis and septa is absent, the type of placentation is
(1) Free central (2) Basal placentation
(3) Axile (4) Parietal

69. Which of the following feature is not associated with root?
(1) Presence of adventitious buds
(2) Balancing organs like root pockets in hydrophytes
(3) Root hair, developing from small sized cells are known as trichoblast
(4) Irrepairable root cap

70. Complete fusion of fruit wall and spermoderm is associated with
a. Graminaceous fruit
b. Fruit of a dicotyledonous family
c. Fertilised unilocular, monocarpellary ovary
d. Fruit having bristly appendages for dispersal
Which of the above statements are **correct**?
(1) a & b (2) b & c
(3) a & c (4) c & d

71. The unbranched stem of bamboo plant
(1) Gives a jointed appearance
(2) Has solid internodes
(3) Has hollow nodes
(4) Is called as scape

72. 'Scape' is an aerial leafless shoot which bear flowers in
(1) Onion (2) *Trapa*
(3) Jack-fruit (4) *Pothos*

73. Bud is condensed immature or embryonic shoot having a growing point surrounded by immature leaves. Which of the following is adventitious bud?
(1) Axillary bud in Begonia
(2) Extra axillary bud in *Ipomoea batata*
(3) Foliar bud in *Bryophyllum*
(4) Extra axillary bud in jack fruit

74. Which of the following is not a modified underground stem for food storage?
(1) Bulbils in *Agave*
(2) Rhizome in ginger
(3) Tuber in *Helianthus tuberosus*
(4) Corm in *Amorphophallus*

75. Phylloclade is
(1) Modification of axillary bud
(2) Green flattened modified stem
(3) One internode long stem
(4) Modified petiole

1. When a cell of parenchyma enters in cell division cycle, the process is termed as
   (1) Maturation (2) Differentiation
   (3) Dedifferentiation (4) Redifferentiation
2. Meristem responsible for increase in the length of stems of grasses is
   (1) Intercalary meristem
   (2) Wound cambium
   (3) Primordial meristem
   (4) Intrafascicular cambium
3. Which of the following is **correct** w.r.t. dicot leaf
   (1) Mesophyll cells are not differentiated
   (2) Mostly the stomata are on lower surface
   (3) Protoxylem is toward lower epidermis
   (4) Vascular bundles are open
4. Which of the following is not related with dicot stem?
   (1) Endodermis is single layered
   (2) Medullary rays are absent
   (3) Presence of hard bast
   (4) Pith is made up of parenchymatous cells situated in the centre of stem
5. Which one of the following is not an example of lateral meristem?
   (1) Wound cambium
   (2) Calyptrogen
   (3) Phellogen
   (4) Interfascicular cambium
6. Cambium (vascular)
   (1) Is absent in dicot leaf
   (2) Is present in monocot stem
   (3) Never develops in dicot stem
   (4) Is present in all leaves
7. Extrastelar secondary growth in dicot stem is due to
   (1) Activity of a primary meristem
   (2) Activity of an intercalary meristem
   (3) Activity of a secondary meristem
   (4) Activity of a meristem arising from pericycle
8. Bark
   (1) Is part of cork
   (2) Is absent in *Betula*
   (3) Is composed of only dead cells
   (4) Includes phloem and cork
9. P-protein found in central part of lumen of sieve tube is associated with
   (1) Translocation of sugar
   (2) Callose formation
   (3) Formation of companion cell
   (4) Tylose formation
10. Wood in angiosperms differs from that of gymnosperms in being
    (1) Homoxylous
    (2) Non-porous
    (3) Heteroxylous
    (4) Homoxylous and polyxylic
11. Pith is absent in
    (1) Monocot root (2) Dicot stem
    (3) Monocot stem (4) All eusteles
12. Which is **not true** for heart wood?
    (1) They have tyloses
    (2) They are rich in extractives
    (3) They are of commercial value
    (4) They are not resistant to water and pests
13. Conjoint, collateral, endarch and closed bundles are characteristic of
    (1) Monocot root (2) Dicot stem
    (3) Dicot root (4) Monocot stem
14. Which of these is an example of non porous wood?
    (1) *Salix* (2) *Populus*
    (3) *Pinus* (4) *Dalbergia*
15. Collenchyma is mainly found in the
    (1) Hypodermis of dicot stem
    (2) Hypodermis of dicot root
    (3) Hypodermis of monocot stem
    (4) More than one option is correct
16. Stinging hairs having poisonous irritating secretions are found on complete surface of _____ to protect itself against herbivory
    (1) *Citrus* (2) *Plumbago*
    (3) *Nepenthes* (4) *Urtica*
17. Quiescent centre or waiting meristem can divide
    (1) Throughout the life span of plant
    (2) Only during flowering shoot formation
    (3) When shoot apex get utilized completely
    (4) When root apical meristem is somehow injured
18. Callose plug is formed in the
    (1) Companion cells of tropical plants
    (2) Vessels of temperate plants
    (3) Sieve tube of tropical plants only
    (4) Sieve tube of temperate plants

19. Vessels differ from tracheids in
(1) Function
(2) Presence of lumen
(3) Distribution in plants and number of cells
(4) Having lignified wall

20. Medullary rays are
(1) Non vascular areas in monocot stem for lateral conduction
(2) Vascular areas in dicot stem for lateral conduction
(3) Non vascular areas for lateral conduction
(4) Non vascular areas in dicot stem for vertical conduction

21. Bicollateral vascular bundles are found in
(1) Cucurbitaceae and Solanaceae
(2) Poaceae and Solanaceae
(3) Cucurbitaceae and Liliaceae
(4) Convolvulaceae and Brassicaceae

22. Metaxylem is directed towards the centre in
(1) Root (2) Stem
(3) Leaf (4) Petiole

23. Find odd one w.r.t. vessels
(1) Tetracentraceae (2) Anacardiaceae
(3) Winteraceae (4) Trochodendraceae

24. Plants having articulated laticifers are
(1) *Euphorbia* and *Ficus*
(2) *Calotropis* and *Nerium*
(3) *Nerium* and *Vinca*
(4) *Hevea* and *Manihot*

25. In monocot stem, schizolysigenous water cavity is present in
(1) Epidermis
(2) Ground tissue
(3) Vascular bundles, above metaxylem
(4) Vascular bundles, below protoxylem

26. The stomatal apparatus consists of
(1) Stomatal aperture + epidermal cells
(2) Stomatal aperture + guard cells
(3) Stomatal aperture + guard cells + subsidiary cells
(4) Stomatal aperture + epithem + complementary cells

27. The position of oldest heart wood in mature dicot stem is
(1) Just below the vascular cambium
(2) Just above the vascular cambium
(3) Just outside the pith
(4) Away from vascular cambium and lies in middle

28. Vessels of same size are uniformly distributed throughout the growth in
(1) *Quercus* (2) *Morus*
(3) *Betula* (4) Oak tree

29. Proplastids are present instead of plastids in which plant tissue?
(1) Parenchyma
(2) Collenchyma
(3) Meristem
(4) Chlorenchyma

30. Plant tissue with maximum refractive index shows
(1) Pectocellulosic cell wall
(2) Lignified cell wall
(3) Conspicuous intercellular space
(4) Ability to divide and grow

31. Secondary meristems are found in
(1) All group of plants
(2) All phanerogams
(3) All angiosperms
(4) Gymnosperms and dicots

32. Find **correct** match between Column-I & Column-II

Column-I	**Column-II**
a. Interfascicular cambium	(i) Secondary cortex
b. Phellogen	(ii) Grit cells
c. Brachysclereids	(iii) p-protein
d. Leptome	(iv) Medullary ray cells

(1) a(iii), b(i), c(ii), d(iv) (2) a(iv), b(i), c(ii), d(iii)
(3) a(i), b(iv), c(iii), d(ii) (4) a(iv), b(ii), c(i), d(iii)

33. The metabolic functions of mature sieve tube are controlled by
(1) Its own nucleus
(2) The nucleus of companion cells
(3) The nucleus of albuminous cells
(4) The nucleus of phloem parenchyma

34. Trichomes are epidermal hairs of
(1) Root
(2) Stem
(3) Leaf
(4) More than one option is correct

35. In dicot stem, stele consists of
(1) Hypodermis + cortex + endodermis
(2) Endodermis + pericycle + pith
(3) Pericycle + pith + pith rays
(4) Pericycle + vascular bundles + pith

36. Intraxylary phloem originates from
(1) Procambium
(2) Interfascicular cambium
(3) Cork cambium
(4) Phelloderm

37. Palisade parenchyma in dorsiventral leaf is
(1) Placed abaxially
(2) Oval cells with fewer chloroplast
(3) Made up of oval or round cells with intercellular spaces
(4) Made up of closely arranged column shaped cells

38. Type of vascular bundle in *Yucca* is
(1) Bicollateral (2) Collateral open
(3) Amphicribal (4) Amphivasal

39. Duramen is
(1) Functional wood
(2) Light coloured
(3) Less durable
(4) Tracheary elements with deposition of tannins and resins

40. Which one of the following pair of tissues is formed as a result of redifferentiation?
(1) Interfascicular cambium and duramen
(2) Phellogen and phellem
(3) Annual rings and phelloderm
(4) Vascular cambium and cork cambium

41. Caruncle is present in the seeds of
(1) *Cocos nucifera* (2) *Piper nigrum*
(3) *Triticum aestivum* (4) *Ricinus communis*

42. Select **odd** one out w.r.t. axile placentation
(1) Develops in bi-multicarpellary, syncarpous ovary
(2) Ovules are present on central axis
(3) May be unilocular or multilocular
(4) Number of locules correspond to the number of carpels

43. Match the following w.r.t. types of fruit

	Column I		**Column II**
a.	Coconut	(i)	Mulberry
b.	Pomegranate	(ii)	Balausta
c.	Fennel	(iii)	Drupe
d.	Sorosis	(iv)	Cremocarp

(1) a(iii), b(ii), c(iv), d(i) (2) a(ii), b(iii), c(iv), d(i)
(3) a(iii), b(ii), c(i), d(iv) (4) a(iv), b(ii), c(i), d(iii)

44. Cork cambium formed in dicot stem during secondary growth is secondary meristem, because
(1) It is formed in stelar region
(2) Adds secondary tissues on its both sides
(3) It develops from primary permanent tissue
(4) It can redifferentiate to form secondary permanent tissue

45. Collenchyma is characterised by all, except
(1) Have high refractive index
(2) Are the only living mechanical tissue
(3) Possess high amount of pectin
(4) Not found in monocot root and dicot stem

46. Vessels are characteristically present in members of
(1) Gnetaceae (2) Tetracentraceae
(3) Winteraceae (4) Trochodendraceae

47. Vascular bundles in dicot leaf
(1) Are closed
(2) Have xylem towards adaxial side of leaf
(3) Are conjoint and collateral but not surrounded by bundle sheath
(4) More than one options are correct

48. Pericycle cells just opposite to the protoxylem are involved in formation of
(1) Lateral roots
(2) Whole of cork cambium in monocot stem
(3) Whole of cambium in dicot root
(4) Cambium ring in dicot stem

49. Monocot stem differs from dicot stem in
(1) Presence of intrafascicular cambium
(2) Absence of V or Y shaped xylem
(3) Presence of schizolysigenous water cavity
(4) Having eustele

50. Mark the **correct** one (w.r.t. meristematic tissue)
(1) Cells are isodiametric with intercellular spaces
(2) Have well differentiated plastids
(3) Are metabolically inactive and have low nucleocytoplasmic ratio
(4) Do not have ergastic substances and thick wall

51. Monocot root has all the structures internally, **except**
(1) Well developed medulla
(2) Sclerenchymatous pericycle
(3) Polyarch condition in vascular region
(4) Uncutinised piliferous layer with root hairs

52. Which of these may not be included in epidermal tissue system?
(1) Bulliform cells in grasses
(2) Cystolith containing cells
(3) Stomatal apparatus
(4) Casparain strips

53. A group of newly formed cells which becomes structurally and functionally specialized and loose the ability to divide are called
(1) Permanent tissue
(2) Meristematic tissue
(3) Redifferentiated cells
(4) Both (1) & (3) are correct

54. Which one of the following statements about parenchyma is **incorrect**?
(1) It forms the major part of the primary plant body
(2) The cells are generally anisodiametric
(3) May be closely packed or have intercellular spaces
(4) It performs various functions like photosynthesis, storage, secretion

55. If secondary xylem of a dicot tree in 2001 had 54 growth rings at the base of its stem then according to dendrochronology what will be the age of this tree by the year 2015?
(1) 64 years (2) 68 years
(3) 60 years (4) 62 years

56. Meristem which forms the primary vascular tissue is
(1) Dermatogen (2) Procambium
(3) Vascular cambium (4) Ground meristem

57. Presence of conjunctive tissue, tetrarch condition of vascular bundles and presence of casparian strips are observable features in the section of
(1) Dicot stem (2) Monocot stem
(3) Dicot root (4) Monocot root

58. Which one of the following is **not correct** w.r.t. the spring wood?
(1) It is lighter in colour and has higher density
(2) It is having larger number of xylary elements
(3) It possess vessels with wider cavities
(4) It is formed due to slow activity of cambium

59. Following are the features related to secondary growth in dicot root, **except**
(1) Cells of conjunctive tissue below phloem bundles become meristematic by dedifferentiation
(2) The cells of pericycle lying opposite to protoxylem become meristematic by differentiation
(3) The cambium formed in root is completely a secondary meristem
(4) The number of cambial strips is equal to the number of phloem bundles

60. Choose the **incorrect** match
(1) Bifacial leaf – Dicot leaf
(2) Hypostomatic leaf – Monocot leaf only
(3) Dorsiventral leaf – *Nerium*
(4) Multiple leaf epidermis – Banyan

61. Which the of the following meristems helps in the formation of stele of stem?
(1) Dermatogen (2) Periblem
(3) Plerome (4) Protoderm

62. The chief water conducting elements in gymnosperms and angiosperms respectively are
(1) Vessels, Tracheids
(2) Companion cell, tracheids
(3) Tracheids, vessels
(4) Trachea, vessels

63. Jute obtained from *Corchorus capsularis* is a
(1) Collenchymatous xylem fibre
(2) Parenchymatous xylem fibre
(3) Sclerenchymatous xylem fibre
(4) Sclerenchymatous phloem fibre

64. Anatomically root differs from stem in
(1) Presence of centrifugal xylem & radial V. Bs.
(2) Absence of cortex and pith
(3) Having phloem parenchyma and vessels in xylems
(4) Presence of radial vascular bundles

65. The epidermal tissue has all of the following functions **except**
(1) Help in checking excessive loss of water
(2) Stomata present on the leaves help in transpiration only
(3) The trichomes help in protection of plant
(4) The trichomes help in the reduction of water loss and dispersal of seeds, fruits

66. Pits represent unthickened areas present in the secondary wall. The thickening which is absent at pit bearing area is
(1) Pectin (2) Lignin
(3) Cellulose (4) Hemicellulose

67. Xylem parenchyma cells
(1) Make tylose in sieve tubes
(2) Can store fat and tannins
(3) Are living and thick walled
(4) Always show apotracheal condition

68. Following are the features related to secondary growth in dicot root, **except**
(1) Cells of conjunctive tissue below phloem bundles become meristematic by dedifferentiation
(2) The cells of pericycle lying opposite to protoxylem become meristematic by differentiation
(3) The cambium formed in root is completely a secondary meristem
(4) The number of cambial strips is equal to the number of phloem bundles

69. Which part of the wood is more durable and resistant to the attack of the micro-organisms and insects?
(1) Alburnum (2) Heart wood
(3) Sap wood (4) Soft wood

70. Period between the appearance of two successive leaf primordia is
(1) Plastochron (2) Chromagen
(3) Promeristem (4) Prosenchyma

71. Choose the **odd** one out w.r.t. secondary meristem
(1) Lateral in position
(2) Increase girth of organs
(3) Possess elongated cells
(4) Do not possess vacuole

72. Maturation of xylem is centrifugal in
(1) Monocot root (2) Dicot stem
(3) Dicot root (4) Dicot leaf

73. Sieve tube elements
(1) Possess lignified wall
(2) Are associated transversely with ontogenically similar cells
(3) Possess P-proteins in sieve pores
(4) Shows senescence of protoplast at the mature stages

74. Choose the **odd** one w.r.t. transverse section of monocot root
(1) Formation of protective exoderm in outer cortex
(2) Polyarch xylem
(3) Distinguished phloem parenchyma
(4) Thickening of conjunctive tissue at later stages

75. Select **incorrect** statement w.r.t. secondary phloem
(1) Restricted to stems and roots of perennial dicots and gymnosperms
(2) Phloem fibres are fewer
(3) It is more abundant with regular arrangement
(4) Is the product of lateral meristem

76. Intrusion of parenchymatous cells into tracheary elements during heart wood formation
(1) Facilitates the water transport
(2) Is seen only in outer part of wood
(3) Gives the wood darker appearance
(4) Forms tylose plugs

77. Choose the **incorrect** statement w.r.t. collenchyma
a. Cell wall thickenings can be present continuously or in patches
b. May contain chloroplast
c. Associated with fruit wall of nuts
d. Provides support to delicate plant parts like petiole of a leaf and floral parts
e. Shows high refractive index
(1) Both b & c (2) a & d only
(3) c & e only (4) Only c

78. Choose **odd** one out w.r.t. function of endodermis
(1) Prevents passage of air and water when casparіated
(2) Dead, metabolically inactive cells
(3) Perform storage of food as starch sheath
(4) Acts as biological checkpost

79. Which one of the following pair of conducting tissue is derived from same mother cells?
(1) Companion cells and sieve tube
(2) Albuminous cells and sieve cells
(3) Sieve tube and bast fibre
(4) Phloem parenchyma and companion cells

80. Maturation of xylem is centripetal in
(1) Monocot root (2) Dicot stem
(3) Dicot leaf (4) Monocot stem

81. In dorsiventral leaf
(1) Vascular bundles does not show variation in size
(2) Adaxially placed mesophyll cells are arranged vertically and parallely
(3) Large, empty, colourless epidermal cells are present
(4) Vascular bundles are surrounded by thick walled bundle cap

82. Vascular cambium of dicot root in stelar region originate
(1) Through dedifferentiation of secondary permanent tissue
(2) Partly from a portion of pericycle just above the metaxylem
(3) Completely from pericycle
(4) Partly from tissue located just below the phloem bundles

83. Meristem formed at young stages of plant but show its functionality in later stages of plant development
(1) Is formed through the process of dedifferentiation
(2) Produces primary tissues
(3) Brings about increase in girth of plant
(4) Is called cork cambium

84. Choose the **odd** one out w.r.t. product obtained from heart wood
(1) Haematoxylin (2) Brasilin
(3) Santalin (4) Cork

85. In some species companion cells have numerous cell wall ingrowths, but are poor in plasmodesmatal connections. These companion cells are
(1) Transfer cells
(2) Intermediary cells
(3) Ordinary companion cells
(4) Albuminous cells

86. Find **correct** match

	Column-I		**Column-II**
a.	Idioblast	(i)	Pectocellulose
b.	Collenchyma	(ii)	Ergastic substances
c.	Brachysclereids	(iii)	Stone cells
d.	Osteosclereids	(iv)	Prop cells

(1) a(ii), b(i), c(iii), d(iv) (2) a(ii), b(i), c(iv), d(iii)
(3) a(iii), b(iv), c(ii), d(i) (4) a(iv), b(iii), c(ii), d(i)

87. When vessels of same size are uniformly distributed throughout the secondary growth then the wood is
(1) Ring porous wood
(2) Diffuse porous wood
(3) Homoxylous wood
(4) Non-porous, soft wood

88. Plants having V or Y shaped vessels arrangement in their vascular bundles show one of the following feature *i.e.*
(1) Undifferentiated sclerenchymatous ground tissues from hypodermis to centre of stem
(2) Conjoint, collateral, endarch and open vascular bundles
(3) Scattered vascular bundles throughout the ground tissue
(4) Presence of phloem parenchyma

89. Cells that help in the rolling of leaves in some grasses are associated with
(1) Epidermal tissue system
(2) Ground tissue system
(3) Fundamental tissue system
(4) Conducting tissue system

90. Which of the following tissue or meristem is primary in origin but secondary in function?
(1) Interfascicular cambium
(2) Intrafascicular cambium
(3) Vascular cambium
(4) Cork cambium

[Chapter - 6 : The Cell : The Unit of Life]

1. Which of the following is incorrect statement?
(1) ATPase activity is present in dynein protein
(2) Histone proteins are lysine and arginine rich
(3) A pair of centrioles is called diplosome
(4) Grana are present in chloroplast of algae and bundle sheath chloroplast of C_4 plants

2. The total number of protofilaments in all the A subfibrils of a centriole is
(1) 13 (2) 117
(3) 147 (4) 39

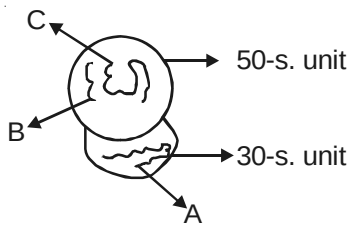
3. Sarcoplasmic reticulum store _____ which are required for _____
(1) Ca^{++}, nerve impulse conduction
(2) Mg^{++}, detoxification
(3) Ca^{++}, muscle contraction
(4) Mg^{++}, ionic balance

4. Match the items in column I with column II and choose the **Correct** answer.

Column I	**Column II**
a. Sap vacuole	1. contains digestive enzyme
b. Contractile vacuole	2. stores metabolic gases
c. Food vacuole	3. osmoregulation
d. Air vacuole	4. stores lipids
e. Sphaerosome	5. stores and concentrates mineral salts and nutrients

(1) a–5, b–3, c–1, d–2, e–4
(2) a–2, b–3, c–4, d–5, e–1
(3) a–5, b–3, c–2, d–4, e–1
(4) a–4, b–1, c–3, d–5, e–2

5. In a prokaryotic ribosome as shown below, identify A, B and C are



(1) 16S rRNA, 5S rRNA, 23S rRNA
(2) 18S rRNA, 5.8S rRNA, 28S rRNA
(3) 185 rRNA, 5S rRNA, 23S rRNA
(4) 16S rRNA, 5.8S rRNA, 23S rRNA

6. Choose the **incorrect** match
(1) Membrane of RBC – 60% protein
(2) Axoneme of flagella – 9 + 0 structure
(3) Oleosomes – Synthesis of fats
(4) Jenus green B – Mitochondria

7. Select **incorrect** statement for 70 S ribosome
   (1) r-RNA / protein ratio is 60 : 40
   (2) Its subunit is 30 S and 50 S
   (3) 16 S RNA is a part of 30 S subunit
   (4) Are attached to ER by ribophorin
8. Endoplasmic reticulum, apart from giving mechanical support to cytoplasmic matrix, also performs a number of functions like
   (1) Synthesis of serum proteins
   (2) Synthesis of lipids, toxification of drugs
   (3) Associated with muscle contraction by release and uptake of Mn^{2+} ion
   (4) Both (1) & (3) are correct
9. Which of the following statement is not concerned with fluid mosaic model of plasma membrane?
   (1) Phospholipid forming a water resistant barrier
   (2) Glycocalyx at inner surface
   (3) Mosaic pattern of proteins
   (4) More extrinsic protein at inner surface
10. Eukaryotic cells have a well organised nucleus and
   a. Both 70S and 80S types of ribosomes
   b. Flagella associated with 9 + 2 organisation
   c. Shows cytoplasmic streaming
   d. Their DNA is complexed with histones to constitute the chromatin
   (1) All are correct
   (2) Only a is incorrect
   (3) Only c and d are correct
   (4) Both b and c are wrong
11. Find out the component of plasma membrane which helps in cell to cell recognition
   (1) Cholesterol (2) Glycocalyx
   (3) Intrinsic proteins (4) Cephalin
12. Choose the **odd** one out w.r.t. SER
   (1) Lipid and sterol synthesis
   (2) Glycogenolysis
   (3) Detoxification of toxic substances
   (4) Nissl's granule in nerves
13. Select an **incorrect** match w.r.t. depositions
   (1) Silica - Grass leaves
   (2) Calcium - *Chara*
   (3) Suberin - Cork cells
   (4) Lignin - Secondary phloem
14. All given statements stand true for plasma membrane, **except**
   (1) Lipids are asymmetric and amphipathic
   (2) Lipids show flip-flop movement
   (3) Oligosaccharides are absent on inner surface of membrane
   (4) The amount and types of extrinsic proteins is same on both surfaces of membrane
15. Triglyceride metabolism to convert fats into energy sources is helped by glyoxylate cycle. The organelle responsible for this is found in
   (1) Castor seeds (2) Maize seeds
   (3) Wheat seeds (4) Pea seeds
16. Each centriole has a cart wheel organisation having a whorl of tubulin fibrils at periphery. These peripheral fibrils are composed of
   (1) 27 microtubules (2) 9 microtubules
   (3) 18 microtubules (4) 11 microtubules
17. Find out all the proteins composing a eukaryotic flagella
   (1) Flagellin, tubulin, dyenin
   (2) Tubulin, nexin, dyenin and flagellin
   (3) Dyenin, tubulin and nexin
   (4) Nexin, tubulin and flagellin
18. Chloroplast resembles with mitochondria in
   (1) Presence of porins in outer membrane
   (2) Having circular DNA and 70S ribosomes
   (3) Presence of ETS and cardiolipin in inner membrane
   (4) More than one option is correct
19. Find the **correct** statement w.r.t. bacterial cell structure
   (1) Chromatophores in green bacteria are covered by non-unit, non-lipid and protein membrane having chlorphyll and phycobilins
   (2) In some bacteria sterols are replaced by hopanoids which act as membrane stabilizers
   (3) DNA is exclusively coiled and looped with the help of polyamines and histones
   (4) Bacterial ribosomes contain, 23S 18S and 5S rRNA along with 21 and 34 proteins in small and larger subunits respectively.
20. Find **correct** statement
   (1) Ratio of proteins and lipids in RBC membrane is 40 : 52
   (2) More extrinsic proteins are found on outer side of RBC membrane
   (3) Peripheral protein spectrin is found towards cytosolic face of RBC membrane
   (4) RBC membrane is impermeable to gases
21. Choose **incorrect** statement w.r.t. mitochondria
   (1) Associated with oxidative phosphorylation
   (2) DNA is double stranded and circular
   (3) Sperm contributes no mitochondria to zygote
   (4) It has ribosomes similar to cytoplasm

22. Eukaryotic flagella have
(1) 18 subfibrils in centriole
(2) Nexin protein in A – B linker
(3) ATPase activity in tubulins
(4) Nine triplets in central axoneme

23. Polytene chromosomes
(1) Have a common centromere called chromocentre
(2) Shows somatic pairing during diplotene stage
(3) Have lateral loops on axial DNA
(4) Do not have ring like structures

24. Which is **not true** for secondary cell wall?
(1) Laid inner to primary wall
(2) Has low hemicellulose and protein than primary wall
(3) It grows by intussusception
(4) May have bordered pits

25. Basal granule in eukaryotic flagella
(1) Has '9 + 2' organisation
(2) Is composed of 27 subfibrils of tubulin
(3) Has ATPase activity in dynein protein
(4) Is surrounded by plasma membrane

26. Which of the following statement is **correct**?
a. Flagella have 9 + 2 arrangement of microtubules
b. Centrioles have 9 + 0 arrangement of microtubules
c. Structure of kinetosome and centriole is same
(1) Only a, b are correct
(2) a, b, c are correct
(3) Only b, c are correct
(4) a, c are incorrect

27. Which one of the following feature is **incorrect** w.r.t. fluid mosaic model of plasma membrane?
(1) Membrane bears non-polar hydrophobic tails of phospholipids pointed outwards
(2) Phospholipid molecules provide fluidity
(3) Intrinsic proteins constitute major part of total proteins
(4) Proteins provide mosaicness to the membrane

28. The demolition squad of the cell does not perform one of the following functions
(1) Helps in intracellular digestion
(2) Removes wastes from the cell by acting as scavenger
(3) Disappearance of tail in tadpole larva
(4) Provides catalase to decompose H_2O_2

29. Match the following

Column I	Column II
a. Regulator of cell cycle	(i) Peroxisome
b. Traffic inspector of cell	(ii) Lysosome
c. Autophagy	(iii) Golgi Bodies
d. Detoxification	(iv) Centriole

(1) a(iii), b(iv), c(ii), d(i) (2) a(iv), b(iii), c(ii), d(i)
(3) a(iii), b(iv), c(i), d(ii) (4) a(iv), b(iii), c(i), d(ii)

30. Eukaryotic cell differs from prokaryotic cell in having
(1) Murein
(2) Pili
(3) Cytoplasmic streaming
(4) Ribosomes

31. Which of the following is incorrectly matched?
(1) Golgibodies – Secretion of proteins
(2) Lysosomes – Beever
(3) Peroxisomes – Photorespiration
(4) Secondary wall – Accretion

32. Which of the following statement is incorrect?
(1) Plasma membrane is asymmetrical because the membrane associated lipids are asymmetric
(2) Fluid mosaic model of biomembranes is the latest and most widely accepted model
(3) Facilitated transport across plasma membrane does not respond to protein inhibitors
(4) Cell wall functions as apoplast

[Chapter 7 : The Cell Cycle and Cell Division]

1. Chromosome condensation during cell division is mainly due to
(1) Synthesis of cyclins
(2) Positive charge in histone protein and negative charge in DNA
(3) Destruction of most proteins
(4) Formation of recombination nodule and synaptonemal complex

2. Synaptonemal complex
(1) Appears in zygotene and disappear in pachytene
(2) Appears in pachytene and disappears in diplotene
(3) Appears in zygotene and disappears in diplotene
(4) Appears in leptotene and disappears in pachytene

3. In Intranuclear mitosis
(1) Nuclear membrane is ruptured
(2) Nuclear membrane persists
(3) Spindle formation is absent
(4) More than one option is correct

4. Congression is
   (1) Centripetal movement of chromosomes
   (2) Arrangement of chromosomes in ball like structure in anaphase
   (3) Anaphasic movement of chromosomes
   (4) Condensation of chromosomes

5. Match the following

	Column I		Column II
a.	Tetravalent stage	(i)	Diplotene
b.	Appearance of chiasmata	(ii)	Leptotene
c.	Synapsis	(iii)	Pachytene
d.	Bouquet stage	(iv)	Zygotene

   (1) a(iii), b(i), c(iv), d(ii) (2) a(i), b(ii), c(iii), d(iv)
   (3) a(ii), b(iv), c(i), d(iii) (4) a(iv), b(ii), c(i), d(iii)

6. During Meiosis-I the nuclear membrane and nucleolus degenerates during
   (1) Diakinesis (2) Leptonema
   (3) Metaphase-I (4) Zygotene

7. A cell with chromosome number = 10 after completion of Meiosis-I, would be having how much of chromosome number in its parent cell and its daughter cells after meiosis-II respectively
   (1) 10 & 10 (2) 20 & 20
   (3) 20 & 10 (4) 10 & 20

8. One of the following statements is **wrong**
   (1) G_1 phase is also known as restriction phase
   (2) DNA replication takes place in S-phase
   (3) G_2 phase is premitotic phase
   (4) G_2 phase is known as decision phase for cell division

9. How many meiotic divisions are required to produce 32 seeds in *Cyperus* plant?
   (1) 40 (2) 32
   (3) 64 (4) 16

10. How many mitotic divisions are required to produce 100 cells?
   (1) 99 (2) 50
   (3) 10 (4) 25

11. Select an **incorrect** statement w.r.t. metaphase
   (1) Spindle fibres are attached to small disc shaped structures at the surface of centromeres called kinetochores
   (2) The plane of alignment of the homologous pair of chromosomes at metaphase is referred to as the metaphasic plate
   (3) Chromosome appears to be made up of two sister chromatids
   (4) The size of chromosomes can be studied in this phase

12. Cells in _____ remain metabolically active but no longer proliferate unless called on to do so, depending on the requirement of the organism
   (1) G_1 phase
   (2) G_0 stage
   (3) Quiescent stage
   (4) More than one option is correct

13. Terminal meiosis occurs in cells of organism showing
   (1) Diplontic life cycle
   (2) Haplontic life cycle
   (3) Diplohaplontic life cycle
   (4) Haplodiplontic life cycle

14. How many meiotic division will it take to produce 227 seeds in Cyperaceae?
   (1) 284 (2) 227
   (3) 454 (4) 114

15. Select **correct** option for diplotene stage out of the following statements
   a. Synapsis
   b. Distinct chromomeres
   c. Desynapsis
   d. Appearance of recombination nodules
   e. Starting of terminalization
   f. Dissolution of synaptonemal complex
   g. Distinct chiasmata
   (1) c, e, f & g (2) c, d, e & f
   (3) d, e, f & g (4) c, d, f & g

16. All given statements are incorrect, **except**
   (1) Content value of DNA will be half of the G_1 value at one pole of anaphase-I
   (2) Congression occurs in metaphase
   (3) Centromere splits in both anaphase and anaphase-I
   (4) Cytokinesis is successive or simultaneous type in plants following cell furrow method

17. Match the following

	Column-I		Column-II
a.	Leptonema	(i)	Dictyotene
b.	Zygonema	(ii)	Tetrad
c.	Pachynema	(iii)	Pairing of chromosome
d.	Diplonema	(iv)	Bouquet formation

   (1) a(iv), b(iii), c(ii), d(i) (2) a(iii), b(ii), c(i), d(iv)
   (3) a(iii), b(iv), c(i), d(ii) (4) a(i), b(iv), c(ii), d(iii)

18. Find the **correct** statement in relation to meiosis-I
(1) Disappearance of nucleolus occurs in pachytene
(2) Condensation of chromatin starts in diplotene
(3) Each metaphasic plate possesses half the total number of chromosomes
(4) Division of centromere occurs in anaphase-I

19. Which of the following events are concerned with the G_1-phase?
(i) Synthesis of tubulin
(ii) Decision of cell cycle
(iii) Maximum growth
(iv) Synthesis of histones
(v) Synthesis of all types of RNA
(1) (ii), (iii), (v) (2) (i), (ii), (v)
(3) (ii), (iii), (iv) (4) (iii), (iv), (v)

20. Meiosis involves/characterized by
(1) Pairing of non-homologous chromosomes and recombination between them
(2) Formation of chiasmata
(3) Its absence in humans
(4) No centromeric division

21. If the amount of DNA in a sperm is 3 picogram, then amount of DNA in a stem cell in G_2 stage will be ___ picogram
(1) 3 (2) 6
(3) 9 (4) 12

22. Mark the **correct** one (w.r.t. mitotic anaphase)
(1) Splitting of centromere
(2) Complete disintegration of nuclear membrane
(3) Initiation of assembly of mitotic spindle
(4) Initiation of condensation of chromosomal material

23. An activated complex essential to regulate the events of M-phase is
(1) Cyclin (2) CDK
(3) Exonuclease (4) MPF

24. Eumitosis is
(1) Mitosis without asters formation
(2) Mitosis with disappearance of nuclear membrane
(3) Intranuclear mitosis
(4) Anastral mitosis

25. If the DNA content of a haploid cell is 2 picogram, then the DNA content in its mother cell at G_2 phase will be
(1) 2 picogram (2) 1 picogram
(3) 4 picogram (4) 8 picogram

26. An event not associated with anaphase I of meiosis is
(1) Polar movement of chromosome
(2) Formation of synaptonemal complex
(3) Appearance of interzonal fibre
(4) Repolymerisation of continuous spindle fibres

[Chapter 8 : Transport in Plants]

1. Guttation suggests that
(1) Plant is transpiring rapidly
(2) There is water logging around roots
(3) Rate of absorption is greater than rate of transpiration
(4) There is absorption lag in plants

2. Sucrose enters a phloem sieve tube cell from mesophyll cell because of
(1) A process regulated by auxin
(2) Osmosis
(3) Water potential
(4) Active transport

3. Which of the following statement is not related with aquaporins?
a. These water channels occur in both plants and animals
b. They speed up osmosis
c. They change the direction of water movement
(1) a and b (2) a and c
(3) b and c (4) c only

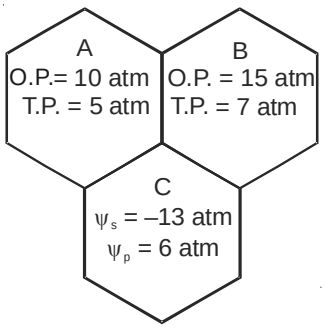
4. Addition of solutes in a solution
(1) Increases its Ψ_w
(2) Decreases its osmotic pressure
(3) Decreases its Ψ_s
(4) Decreases its DPD

5. Water absorption is mostly _____ and mineral absorption is mostly _____
(1) Passive, passive (2) Active, active
(3) Passive, active (4) Active, passive

6. Movement of sap in phloem and xylem are respectively
(1) Bidirectional and unidirectional
(2) Unidirectional and bidirectional
(3) Unidirectional in both
(4) Bidirectional in both

7. Select **correct** statement w.r.t. osmotic pressure
   (a) Temperature increases O.P.
   (b) Maximum value is recorded in halophytes
   (c) Water moves from low O.P. to high O.P.
   (d) 0.1 (M) sucrose has more O.P. then 0.1 (M) NaCl
   (1) Only (a) and (b) are correct
   (2) Only (b) and (c) are correct
   (3) Only (c) and (d) are correct
   (4) (a), (b) and (c) are correct

8. What is the direction of water movement in the diagram?



   (1) C ← A → B (2) A → C ← B
   (3) A ← C → B (4) A ← B → C

9 Most common sugar transported from leaves to storage or sink region is sucrose because
   (1) It is non-reducing
   (2) It does not alter the osmotic concentration
   (3) It is chemically unstable
   (4) More than one options are correct

10. As a result of increased endosmosis of water in a cell the diffusion pressure of the cell will
   (1) Increase (2) Decrease
   (3) Remain same (4) Be zero

11. When a molecule moves across a membrane independent of other molecule, the process is
   (1) Symport (2) Cotransport
   (3) Antiport (4) Uniport

12. Property related to facilitated diffusion and active transport but not to simple diffusion, are
   a. Require special membrane proteins
   b. Highly selective
   c. Transport saturate
   d. Response to protein inhibitors
   (1) a and b (2) a and c
   (3) b and c (4) All of these

13. Water moves from
   (1) Low DPD to high DPD
   (2) High ψ to low ψ
   (3) Less –ve to more –ve ψ
   (4) All of these are correct

14. Loss of or excretion of water in form of liquid droplets from leaves of Garden nasturtium
   (1) Is bleeding
   (2) Occur due to local pressure in phloem
   (3) Occur through pore below which epithem are present
   (4) Is measured by tensiometer

15. Transpiration is considered as a compromise to accomplish photosynthesis. This statement is supported by all **except**
   (1) Requirement of two are opposite
   (2) Photosynthesis require a supply of CO_2 which enter plant when stomata are open which also result in water loss
   (3) Stomata and cuticle have evolved in response to one or both of them
   (4) Transpiration ratio is very low in plants

16. Translocation of sugar in plants is not a purely physical process as described by Munch because
   (1) Cytokinins and auxins affect the rate of transport
   (2) Some amount of sugar is utilised during its transport
   (3) Phloem loading and unloading both utilise energy
   (4) More than one option is correct

17. Find **incorrect** statement w.r.t. plasmolysis
   (1) At first stage of plasmolysis cell is called flaccid and osmotic concentration of cell interior is equivalent to that of external solution
   (2) It can be demonstrated with 10% solution of potassium nitrate in *Spirogyra*
   (3) Used to remove weeds
   (4) Prolonged plasmolysis is reversible even after an interval

18. Mechanism of phloem translocation, which was put forward by Munch
   a. Is cytoplasmic streaming
   b. Is transcellular streaming
   c. Is pressure flow hypothesis
   d. Explains movement from low turgor pressure area to higher turgor pressure area
   (1) a and d (2) b and d
   (3) c only (4) c and d

19. In herbaceous shade loving plants 50% of the transpiration is
   (1) Bark
   (2) Lenticular
   (3) Cuticular
   (4) More than one option is correct

20. Guttation is favoured by
(1) High water absorption and high transpiration
(2) High transpiration and high RH
(3) Low water absorption and low transpiration
(4) High water absorption and low transpiration

21. Blue light causes maximum transpiration because it activates
(1) PEPCO (2) PEP synthetase
(3) Rubisco (4) Pyruvic kinase22.

Which of following is / are example(s) of semipermeable membrane?
(1) Plasmalemma and tonoplast
(2) Egg membrane and cellulose cell wall
(3) Cellulose cell wall and animal bladder
(4) Parchment membrane and animal bladder

23. Which of the following represent a plasmolysed cell?
(1) $\psi_S = -16, \psi_P = 8$ bars
(2) $\psi_S = -16, \psi_P = 2$ bars
(3) $\psi_S = -10, \psi_P = -2$ bars
(4) $\psi_S = -12, \psi_P = 2$ bars

24. Protein pumps help in
(1) Absorption of hydrophilic particles down to concentration gradient
(2) Absorption of hydrophilic particles against the concentration gradient
(3) Facilitated diffusion
(4) Passive absorption

25. Casparian strips interrupt
(1) Apoplastic path (2) Symplastic path
(3) Mycorrhizal absorption (4) Plasmodesmata

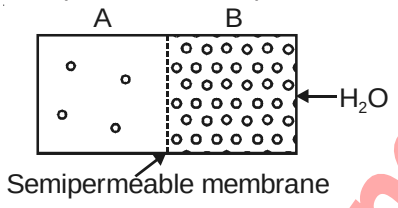
26. What will happen to a flaccid plant cell if it is kept in higher water potential?
(1) Endosmosis and ψ_w in cell will increase
(2) Endosmosis and ψ_w in cell will decrease
(3) Exosmosis and ψ_w in cell will increase
(4) Exosmosis and ψ_w in cell will decrease

27. Large protein molecules embedded in the outer membrane of chloroplast, mitochondria and some bacteria which play a important role in facilitated diffusion are
(1) Receptor proteins (2) Aquaporins
(3) Porins (4) Glycophorin

28. When additional pressure more than osmotic pressure is applied to prevent the flow of water into the solution. It is called
(1) Reverse osmosis (2) Facilitated diffusion
(3) Mass flow (4) Simple diffusion

29. Positive pressure that develops in xylem sap of the root of some plants is
(1) Responsible for mineral absorption
(2) Root pressure and passive
(3) Root pressure and active
(4) Responsible for ascent of sap in higher plants

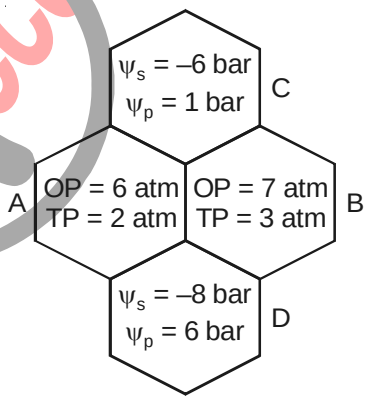
30. Find the correct statement w.r.t. diagram below, when pure water is separated in two chambers A & B

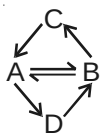


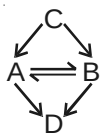
(1) Movement of water is A → B only
(2) Movement of water is B → A only
(3) Movement of water is bidirectional
(4) No movement of water takes place

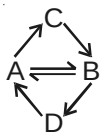
31. According to potassium pump theory of stomatal movement, opening of stomata is favoured by
(1) High starch, low CO_2, high pH and phosphorylase
(2) High sugar, low CO_2, CK and phosphatase
(3) PEPcase, blue light, CK and ATP
(4) High malic acid, PEPco and ABA

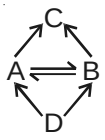
32. Find the direction of movement of water in given presentation of cells



(1) 

(2) 

(3) 

(4) 

33. According to active K^+ transport theory of Levitt
(1) Starch is completely oxidised into PEP in guard cells
(2) Potassium malate will result in decreased OP of guard cells
(3) K^+ ion movement outside the guard cells is always active process
(4) Malic acid dissociates into malate ions and H^+ in the guard cells

34. Choose **incorrect** statement w.r.t. pressure flow hypothesis of phloem transport
(1) Loading and unloading of sugar in phloem utilises ATP
(2) Sugar moves from source to sink along the pressure gradient
(3) Deficiency of boron decreases rate of transport
(4) Direction of sugar translocation is only unidirectional

35. Find out the incorrect match

	Column-I	Column-II
(1)	Stomatal opening	Influx of K^+ ion in G.C
(2)	Heat of wetting	Imbibition
(3)	Translocation of sugar	Physical process
(4)	Transpiration	Unavoidable process

36. Passive water absorption increases
(1) At high root-shoot ratio
(2) In highly concentrated soil solution
(3) When soil has less available water
(4) In water logging conditions

37. Read the following statements regarding stomatal movements
a. Full moon light is sufficient to keep stomata open in some plants
b. Blue light is more effective during transpiration whereas red light lead to stomatal closure
c. Q_{10} for stomatal opening is two
d. High CO_2 concentration decreases pH which makes ABA functional, that leads to stomatal closure
(1) a, b and c are correct (2) a, c and d are correct
(3) b, c and d are correct (4) a, b and d are correct

38. If a pressure greater than atmospheric pressure is applied to a solution, its water potential
(1) Increases
(2) Decreases
(3) Remains the same
(4) First increases then decreases

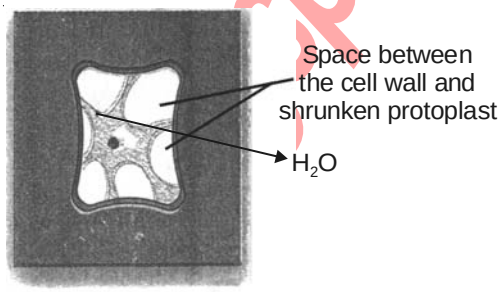
39. Which of the following is true for a fully flaccid cell?
(1) DPD = OP (2) OP = TP
(3) WP = –ve (4) DPD = 0

40. Picric acid is used to confirm that ascent of sap takes place
(1) Due to the activity occurring in roots
(2) Due to high DPD in mesophyll cells
(3) Even when living parenchymatous cells are killed
(4) Due to a positive hydrostatic pressure

41. In imbibition
(1) Volume of a system decreases
(2) Heat of wetting is absorbed
(3) Imbibant swells and imbibate is mobilised
(4) More than one option is correct

42. The transpiration driven ascent of xylem sap depends mainly on the following physical properties of water, **except**
(1) Mutual attraction between water molecules
(2) Attraction of water molecules to polar surface of tracheary elements
(3) Surface tension
(4) High osmotic pressure created by pumping of salts inside the xylem elements

43. What is present inside the space shown in the given diagram?



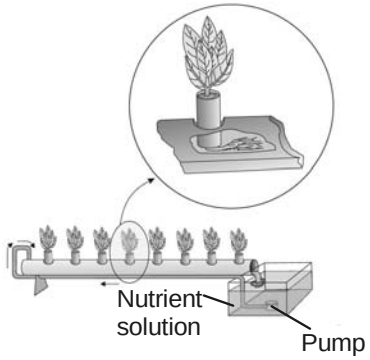
Plamolysed cell

(1) Solute only (2) Solvent only
(3) Solute and water (4) Air

44. Movement of a molecule across a typical plant cell (about 50 µm) takes approximately
(1) 1 hour (2) 2.5 seconds
(3) 30 seconds (4) 1 minute

45. Mark the correct one (w.r.t mass flow movement)
(1) All substances move independently depending on their concentration gradients
(2) Not due to the pressure difference between the two points
(3) Similar to ATP dependent diffusion
(4) All substances swept along at the same place
Mineral nutrition

46. Choose correct option for following technique of plant production



(1) This concept was first given by Julius von Sachs
(2) Successfully used for commercial production of vegetables
(3) Involves culturing of plants in soil free, defined mineral solution
(4) More than one option is correct

ZOOLOGY

[Chapter-2 : Structural Organization in Animals]

1. Eustachian tube, epiglottis and pinna of ear is formed by
   (1) Hyaline cartilage (2) White fibro cartilage
   (3) Elastic cartilage (4) Calcified cartilage
2. Which of the plasma protein act as acid base buffer?
   (1) Serum albumin (2) Serum globulin
   (3) Prothrombin (4) Fibrinogen
3. Earthworm can move with the help of
   (1) Longitudinal and circular muscle only
   (2) Chitinous setae only
   (3) Chitinous setae and coelomic fluid act as hydro skeleton
   (4) All of these
4. Troponin is a protein that
   (1) Contains numerous molecules of ADP
   (2) Has a high affinity for calcium ions
   (3) Forms the binding site for the myosin heads when they attach to actin
   (4) Is bound to myosin to form a complex that is normally inhibited in the resting muscle fiber
5. Each maxillary palp of cockroach is _____
   (1) Three segmented (2) Five segmented
   (3) Seven segmented (4) Not segmented
6. Duodenum receives bile from gall bladder and pancreatic juices from pancreas through
   (1) Separate bile and pancreatic duct
   (2) Common hepato-pancreatic duct
   (3) Ampulla of vater
   (4) Stenson's duct
7. Following structure are present in frog **except**
   (1) Renal portal (2) Salivary gland
   (3) Thyroid gland (4) Sinuauricular node
8. Which of the following is incorrect w.r.t. to junction and its function?
   (1) Tight junction – Promotes leaking of substances across a tissue
   (2) Adhering junction – Keep neighbouring cells together
   (3) Gap junction – Connecting the cytoplasm of adjoining cells for rapid transfer of ions and small molecules
   (4) Gap junction – Facilitates the cells to communicate with each other
9. Which of the following is true regarding the Bidder's canal in frog?
   (1) Transverse canal and carry sperms and urine, both
   (2) Transverse canal and carry sperms only urine
   (3) Longitudnal canal and carry sperms and urine, both
   (4) Longitudinal canal and carry sperms only
10. During muscle contraction the correct sequence of events is :
   (a) By utilising the energy from hydrolysis of ATP myosin head binds to exposed active site of actin forming the cross-bridge
   (b) Binding of Ca^{++} with troponin of actin filaments and thereby remove the masking of active sites for myosin
   (c) Releasing the ADP and P_i from myosin it goes back to relaxed state
   (d) Release of acetylcholine at neuromuscular junction which generates action potential in the sarcolemma
   (1) c, b, d, a (2) b, d, a, c
   (3) d, b, a, c (4) a, b, c, d
11. 'S' shaped chitnous setae arranged in a row embedded in the epidermal pits in the middle of each segment of *Pheretima* **except**
   (1) First segment
   (2) First and last segment
   (3) Clitellum segment
   (4) First, fourteen to sixteen and last segment
12. If dorsal pore of earthworm is blocked, which of the following function is affected first?
   (1) Digestion
   (2) Blood circulation
   (3) Gaseous exchange
   (4) Removal of excretory waste
13. In Cockroach (Periplaneta) attachment of head with rest part of the longitudinal body axis is termed as
   (1) Prognathus (2) Epiagnathus
   (3) Hypoagnathus (4) Agnathus
14. Which of the following is/are associated with heart of frog?
   (1) Sinus venosus (2) Pylangium
   (3) Synangium (4) All of these

15. Principal cells of connective tissue are
(1) Fibroblasts (2) Mast cells
(3) Adipocytes (4) Histiocytes

16. Blood drawn from a blood vessel can be kept uncoagulated by adding a pinch of sodium oxalate to it. Oxalate precipitate which of the clotting factor?
(1) Factor II (2) Factor III
(3) Factor IV (4) Factor VIII

17. Which of the following muscle shows autorhthymicity?
(1) Striped (2) Unstriped
(3) Cardiac (4) Both 2 and 3

18. Match the terms in column I with column II

Column I	Column II
a. Bidder's canal	(i) Ovary
b. Jacobson's organ	(ii) Kidney
c. Optic lobes	(iii) Mid brain
d. Mesovarium	(iv) Olfaction
	(v) Testes

(1) a(v), b(iii), c(ii), d(i) (2) a(ii), b(iv), c(iii), d(v)
(3) a(ii), b(iv), c(iii), d(i) (4) a(v), b(iv), c(iii), d(i)

19. Internally mesenteron is covered by very thin and transparent peritrophic membrane formed of chitin and protein, secreted by gizzard. It serves
(1) As a secretory membrane, as it secrete digestive enzymes
(2) To protect the wall of midgut from abrasion due to friction of food particles, permeable to digested food and enzymes
(3) As filtering membrane, to filter the larger food particles
(4) Act as absorptive membrane

20. Following features are associated with blood vascular system of cockroach **except** one. Mark the except one
(1) Heart of cockroach is tubular, dorsally placed and with thirteen chambers
(2) Open type of blood circulation, body cavity is filled by blood called haemocoel
(3) Blood cells of cockroach are haemocytes some are phagocytic nature
(4) Visceral organs are located in haemocoel are not in direct contact with blood

21. Growth of cartilage is
(1) Unidirectional
(2) Bidirectional
(3) Multidirectional
(4) Non-directional, as there is no growth

22. Which of the following statement is true ?
(1) Nervous tissue is located only in the brain and spinal cord
(2) Neurons are capable of mitosis to accomodate increased learning
(3) Most bones in the body begin as fibrocartilage and then ossify to bone
(4) Mast cells that produce the anti coagulant heparin are dispersed throughout loose connective tissue

23. Nucleus pulposus is supposed to be remnant of notochord present in
(1) In the centre of each vertebra
(2) Centre of intervertebral disc
(3) Between alementary canal and dorsal hollow nerve cord
(4) In the ligamentum flava

24. Which structure of the cockroach is functionally analogus to liver of vertebrates?
(1) Urate cells (2) Oenocytes
(3) Chloragogen cell (4) Trophocytes

25. Which feature is not valid w.r.t. the tracheal system of respiration in cockroach?
(1) There are 8 pairs of abdominal spiracles
(2) There are 2 pairs of thoracic spiracles
(3) Expiration in cockroach is an active process
(4) The last 2 pairs of spiracles of the abdomen region are always open

26. Which of the following is the largest sinus in *Periplaneta*?
(1) Pericardial sinus (2) Perivisceral sinus
(3) Perineural sinus (4) Sternal sinus

27. Which of the following is **not** a **correct** description of the peritrophic membrane?
(1) Made up of protein
(2) Secreted by gizzard
(3) Protects the wall of midgut from abrasive food
(4) It does not allow any enzyme to pass through

28. Krause's membrane forms
(1) T-tubule (2) Z-line
(3) M-line (4) M-zone

29. Mark the **incorrect** statement
(1) Brush-bordered epithelium is found in proximal part of uriniferous tubule
(2) Epithelial tissue is the fundamental animal tissue
(3) Stereocilia are present in vas deferens
(4) Salivary glands are holocrine glands

30. In polycythemia, the adverse effects occur due to
(1) Decreased blood volume
(2) Increased circulation time
(3) Increased viscosity of blood
(4) Increased availability of oxygen

31. The resorption of bone during remodelling is done by
(1) Osteoclast (2) Osteocyte
(3) Osteoprogenator (4) Osteoblast

32. A pair of first maxillae are located on each side of mouth next to mandibles. Their maxillary palp is _____
(1) Three segmented (2) Five segmented
(3) Seven segmented (4) Not segmented

33. Ligaments join bones to bones and allow its stretching. It is made up of
(1) White fibrous connective tissue only
(2) Yellow fibrous connective tissue only
(3) Yellow and white fibrous connective tissue
(4) Dense irregular connective tissue

34. Haematocrit value is
(1) The rate of sedimentation of erythrocytes
(2) The relative volume of erythrocytes in the centrifuge tube, as a percentage of the total blood volume
(3) The percentage of haemoglobin in 100 ml of blood
(4) The percentage of haemoglobin in single RBC

35. Brunner's gland is
(1) Simple coiled tubular gland
(2) Simple branched tubular gland
(3) Compound tubular gland
(4) Compound tubulo-acinar gland

36. Which of the following character is not related with smooth muscle fibres?
(1) Spindle shaped (2) Multinucleated
(3) Light and dark bands absent
(4) Fibres unbranched

37. In brain and spinal cord myelin sheaths around the axon is formed by
(1) Neurilemma (2) Schwann cells
(3) Oligodendrocytes (4) All of these

38. In cockroach sperms are glued together in the form of bundles called spermatophores. These are pear shaped capsule having a three layered wall in which middle layer is secreted by
(1) Utricular gland (2) Ejaculatory duct
(3) Phallic gland (4) Seminal vesicle

39. Which of the following condition of blood group will not cause a serious problem during second pregnancy?
(1) If father's blood is Rh^+ and mother's blood Rh^-
(2) If mother's blood is Rh^- and foetus blood is Rh^+
(3) If father's blood is Rh^- and mother's blood is Rh^+
(4) Both (1) & (2)

40. In which of the following glands, the secretion is discharged by simple diffusion, so that there is no loss of cells or their parts?
(1) Merocrine gland (2) Holocrine gland
(3) Apocrine gland (4) Heterocrine gland

41. Which of the following mammalian tissue forms peritoneum of coelom?
(1) Pseudostratified epithelium
(2) Cuboidal epithelium
(3) Squamous epithelium
(4) Glandular epithelium

42. Which of the following bone is formed by transformation of dermis of skin and is layed over the already present cartilage?
(1) Clavicle (2) Patella
(3) Humerus (4) Femur

43. Which of the following structure helps in excretion in male cockroach?
(1) Phallic gland (2) Conglobate gland
(3) Uricose gland (4) Collaterial gland

44. Find the **incorrect** match w.r.t. bone disorder and their symptom
(1) Osteomyelitis - Inflammation of bone marrow
(2) Osteomyelodysplasia - Enlargement of the bone marrow cavities
(3) Paget's disease - Irregular thickening and softening of bone
(4) Osteoporosis - Thickening of bone because of excessive deposition of calcium phosphate

45. Brown colour of fat in brown adipose connective tissue is due to
(1) Copper containing cytochrome pigment
(2) Iron containing cytochrome pigment
(3) Zinc containing cytochrome pigment
(4) Silver containing cytochrome pigment

46. Brood pouch in female *Periplaneta* is formed by the contribution of
(1) 7th sternum + 8th & 9th tergum
(2) 7th + 8th sternum + 9th tergum
(3) 7th, 8th, 9th sternum
(4) 7th sternum + 8th & 9th sternum

47. Trehalose is the non reducing sugar found in the
(1) Oenocytes of cockroach
(2) Coelomic fluid of earthworm
(3) Haemolymph of cockroach
(4) Heart of frog

48. Ependyma cells lining ventricles of brain are
(1) Squamous cell (2) Columnar cell
(3) Cuboidal cell (4) Pseudostratified

49. Which of the following is precursor of blood platelets?
(1) Megakaryocyte (2) Normoblast
(3) Reticulocyte (4) Myeloblast

50. Haversian system is found in
(1) Compact bone (2) Spongy bone
(3) Cancellous bone (4) Trabeculae

51. Which of the following is odd one w.r.t origin?
(1) Neurons (2) Astrocytes
(3) Oligodendrocytes (4) Microglial cells

52. In cockroach, larval and nymphal characters are maintained by
(1) Ecdysone (2) Salivary gland
(3) Juvenile hormone (4) Conglobate gland

53. During hibernation frog respires through
(1) Skin
(2) Lung
(3) Buccopharyngeal cavity
(4) All of these

54. Tadpole larva of frog can be made to grow into giant sized tadpole, if they are
(1) Administered with antithyroid substance like thiourea
(2) Administered with large amount of thyroxine
(3) Reared on glucose rich diet
(4) Reared on protein rich diet

55. Find the odd one with respect to type of movement
(1) Leucocytes (2) Macrophages
(3) Phagocytes (4) Sperms in humans

56. The muscle that extends the forearm is
(1) Biceps (2) Triceps
(3) Masseter (4) Latissimus dorsi

57. Which type of the following cells are involved in the formation of myelin sheath in PNS?
(1) Astrocytes (2) Neurolemmocytes
(3) Oligodendrocytes (4) Microglia cells

58. Maximum regeneration power is found in which tissue?
(1) Nervous Tissue (2) Epithelial Tissue
(3) Connective Tissue (4) Muscular Tissue

59. Tendon is an example of
(1) Areolar tissue
(2) Adipose tissue
(3) Dense regular connective tissue
(4) Dense irregular connective tissue

60. Intercalacted disc is the characteristic of
(1) Smooth muscle (2) Skeletal muscle
(3) Cardiac muscle (4) All of these

61. Most abundant cation in protoplasm is
(1) Na^+ (2) K^+
(3) Ca^{++} (4) Mg^{++}

62. Phagocytic cells of connective tissue are
(1) Fibroblast cells (2) Histiocyte cells
(3) Mast cells (4) Adipose cells

63. Umblical cord consists of
(1) Areolar connective tissue
(2) Mucoid connective tissue
(3) Reticular connective tissue
(4) Adipose connective tissue

64. True vocal cords are made up of
(1) Areolar connective tissue
(2) White Fibrous connective tissue
(3) Yellow Fibrous connective tissue
(4) Adipose connective tissue

65. Which of the following is an example of flat bone?
(1) Vertebrae (2) Femur
(3) Sternum (4) Carpals

66. Amphicoelous vertebrae is found in
(1) 8^{th} vertebra of frog (2) 9^{th} vertebra of frog
(3) Cartilaginous fishes (4) Both (1) & (3)

67. Gap junctions
(a) Connect the sarcotubular system to individual skeletal muscle cells
(b) Are absent in cardiac muscle
(c) Are present and provide the pathway for rapid spread of excitation from one cardiac muscle fiber to another
(d) Are present but of little functional importance in cardiac muscle
Which is/are correct ?
(1) a and b (2) only b
(3) only c (4) a, c & d

68. The functions of tropomyosin in skeletal muscle include
(1) Sliding on actin to produce shortening
(2) Releasing Ca^{++} after initiation of contraction
(3) Acting as a 'relaxing protein' at rest by covering up the sites where myosin binds to actin
(4) Both (1) and (3)

69. Cockroach can move on smooth surface with the help of adhesive structure like
(1) Claw (2) Arolium
(3) Plantulae (4) Both (2) & (3)

1. During the formation of polysaccharides molecule of water is released at each condensation
$n(C_6H_{12}O_6)$ ® Polysaccharide
If n = 50, what would be the number of C, H and O in the polysaccharide formed?
(1) $C_{300}\ H_{500}\ O_{250}$ (2) $C_{300}\ H_{502}\ O_{251}$
(3) $C_{300}\ H_{600}\ O_{300}$ (4) $C_{300}\ H_{504}\ O_{252}$

2. Tick mark the **incorrect** match
(1) Cellulose Nitrate : Used in propellant explosives
(2) Cellulose Acetate : Used in fabrics
(3) Cellulose Xanthate : Used in preparation of jelly
(4) Carboxymethyl Cellulose : Added to ice-creams cosmetics and medicine

3. The presence of a non-competitive inhibitor
(1) Leads to both an increase in the V_{max} of a reaction and an increase in the K_m
(2) Leads to a decrease in the observed V_{max}
(3) Leads to decrease in K_m and V_{max}
(4) Leads to increase in K_m without affecting V_{max}

4. When a combination of pulses and cereals is consumed, all essential amino acids are adequately supplied. Cereal and millet proteins are deficient in _____ and _____ amino acids
(1) Methionine and cysteine
(2) Methionine and lysine
(3) Lysine and Tryptophan
(4) Tyrosine and Tryptophan

5. Enzymes, vitamins and hormones are common in
(1) Being proteinaceous
(2) Regulating metabolism
(3) Being synthesised in the body of the organism
(4) Being used to catalyse metabolic processes

6. Proteases can act on a variety of proteins. The K_m value of the protease will _____
(1) Not vary with the type of protein
(2) Vary with the type of protein
(3) Decrease with the type of protein
(4) Increase with type of protein

7. The co-enzyme NAD has how many phosphate groups and nucleotides, respectively?
(1) One and one (2) Two and one
(3) One and Two (4) Two and two

8. The catalytic efficiency of two different enzymes is compared by their
(1) Product
(2) Molecular size
(3) K_m value
(4) Optimum pH on which it acts

9. Exoskeleton of arthropods have a complex polysaccharides called chitin. These complex polysaccharides are _____ . They have building blocks as _____
(1) Homopolymers, N-acetyl glucosamine
(2) Heteropolymer, N-acetyl galactosamine
(3) Heteropolymer, N-acetylglucosamine
(4) Homopolymer, N-acetylgalactosamine

10. In a killed animal, glycogen of liver disintegrates enzymatically to form
(1) Lactose
(2) Fructose
(3) Glucose
(4) Lactic acid

11. Which of the following disaccharide will yield only α-glucose on hydrolysis?
(1) Lactose (2) Maltose
(3) Sucrose (4) Cellobiose

12. Histidine decarboxylase which cleaves C–C bond in histidine to form carbon dioxide and histamine belongs to which category of enzymes?
(1) Transferase (2) Hydrolase
(3) Lyase (4) Oxidoreductase

13. In World war-II, nerve gas was used to kill human beings by irreversibly inhibiting _____ enzyme. This is an example of _____ inhibition
(1) Cytochrome oxidase, non-competitive
(2) Phosphofructokinase, allosteric
(3) Acetylcholinesterase, non-competitive
(4) Hexokinase, allosteric

14. Observe the relationship between the first two words and fill in a suitable word in the fourth place
(a) Aminoacids : Protein :: Nucleotides : _____
(b) Plants : Starch :: Mammals : _____
(c) α-Helix : Protein :: Double Helix : _____
Which of the following is correct sequence?
(1) DNA, glucose, Nucleic acid
(2) Nucleic acids, Glycogen, DNA
(3) RNA, Amylose, Nucleic acids
(4) Nucleic acid, Amylopectin, DNA

15. All the following statement about cellulose are correct but one is wrong which one is wrong?
(1) Cellulose is a homopolymer
(2) It is the most abundant organic molecule in the biosphere

(3) It is branched polymer of β-glucose
(4) It has β-1-4 glycosidic bonds

16. Which of the following is an example of competitive inhibition?
(1) Inhibition of hexokinase by glucose-6-phosphate
(2) Inhibition of cytochrome oxidase, by cyanide
(3) Inhibition of succinic dehydrogenase by malonate
(4) Inhibition of phosphofructokinase by ATP

17. In both cells and extra-cellular fluids dibasic phosphate (HPO_4^{2-}) and monobasic phosphate ($H_2PO_4^-$) neutralise
(1) Strong acids and bases respectively
(2) Strong bases and acids respectively
(3) Strong acids only
(4) Strong bases only

18. Glucosamine is present in the structure of
(1) Fungal Cellulose (2) Hyaluronic acid
(3) Chondroitin sulfate (4) All of these

19. Which of the following is not associated with phosphate group?
(1) Guanylic acid (2) Uridylic acid
(3) Cytidine (4) Cytidylic acid

20. The sequence of amino acid *i.e.*, the positional information in a protein is included under
(1) Quarternary structure (2) Secondary structure
(3) 3-D-view (4) Primary structure

21. The type of bonding present in case of chitin is
(1) α 1-4 (2) β 1-2
(3) β 1-4 (4) α 1-6

22. Vitamin E or tocopherols belong to group
(1) Quarternary protein
(2) Heteropolysaccharide
(3) Derivative of monosaccharide
(4) Terpenes

23. GLUT-4, a protein, which
(1) Acts as hormone
(2) Acts as an enzyme
(3) Enables glucose transport into cells
(4) Is present in intercellular spaces

24. Find out the correct statement
(1) 3° structure is absolutely necessary for the many biological activities of proteins
(2) Most of blood proteins are acidic
(3) Glycogen has α, 1 - 4 as well as α, 1 - 6 glycosidic bonds
(4) All of these

25. Nature of artificial silk is
(1) Proteins (2) Polysaccharide
(3) Lipoprotein (4) Fat

26. LDH which catalyses pyruvate to lactate is an example of
(1) Antienzyme (2) Isoenzyme
(3) Co-enzyme (4) Apoenzyme

27. Which one of the following is **correct** for raffinose w.r.t. their sugar components?
(1) Glucose-galactose-mannose
(2) Galactose-glucose-fructose
(3) Galactose-trehalose-fructose
(4) Mannose-glucose-fructose

28. Type/s of glycosidic bond/s found in amylopectin is/are
(1) α(1 – 4) (2) β(1 – 4)
(3) α(1 – 4) & α(1 – 6) (4) α(1 – 4) & β(1 – 6)

29. Cytidine monophosphate (CMP) is same as
(1) Ribose + Cytosine + Phosphate
(2) Cytidylic acid
(3) Deoxyribose + Cytosine + Phosphate
(4) Both (1) & (2)

30. Which of the following storage protein is prolamine not coagulated on heating, soluble in 70 – 80% alcohol present in maize?
(1) Oryzenin (2) Glutelin
(3) Glutenin (4) Zein

31. Which of the following statements is not true for Km value/Michaelis-Menten constant?
(1) Its a substrate concentration at which enzyme linked reaction reaches $\frac{1}{2}$ of its maximum velocity
(2) Allosteric enzymes does not follow Km
(3) Km value will differ for enzyme protease which acts on different proteins
(4) Lower Km value indicates lower substrate affinity of enzyme

32. Which of the following is **incorrect** match about the enzymes and reaction catalysed?
(1) Maltose $\xrightarrow{\text{Maltase}}$ glucose + glucose
(2) Lactose $\xrightarrow{\text{Lactase}}$ fructose + galactose
(3) Sucrose $\xrightarrow{\text{Invertase}}$ glucose + fructose
(4) Dipeptides $\xrightarrow{\text{Dipeptidase}}$ amino acids

33. Adenylic acid is
(1) Riboside
(2) Ribotide
(3) Ribose + phosphate + base
(4) Both (2) & (3)

34. Which of the following is not essential for normal biosynthesis of thyroid hormones?
(1) Iodine (2) Protein synthesis
(3) Thyroglobulin (4) Ferritin

35. All of the following mucopolysaccharides are obtained from marine brown and red algae except
(1) Agar (2) Alginic acid
(3) Carragenin (4) Chondroitin sulphate

36. Which of the following statement is/are not correct w.r.t. RNA?
a. RNA is always single stranded
b. RNA does not follow Chargaff's rules
c. t-RNA is smallest type of RNA and found in cytoplasm
d. RNA contains adenine, guanine, cytosine and thymine instead of uracil
(1) a & b (2) a & d
(3) a, b & d (4) a, b & c

37. An inhibitor I binds either with free enzyme or the ES complex and prevents the reaction. Thus in presence of I
(1) K_m value increases
(2) V_{max} remains unaffected
(3) V_{max} of the reaction increases
(4) V_{max} of the reaction decreases

38. Allosteric modulation is due to the inhibition of enzyme by
(1) Co-enzyme
(2) Substrate concentration
(3) Products of reaction
(4) Enzyme concentration

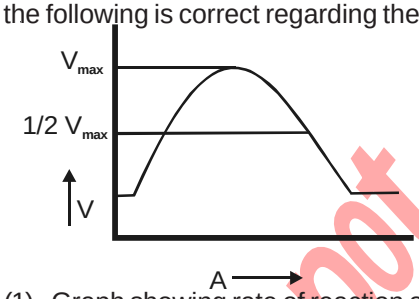
39. Cotton fibre and paper are chemically made up of
(1) Chitin containing N-acetylglucosamine
(2) Phospholipid
(3) Cellulose
(4) Glycine and glutathione

40. Which drug (steroid) is obtained from yam plant for formation of antifertility pills?
(1) Digitalis (2) Strophanthin
(3) Diosgenin (4) Sitosterol

41. Type of secondary structure shown by keratin protein of hair, nails and horns
(1) β pleated-parallel (2) β pleated-antiparallel
(3) α helix (4) Triple helix

42. The amino acid which gives rise to plant hormone indole - 3 - acetic acid and nicotinamide is
(1) Tyrosine
(2) Tryptophan
(3) Methionine
(4) Glycine

43. Consider the following graph showing the rate of reaction of an enzyme catalysed reaction. Which of the following is correct regarding the graph ?



(1) Graph showing rate of reaction at different concentration of H^+
(2) Graph showing rate of reaction at different temperature
(3) Graph showing rate of reaction at different substrate concentration
(4) Both (1) and (2)

44. The enzyme 'phosphoglyceromutase' which catalyzes conversion of 3-phosphoglycerate to 2-phosphoglycerate belongs to the
(1) Class I (2) Class II
(3) Class IV (4) Class V

45. Which of the following includes enzymes of succus entericus only?
(1) Trypsinogen, enterokinase, carboxypeptidase
(2) Enterokinase, rennin, DNAase
(3) Maltase, aminopeptidase, nucleotidase
(4) DNAase, procarboxypeptidase, elastase

46. Most abundant unsaturated fatty acid is
(1) Palmitic acid
(2) Oleic acid
(3) Arachidonic acid
(4) Linolenic acid

47. Raffinose is a trisaccharide having
(1) 2 glucose and 1 fructose
(2) 1 glucose, 1 fructose and 1 lactose
(3) 1 glucose, 1 fructose and 1 galactose
(4) 2 galactose and 1 fructose

48. In feed back inhibition, a metabolic pathway is switched off by
(1) Lack of a substrate
(2) Competitive inhibition
(3) Accumulation of end product
(4) A rise in temperature

49. Which of the following protein does not show α-helix structure?
(1) Fibroin of silk (2) Keratin of hair
(3) Fibrin (4) Both (1) & (3)

50. Cheese is a
(1) Denatured fat
(2) Branched polysaccharide
(3) Unbranched polysaccharide
(4) Denatured protein

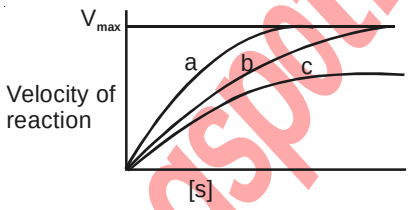
51. Which of the following statement is **incorrect** for B-form DNA?
(1) It is dsDNA
(2) Both strands are antiparallel and complimentary to each other
(3) It is right handed DNA, in which both strands are held together with phospho diester bond
(4) More sequence with G – C is more stable or has high melting area

52. Choose correct combination of proteins and related functions
a. Collagen - Intercellular ground substance
b. GLUT-4 - Enables glucose transport into cells
c. Trypsin - Digestion of proteins
d. Antibody - γ-immunoglobulin fight against infections agents
(1) a correct (2) a & b correct
(3) a, b & c correct (4) a, b, c & d correct

53. Which of the following is the most abundant protein in whole of the biosphere?
(1) Collagen (2) RUBISCO
(3) Myoglobin (4) Hemoglobin

54. Raffinose is a trisaccharide having
(1) 2 glucose and 1 fructose
(2) 1 glucose, 1 fructose and 1 lactose
(3) 1 glucose, 1 fructose and 1 galactose
(4) 2 galactose and 1 fructose

55. The figure given below shows three velocity-substrate-concentration curves for an enzyme reaction. What do the curves a, b and c depict respectively ?



(1) a. Normal enzyme reaction
b. Competitive inhibition
c. Noncompetitive inhibition
(2) a. Competitive inhibition
b. Noncompetitive inhibition
c. Normal enzyme reaction
(3) a. Normal enzyme reaction
b. Uncompetitive enzyme reaction
c. Noncompetitive enzyme reaction
(4) a. Uncompetitive enzyme reaction
b. Noncompetitive enzyme reaction
c. Normal enzyme reaction

56. Most abundant RNA is
(1) m-RNA (2) r-RNA
(3) t-RNA (4) All of these

[Chapter - 4 : Digestion and Absorption]

1. Consider the following four statements (i - iv) about the function of stomach
i. Absorption of water, simple sugars and alcohol
ii. Digestion of protein (collagen)
iii. Absorption of vitamin B_{12}
iv. Maltose of bolus is digested into glucose and finally, absorbed.
Which two of the above functions of stomach are true?
(1) i and iii (2) i, ii and iii
(3) iii and iv (4) ii and iii

2. There are four different hormones, their sources and actions are given in following table. Select the correct one

	Hormones	Sources	Action
(1)	Secretin	Duodenum	Stimulate the gastric mobility
(2)	GIP	Duodenum	Inhibition of gastric activity
(3)	Gastrin	Stomach & Jejunum	Receptors like CCK
(4)	CCK	Duodenum	Close the sphincter of Boyden

3. Which of the following is incorrect about the characteristic of marasmus?
(1) It occurs in infant under one year of age
(2) Ribs are prominent
(3) Subcataneous fat is normal
(4) It is caused by deficiency of carbohydrate along with protein

4. After digestion the passively absorbable substance is
(1) Glucose (2) Galactose
(3) Fructose (4) Amino acids

5. Colon is characterised by
(1) Presence of taeniae coli but absence of haustra
(2) Presence of vermiform appendix but absence of taeniae coli
(3) Presence of taeniae coli and haustra
(4) Presence of haustra but absence of epiploic appendages

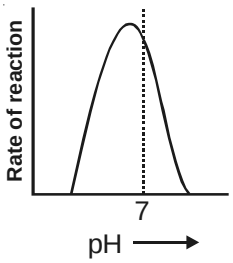
6. A person suffering from achlorhydria will subsequently suffer from
(1) Haemorrhoids (2) Pernicious anaemia
(3) Microcytic anaemia (4) Indigestion of protein

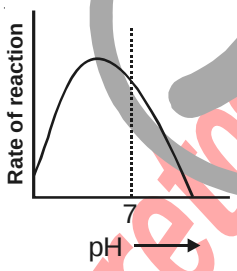
7. Consider the following statements concerning tongue
   (a) It is freely movable muscular voluntary organ.
   (b) It is attached with anterior floor of oral cavity.
   (c) Its attachment is supported by frenulum.
   (d) All papillae bear taste buds.
   Which of the above statements are correct?
   (1) (a), (b) and (c) are correct
   (2) (a), (b) and (d) are correct
   (3) (a) and (c) are correct
   (4) (b), (c) and (d) are correct

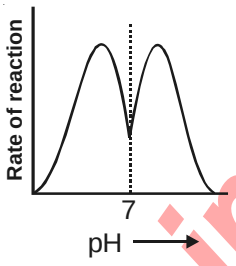
8. Select the correct combination w.r.t. organs, tissue layer and their respective glands
   (1) Stomach → Submucosa → Digestive glands
   (2) Duodenum → Submucosa → Brunner's gland
   (3) Jejunum → Mucosa → Brunner's gland
   (4) Ileum → Fibrosa → Argentaffin cells

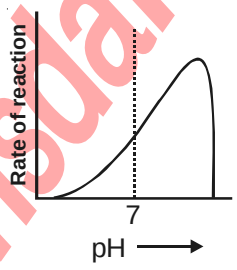
9. If there is over activity of vagus nerve then _____
   (1) Protein digestion is affected
   (2) Gastric secretion will decrease
   (3) Peristalic movements of stomach will decrease
   (4) Gastric ulcer can occur

10. Which of the following graph depicts the rate of enzymatic activity and pH for salivary amylase?

(1)


(2)


(3)


(4)


11. Which of the following hormones can reduce gastric motility?
   (1) Enterogastrone (2) Secretin
   (3) GIP (4) All of these

12. In constipation, the faeces are retained within the colon as the bowel movement occur irregularly. This can be treated by taking
   (1) Distilled water (2) Fat rich food
   (3) Magnesium salt (4) Salty water

13. Auerbach plexuses is present
   (1) Between longitudinal and circular muscles is muscularis externa
   (2) Between circular and oblique muscles in sub-mucosa
   (3) In muscularis mucosa
   (4) In sub-mucosa

14. Which layer of the human tooth links it with peridontal layer of alveolar socket?
   (1) Dentine (2) Dental pulp
   (3) Cementum (4) Enamel

15. Which of the following enzyme is involved in the digestion of the protein-keratin?
   (1) Pepsin
   (2) Trypsin
   (3) Chymotrypsin
   (4) It cannot be digested in human body

16. If the vagus nerve is cut which of the following function/s is/are affected in alimentary canal?
   (1) Secretion of gastric juice
   (2) Secretion of succus entericus
   (3) Peristalsis
   (4) All of these

17. Water is absorbed in the jejunum, ileum and colon and excreted in the faeces. Arrange these in order of the amount of water absorbed or excreted from greatest to smallest
   (1) Colon, jejunum, ileum, faeces
   (2) Jejunum, ileum, colon, faeces
   (3) Colon, ileum, jejunum, faeces
   (4) Faeces, colon, ileum, jejunum

18. Auerbach plexus is present
   (1) Between longitudinal and circular muscles of muscularis externa
   (2) Between circular and oblique muscles of sub-mucosa
   (3) In muscularis mucosa
   (4) In sub-mucosa

19. The symptoms of vitamin B_1 deficiency are
   (1) Swollen lips, thick pigmented skin of hands and legs, irritability
   (2) Wasting of muscles, thin limbs, oedema and diarrhoea
   (3) Reduced aerobic carbohydrate metabolism. So peripheral nerves are inflammed causing pain numbness and weakness of limb muscles
   (4) Fragile blood vessels because of defective collagen fibres

20. Nicotinamide and riboflavin nucleotides act as co-enzymes of
(1) Reducing enzymes
(2) Oxidising enzymes
(3) Zymogens
(4) Allosteric enzymes

21. Which of the following hormone is incorrectly matched with its source and action?

S.No.	Hormone	Source	Action
(1)	Gastrin	Pyloric stomach	Stimulates gastric glands to secrete and release the gastric juice
(2)	GIP (Gastric Inhibitory Peptide)	Duodenum	Inhibits gastric secretion and mobility
(3)	Secretin	Small intestine	Stimulates the Brunner's glands to release mucus and enzymes
(4)	Vasoactive Intestinal Peptide (VIP)	Small intestine	Dilates peripheral blood vessels of gut and inhibits gastric acid secretion

22. Match the column

Column I		Column II
a. Thiamine	(i)	Dermatitis
b. Riboflavin	(ii)	Megaloblastic anaemia
c. Pantothenic acid	(iii)	Scurvy
d. Folic acid	(iv)	Cheilosis
e. Ascorbic acid	(v)	Wernicke's syndrome

(1) a(i), b(v), c(iv), d(ii), e(iii)
(2) a(iii), b(iv), c(i), d(ii), e(v)
(3) a(v), b(i), c(ii), d(iv), e(iii)
(4) a(v), b(iv), c(i), d(ii), e(iii)

23. Which of the following is incorrect about the enzyme, type of secretion and substrate?
(1) Pepsin - Gastric juice - Proteins
(2) Enteropeptidase - Succus entericus - Trypsinogen
(3) DNAase - Succus entericus - DNA
(4) Aminopeptidase - Succus entericus - Large peptide

24. The dark green mucilaginous material in the intestine of the full term foetus
(1) Stercobilinogen (2) Skatole
(3) Meconium (4) Urobilinogen

25. Heart burn condition can arise in case of
(1) Inflammation of alveoli
(2) Inflammation of atria
(3) Inflammation of pleural membrane
(4) Cardiac sphincter fails to close

26. The disease which is characterised by deficiency of proteins and calories in which subcutaneous fat is not preserved is
(1) Osteomalacia
(2) Megaloblastic anaemia
(3) Kwashiorkor
(4) Marasmus

27. Activation of chymotrypsinogen into chymotrypsin is caused by
(1) Enterokinase (2) Enteropeptidase
(3) Trypsin (4) Pepsin

28. Which layer of gastrointestinal tract forms rugae in stomach and small finger like foldings called villi in small intestine?
(1) Circular muscles of muscularis externa
(2) Connective tissue of submucosa
(3) Mucosa layer
(4) Serosa made of mesothelium

29. The dental formula of deciduous teeth in humans is
(1) $i\frac{2}{2}, c\frac{1}{1}, pm\frac{2}{2}, m\frac{3}{3}\times 2$
(2) $i\frac{2}{2}, c\frac{1}{1}, pm\frac{0}{0}, m\frac{2}{2}\times 2$
(3) $i\frac{2}{2}, c\frac{1}{1}, pm\frac{2}{2}, m\frac{2}{2}\times 2$
(4) $i\frac{2}{2}, c\frac{1}{1}, pm\frac{0}{0}, m\frac{3}{3}\times 2$

30. The ductus choledochus contains sphincter of Boyden which helps in
(1) Emptying of gall bladder
(2) Filling of pancreatic juice
(3) Filling of gall bladder
(4) Filling of succus entericus

31. Kupffer's cells in the liver are located in
(1) Glisson's capsule (2) Sinusoids
(3) Portal triad (4) Falciform ligament

32. Excessive stimulation of vagus nerve can be related to
(1) Xerostomia (2) Inhibition of peristalsis
(3) Cholelithiasis (4) Gastric ulcer

33. Distended or enlarged rectal vein of anal columns leads to
(1) Haemorrhoids (2) Appendicitis
(3) Piles (4) Both (1) & (3)

34. Digestive juice added into duodenum through sphincter of oddi is/are
a. Gastric juice b. Bile juice
c. Pancreatic juice d. Succus entericus
(1) Only c (2) Only b
(3) c and d (4) b and c

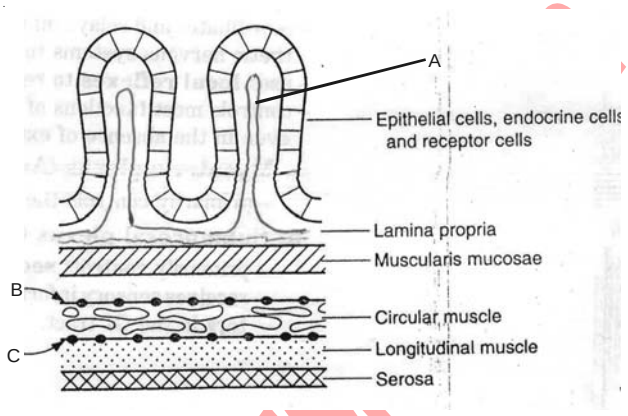
35. Oxyntic(parietal) cells of gastric gland secrete HCl. Mark wrong one regarding functions of HCl
(1) Inactivates ptyalin and maintains strong acidic medium
(2) Is germicidal and kills microbes
(3) Activates pro-enzymes
(4) Converts Fe^{3+} into Fe^{2+} which inhibits the absorption of iron

36. Sodium glycocholate and sodium taurocholate are the sodium salts of cholic acid. Mark incorrect one regarding them
(1) Cause emulsification of fats
(2) Increase lipase activity
(3) Also help in absorption of fat products
(4) Inorganic in nature

37. Which of the following condition can be related to iron deficiency anemia?
(1) Heart burn (2) Achlorhydria
(3) Achalasia cardia (4) Hypoglycaemia

38. Accessory duct of pancreas which directly opens into duodenum called
(1) Duct of Santorini (2) Duct of Wirsung
(3) Ventral duct (4) Ductus choledocus

39. Identify the following structure labelled as A,B & C in the diagram.



(1) A – Lacteal ; B – Submucosal plexus ; C – Myenteric plexus
(2) A – Submucosal plexus ; B – Myenteric plexus ; C – Lacteals
(3) A – Circular muscle ; B – Myenteric plexus ; C – Submucosal plexus
(4) A – Longitudinal muscle ; B – Myenteric plexus ; C – Submucosa

40. Enterohepatic circulation involves
(1) Hepatic portal vein and hepatic artery
(2) Hepatopancreatic duct and hepatic portal vein
(3) Hepatopancreatic duct, hepatic artery & hepatic portal vein
(4) Hepatopancreatic duct, hepatic vein & hepatic portal vein

41. Which of the following event can be conditioned?
(1) Secretion of adrenal medulla
(2) Secretion of salivary glands
(3) Deglutination
(4) Rotation of eye balls

[Chapter - 5 : Breathing and Exchange of Gases]

1. Select the **incorrect** match
(1) Dorsal respiratory group – Maintain basic respiratory rhythm
(2) Ventral respiratory group – Enhanced respiratory drive
(3) Pneumotaxic centre – Switch off point of respiration
(4) Hering - Breuer's reflex – Preventing excess deflation of the lungs

2. Which of the following can alter respiratory mechanism?
(1) Pneumotaxic centre of pons
(2) Chemosensitive area of pons
(3) Chemosensitive area of medulla
(4) Both (1) & (3)

3. In which of the following diseases inflammation does not occur?
(1) Bronchitis (2) Pneumonia
(3) Emphysema (4) All of these

4. Consider the following three chemical reactions about carbonic anhydrase
i. $CO_2 + H_2O \rightarrow H_2CO_3$
ii. $H_2CO_3 \rightarrow H^+ + HCO_3^-$
iii. $H_2CO_3 \rightarrow H_2O + CO_2$
Which set of the above reactions for such an enzyme is correct?
(1) i and ii (2) i and iii
(3) ii and iii (4) i, ii and iii

5. Partial pressure of O_2 in oxygenated blood is 95 when
(1) pO_2 is 40 mm Hg in deoxygenated blood
(2) pO_2 is 40 mm Hg in tissue
(3) pO_2 is 116 mm Hg in atmospheric air
(4) pO_2 is 104 mm Hg in alveoli

6. Select the **correct** match

	Column I		Column II
a.	Inspiration	(i)	Complemental air
b.	Normal expiration	(ii)	Active process
c.	IRV	(iii)	Passive process
d.	ERV	(iv)	Supplemental air

(1) a(ii), b(i), c(iii), d(iv) (2) a(ii), b(iii), c(i), d(iv)
(3) a(iii), b(ii), c(i), d(iv) (4) a(iv), b(iii), c(ii), d(i)

7. Consider the following cells present in lungs :
(a) Squamous epithelial cells
(b) Pneumocytes-II
(c) Dust cells
(d) Clara cells
Which set of the cells are correct w.r.t. phagocytic behaviour?
(1) (a), (b) and (c) (2) (a) and (c)
(3) (b) and (c) (4) (c) only

8. Select the correct statement
(1) Inspiration can occur if the pressure within the lungs is less than the atmospheric pressure
(2) Expiration can occur if the intra-pulmonary pressure is less than the atmospheric pressure
(3) Positive pressure in the lungs with respect to atmospheric pressure leads to inspiration
(4) Inspiration can occur if the intra-pulmonary pressure is equal as the atmospheric pressure

9. Choose the **correct** combination w.r.t. Po_2

	Column-I		Column-II
a.	Alveolar air	(i)	40 mm Hg
b.	Oxygenated blood	(ii)	95 mm Hg
c.	Deoxygenated blood	(iii)	100 mm Hg
d.	Expired air	(iv)	116 mm Hg

(1) a(iii), b(ii), c(i), d(iv) (2) a(iii), b(i), c(ii), d(iv)
(3) a(iii), b(i), c(iv), d(ii) (4) a(iii), b(iv), c(i), d(ii)

10. What is the total amount of CO_2 transported by RBCs?
(1) 70% (2) 80-90%
(3) 20-25% (4) 40%

11. At what partial pressure of oxygen 50% of haemoglobin molecules of RBC get saturated, under normal conditions?
(1) 10-15 mm Hg (2) 27-30 mm Hg
(3) 37-40 mm Hg (4) 45-50 mm Hg

12. Which of the following disease is characterised by proliferation of fibrous connective tissue in upper part of lungs?
(1) Pneumonia
(2) SARS
(3) Occupational respiratory disease
(4) Bronchial asthma

13. The following pulmonary capacities cannot be measured by simple spirometer directly
(1) Inspiratory capacity
(2) Functional residual capacity
(3) Total lung capacity
(4) Both (2) & (3)

14. Which of the following statement is not true?
(1) The concentration of CO_2 and H^+ cause increased strength of inspiratory as well as, expiratory signal
(2) During strong pneumotaxic signal, complete filling of lungs occur
(3) The volume of dissolved CO_2 in 100 ml of deoxygenated blood is 2.7 ml
(4) Diffusing capacity of oxygen is two times faster than nitrogen

15. Nerve impulse from the dorsal respiratory group of neurons stimulate the
(1) Diaphragm to become dome shaped
(2) Diaphragm to flatten
(3) External intercostal muscle to lower the rib cage
(4) Internal intercostal muscle to raise the rib cage

16. At a particular pressure difference the diffusion of carbon dioxide is
(a) Twenty times faster than oxygen
(b) Forty time faster than nitrogen
(c) Two times faster than oxygen
(d) Eight times faster than nitrogen
(1) Only a & d (2) Only a & b
(3) Only a & c (4) Only b, c & d

17. The impulse for voluntary muscles for forced breathing starts in
(1) Medulla (Pons) (2) Pneumotaxic area
(3) Cerebral hemispheres (4) Spinal chord

18. Gaseous exchange does not occurs in
(1) Lungs alveoli
(2) Alveolar ducts
(3) Terminal bronchioles
(4) Respiratory bronchioles

19. Contraction of the external intercostal muscle accounts for _____ of the change in intrathoracic volume during quiet inspiration
(1) 25% (2) 15%
(3) 55% (4) 75%

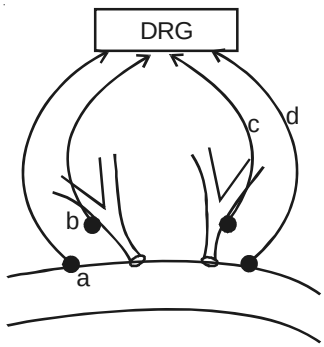
20. If the pneumotaxic signals are weak
(1) Complete filling of lungs is not possible
(2) Breathing rate becomes slow
(3) Inspiration takes less time period
(4) Expiration takes more time period

21. Which of the following statement is not true?
(1) The concentration of CO_2 and H^+ cause increased strength of inspiratory as well as expiratory signal
(2) During strong pneumotaxic signal, complete filling of lungs occur
(3) The volume of dissolved CO_2 in 100 ml of deoxygenated blood is 2.7 ml
(4) Diffusing capacity of oxygen is two times faster than nitrogen

22. Orthopnoea is
(1) Painful breathing
(2) Rapid breathing
(3) Slower breathing
(4) Difficult breathing in horizontal position

23. Carotid bodies and aortic bodies are associated with
(1) Regulation of blood volume
(2) Regulation of respiration rate
(3) Regulation of blood supply to heart and aortic arches
(4) Regulation of blood supply to brain

24.

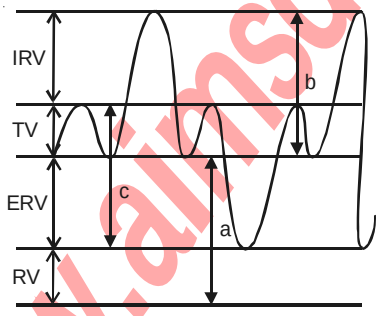


Identify a, b, c and d in the given figure
(1) a – Aortic body ; b – Carotid body ; c – X Cranial nerve ; d – IX Cranial nerve
(2) a – IX Cranial nerve ; b – X Cranial nerve ; c – Aortic body; d – Carotid body
(3) a – VIII Cranial nerve ; b – X Cranial nerve ; c – Carotid body ; d – Aortic body
(4) a – VII Cranial nerve ; b – XI Cranial nerve ; c – Aortic body ; d – Carotid body

25. Which of the following is correct?
(1) TLC = VC + RV
(2) EC = RV + ERV
(3) IC = ERV + TV
(4) FRC = TLC –(ERV + TV)

26. At times, the health care professionals have to administer neonatal lung surfactant intratracheally to the newly born babies suffering from
(1) Respiratory Distress Syndrome (RDS)
(2) Asthma
(3) Hypercapnia
(4) Asthma

27. In the following figure identify various pulmonary capacities (a, b and c) of human lung



(1) a–FRC ; b–EC ; c–IC (2) a–EC ; b–IC ; c–EC
(3) a–FRC ; b–IC ; c–EC (4) a–EC ; b–IC ; c–FRC

28. Larynx is a cartilaginous structure consist of nine pieces which of the following are unpaired cartilages of larynx?
(1) Epiglottis, thyroid, arytenoid
(2) Thyroid, cricoid, arytenoid
(3) Arytenoid, corniculate, cuneiform
(4) Thyroid, cricoid, epiglottis

29. Which of the following muscles involve in forceful expiration?
(1) Abdominal muscles and diaphragm muscles
(2) Diaphragm muscles and external intercostal muscles
(3) Abdominal muscles and internal intercostal muscles
(4) External and internal intercostal muscles

30. In expired air pO_2 and its percentage is respectively
(1) 159 mm Hg, 20.84%
(2) 116 mm Hg, 15.7%
(3) 159 mm Hg, 15.7%
(4) 116 mm Hg, 20.84%

31. Which of the following pulmonary capacities can not be measured by simple spirometer?
(1) Inspiratory capacity
(2) Functional residual capacity
(3) Vital capacity
(4) Expiratory capacity

32. There are several factors that affect the oxygen haemoglobin dissociation curve. Under which of the following, would the graph moves towards left?
(1) Increase in pH
(2) Increase in temperature
(3) Increase in pCO_2
(4) Excess of 2, 3-DPG

33. Which of the following is correct with reference to apneustic centre?
(1) It is present in the dorsal part of pons Varolii
(2) It operates in association with VRG
(3) It controls depth of inspiration
(4) It is associated Hering breurer reflex

34. Rate and depth of breathing will increase when
(1) CO_2 concentration increases in arteries
(2) O_2 concentration increases in arteries
(3) 2, 3 DPG concentration increases in vein
(4) HCO_3^- concentration increases in vein

35. Which one of the following statement is correct?
(1) All animals require oxygen for their survival
(2) In most of the invertebrate groups O_2 is transported through blood
(3) In lower invertebrates, respiration occurs through body surface
(4) The main function of nephridia is gaseous exchange

36. Much of the CO_2 reacts with water of the RBC to form carbonic acid. The reaction is facilitated by
(1) Carboxylase enzyme and Ca^{++} ions
(2) Bicarbonate synthetase and K^+ ions
(3) Carbonic anhydrase and Zn^{++} ions
(4) Carbonic acid lyase and Mg^{++} ions

37. Which one of the following is the correct matching pair of the disease and their three symptoms?

	Diseases		Symptoms
(1)	Bronchitis	-	Coughing, wheezing, difficulty in breathing mainly during expiration
(2)	Bronchial asthma	-	Hypertrophy and hyperplasia of sero-mucous gland, excess mucus secretion, thick greenis yellow sputum
(3)	Emphysema	-	Alveolar septa collapse, surfac area of lungs reduces, inflated lungs
(4)	Pulmonary tuberculosis	-	Inflammation in alveoli, alveoli is filled with fluid, blood oxyger reduced

38. Maximum volume of air that can be inspired during forceful inspiration after normal expiration
(1) Inspiratory capacity
(2) Expiratory capacity
(3) Functional residual capacity
(4) Total lung capacity

39. In which of the following has maximum CO_2 concentration?
(1) Alveoli of lungs (2) Atmospheric air
(3) Tissue fluid (4) Both (1) & (3)

40. Find the **incorrect** statement
(1) When pCO_2 is high and pO_2 is low as in tissues more binding of CO_2 occurs
(2) RBCs contain a very high concentration of carbonic anhydrase
(3) A parabolic curve is obtained when percentage saturation of Hb with oxygen is plotted against the pO_2
(4) Nearly 20-25% of CO_2 is transported by RBC's whereas 70% of it is carried as bicarbonate

41. Approximately how much ml of CO_2 is delivered by deoxygenated blood (per 100 ml) to alveoli?
(1) 19.4 ml (2) 14.4 ml
(3) 5.5 ml (4) 4 ml

42. Which of the following is **not** true regarding total lung capacity?
(1) TLC = VC + RV
(2) TLC = TV + IRV + ERV + RV
(3) TLC = IC + FRC
(4) TLC = VC + FRC

43. Hypoxia developed due to poor cardiac output or insufficient supply of oxygen and nutrients is
(1) Arterial hypoxia (2) Stagnant hypoxia
(3) Anaemia hypoxia (4) Hypoxia hypoxia

44. Find out the incorrect statement
(1) Less concentration of H^+ ions is favourable for formation of oxyhaemoglobin
(2) Larynx is cartilagenous sound box of body
(3) Solubility of CO_2 is less than solubility of O_2
(4) Affinity of CO with haemoglobin is more than O_2

45. HCO_3^- ions diffuse out into plasma and Cl^- ions move into the RBCs at the level of tissues and is known as
(1) Chloride shift (2) Haldane effect
(3) Hamburger phenomenon (4) Both (1) & (3)

46. Inspiratory reserve volume + Tidal, volume + Expiratory reserve volume is termed as
(1) Inspiratory capacity
(2) Functional residual capacity
(3) Vital capacity
(4) Total lung capacity

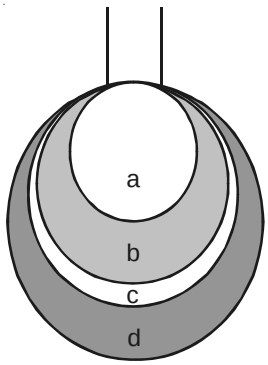
47. If residual volume is 1200 ml, expiratory reserve volume is 1100 ml, Tidal volume is 500 ml inspiratory reserve volume is 3000 ml then find out functional residual capacity of this person
(1) 4100 ml (2) 2300 ml
(3) 5800 ml (4) 3500 ml

48. Volume of air which we can inspire by a forceful inspiration over tidal volume is
(1) Inspiratory reserve volume
(2) Expiratory reserve volume
(3) Residual volume
(4) Functional residual capacity

49. Inspiration can occur when
(1) Intra-pulmonary pressure is less than atmospheric pressure
(2) Intra-pulmonary pressure is more than atmospheric pressure
(3) Intra-pulmonary pressure is equal to atmospheric pressure
(4) Intra-pulmonary pressure is mismatched with atmospheric pressure

50. In the given figure different respiratory volumes and capacities are shown by a, b, c and d. Identify them choosing the words from the box given below

Residual Volume (RV), Expiratory Reserve Volume (ERV), Tidal Volume (TV), Inspiratory Reserve Volume (IRV)



(1) a–RV ; b–ERV ; c–TV ; d–IRV
(2) a–TV ; b–RV ; c – ERV ; d–IRV
(3) a–RV ; b–IRV ; c–ERV ; d–TV
(4) a–TV ; b–RV ; c–IRV ; d–ERV

❑ ❑ ❑

ANSWERS

[PHYSICS]

Chapter 5 : System of Particles and Rotational Motion

1.	(4)	2.	(2)	3.	(3)	4.	(4)	5.	(1)	6.	(1)	7.	(2)
8.	(3)	9.	(4)	10.	(3)	11.	(3)	12.	(3)	13.	(1)	14.	(1)
15.	(2)	16.	(1)	17.	(1)	18.	(1)	19.	(3)	20.	(1)	21.	(3)
22.	(3)	23.	(3)	24.	(3)	25.	(2)	26.	(1)	27.	(2)	28.	(4)
29.	(1)	30.	(1)	31.	(2)	32.	(3)	33.	(2)	34.	(3)	35.	(2)
36.	(3)	37.	(1)	38.	(1)	39.	(2)	40.	(4)	41.	(4)	42.	(2)
43.	(1)	44.	(1)	45.	(4)	46.	(1)	47.	(3)	48.	(2)	49.	(2)
50.	(4)	51.	(2)	52.	(3)	53.	(1)	54.	(2)	55.	(4)	56.	(2)
57.	(2)	58.	(3)	59.	(2)								

Chapter 6 : Gravitation

1.	(3)	2.	(3)	3.	(2)	4.	(1)	5.	(4)	6.	(3)	7.	(4)
8.	(1)	9.	(2)	10.	(4)	11.	(2)	12.	(3)	13.	(2)	14.	(1)
15.	(3)	16.	(2)	17.	(3)	18.	(1)	19.	(4)	20.	(2)	21.	(4)
22.	(3)	23.	(2)	24.	(3)	25.	(2)	26.	(2)	27.	(4)	28.	(1)
29.	(3)	30.	(4)	31.	(3)	32.	(3)	33.	(2)	34.	(1)	35.	(4)
36.	(2)	37.	(3)	38.	(4)	39.	(2)						

Chapter 7 : Machanical Properties of Solids

1.	(4)	2.	(2)	3.	(1)	4.	(3)	5.	(4)	6.	(3)	7.	(1)
8.	(2)	9.	(4)	10.	(3)	11.	(4)	12.	(3)	13.	(2)	14.	(1)
15.	(3)	16.	(4)	17.	(2)	18.	(2)	19.	(3)	20.	(2)	21.	(1)
22.	(1)												

Chapter 8 : Machanical Properties of Fluids

1.	(2)	2.	(2)	3.	(3)	4.	(4)	5.	(3)	6.	(3)	7.	(2)
8.	(4)	9.	(2)	10.	(3)	11.	(2)	12.	(4)	13.	(1)	14.	(1)
15.	(1)	16.	(3)	17.	(1)	18.	(2)	19.	(4)	20.	(2)	21.	(2)
22.	(1)	23.	(2)	24.	(3)	25.	(3)	26.	(1)	27.	(1)	28.	(3)
29.	(1)	30.	(2)	31.	(3)	32.	(3)	33.	(1)	34.	(1)	35.	(3)
36.	(2)	37.	(2)	38.	(3)	39.	(3)	40.	(3)	41.	(3)	42.	(4)
43.	(4)	44.	(3)	45.	(2)	46.	(1)						

[CHEMISTRY]

Chapter 6 : Thermodynamics

1.	(4)	2.	(2)	3.	(1)	4.	(3)	5.	(1)	6.	(4)	7.	(1)
8.	(1)	9.	(4)	10.	(1)	11.	(2)	12.	(4)	13.	(3)	14.	(2)
15.	(1)	16.	(1)	17.	(2)								

Chapter 7 : Equlilbrium

1.	(3)	2.	(2)	3.	(1)	4.	(4)	5.	(2)	6.	(4)	7.	(4)
8.	(4)	9.	(1)	10.	(2)	11.	(3)	12.	(3)	13.	(1)	14.	(4)
15.	(2)	16.	(2)	17.	(3)	18.	(4)	19.	(2)	20.	(4)	21.	(3)
22.	(3)	23.	(3)	24.	(3)								

Chapter 8 : Redox Reaction

1.	(1)	2.	(2)	3.	(1)	4.	(2)	5.	(2)	6.	(3)	7.	(4)
8.	(3)	9.	(1)	10.	(1)	11.	(4)	12.	(3)	13.	(2)	14.	(43)
15.	(4)												

Chapter 9 : Hydrogen

1.	(4)	2.	(2)	3.	(1)	4.	(1)	5.	(3)	6.	(2)	7.	(3)

Chapter 10 : s-Block Elements

1.	(4)	2.	(2)	3.	(2)	4.	(2)	5.	(2)	6.	(1)	7.	(1)
8.	(2)	9.	(4)	10.	(3)	11.	(4)	12.	(3)	13.	(1)	14.	(3)
15.	(1)	16.	(2)										

Chapter 11 : Some p-Block Elements

1.	(2)	2.	(4)	3.	(4)	4.	(2)	5.	(4)	6.	(2)	7.	(1)
8.	(3)	9.	(3)	10.	(1)	11.	(3)	12.	(1)	13.	(3)	14.	(2)
15.	(2)	16.	(2)	17.	(3)	18.	(3)						

[BOTANY]

Chapter 4 : Morphology of Flowering Plants

1.	(4)	2.	(4)	3.	(2)	4.	(4)	5.	(4)	6.	(4)	7.	(2)
8.	(2)	9.	(3)	10.	(2)	11.	(4)	12.	(1)	13.	(3)	14.	(1)
15.	(1)	16.	(2)	17.	(4)	18.	(1)	19.	(4)	20.	(3)	21.	(4)
22.	(3)	23.	(3)	24.	(2)	25.	(4)	26.	(2)	27.	(1)	28.	(4)
29.	(2)	30.	(3)	31.	(2)	32.	(1)	33.	(2)	34.	(2)	35.	(3)
36.	(2)	37.	(3)	38.	(3)	39.	(4)	40.	(3)	41.	(2)	42.	(3)
43.	(2)	44.	(3)	45.	(1)	46.	(2)	47.	(3)	48.	(3)	49.	(2)
50.	(3)	51.	(2)	52.	(2)	53.	(4)	54.	(4)	55.	(2)	56.	(4)
57.	(2)	58.	(4)	59.	(4)	60.	(3)	61.	(1)	62.	(2)	63.	(2)
64.	(2)	65.	(1)	66.	(2)	67.	(3)	68.	(1)	69.	(4)	70.	(3)
71.	(1)	72.	(1)	73.	(3)	74.	(1)	75.	(2)				

Chapter 5 : Anatomy of Flowering Plants

1.	(3)	2.	(1)	3.	(2)	4.	(2)	5.	(2)	6.	(1)	7.	(3)
8.	(4)	9.	(1)	10.	(3)	11.	(3)	12.	(4)	13.	(4)	14.	(3)
15.	(1)	16.	(4)	17.	(4)	18.	(4)	19.	(3)	20.	(3)	21.	(1)
22.	(1)	23.	(2)	24.	(4)	25.	(4)	26.	(3)	27.	(3)	28.	(3)
29.	(3)	30.	(1)	31.	(4)	32.	(2)	33.	(2)	34.	(2)	35.	(4)

36. (1)	37. (4)	38. (4)	39. (4)	40. (3)	41. (4)	42. (3)
43. (1)	44. (3)	45. (4)	46. (1)	47. (4)	48. (1)	49. (3)
50. (4)	51. (2)	52. (4)	53. (1)	54. (2)	55. (2)	56. (2)
57. (3)	58. (4)	59. (2)	60. (2)	61. (3)	62. (3)	63. (4)
64. (4)	65. (2)	66. (2)	67. (2)	68. (2)	69. (2)	70. (1)
71. (4)	72. (2)	73. (3)	74. (4)	75. (2)	76. (4)	77. (4)
78. (2)	79. (1)	80. (1)	81. (2)	82. (4)	83. (3)	84. (4)
85. (1)	86. (1)	87. (2)	88. (3)	89. (1)	90. (2)	

Chapter 6 : The Cell : The Unit of Life

1. (4)	2. (2)	3. (3)	4. (1)	5. (1)	6. (2)	7. (4)
8. (1)	9. (2)	10. (1)	11. (2)	12. (4)	13. (4)	14. (4)
15. (1)	16. (1)	17. (3)	18. (4)	19. (2)	20. (3)	21. (4)
22. (2)	23. (1)	24. (3)	25. (2)	26. (2)	27. (1)	28. (4)
29. (2)	30. (3)	31. (2)	32. (3)			

Chapter 7 : The Cell Cycle and Cell Division

1. (2)	2. (3)	3. (2)	4. (1)	5. (1)	6. (1)	7. (3)
8. (4)	9. (3)	10. (1)	11. (2)	12. (4)	13. (1)	14. (3)
15. (1)	16. (2)	17. (1)	18. (3)	19. (1)	20. (2)	21. (4)
22. (1)	23. (4)	24. (3)	25. (4)	26. (2)		

Chapter 8 : Transport in Plant

1. (3)	2. (4)	3. (4)	4. (3)	5. (3)	6. (1)	7. (4)
8. (1)	9. (4)	10. (1)	11. (4)	12. (4)	13. (4)	14. (3)
15. (4)	16. (4)	17. (4)	18. (3)	19. (3)	20. (4)	21. (1)
22. (4)	23. (3)	24. (2)	25. (1)	26. (1)	27. (3)	28. (1)
29. (3)	30. (3)	31. (3)	32. (4)	33. (4)	34. (4)	35. (3)
36. (1)	37. (2)	38. (1)	39. (1)	40. (3)	41. (3)	42 (4)
43. (3)	44. (2)	45. (4)	46. (4)			

[ZOOLOGY]

Chapter 2 : Structural Organization in Animals

1. (3)	2. (1)	3. (4)	4. (2)	5. (2)	6. (2)	7. (2)
8. (1)	9. (4)	10. (3)	11. (4)	12. (3)	13. (3)	14. (4)
15. (1)	16. (3)	17. (4)	18. (3)	19. (2)	20. (4)	21. (1)
22. (4)	23. (2)	24. (3)	25. (4)	26. (2)	27. (4)	28. (2)
29. (4)	30. (3)	31. (1)	32. (2)	33. (3)	34. (2)	35. (2)
36. (2)	37. (3)	38. (2)	39. (3)	40. (1)	41. (3)	42. (1)
43. (3)	44. (4)	45. (2)	46. (3)	47. (3)	48. (2)	49. (1)
50. (1)	51. (4)	52. (3)	53. (1)	54. (1)	55. (4)	56 (2)
57. (2)	58. (2)	59. (3)	60. (3)	61. (2)	62. (2)	63. (2)
64. (3)	65. (3)	66. (4)	67. (3)	68. (3)	69. (4)	

Chapter 3 : Biomolecules

1.	(2)	2.	(3)	3.	(2)	4.	(3)	5.	(2)	6.	(2)	7.	(4)
8.	(3)	9.	(3)	10.	(4)	11.	(2)	12.	(3)	13.	(3)	14.	(2)
15.	(3)	16.	(3)	17.	(1)	18.	(4)	19.	(3)	20.	(4)	21.	(1)
22.	(4)	23.	(3)	24.	(4)	25.	(2)	26.	(2)	27.	(2)	28.	(3)
29.	(4)	30.	(4)	31.	(4)	32.	(2)	33.	(4)	34.	(4)	35.	(4)
36.	(2)	37.	(4)	38.	(3)	39.	(3)	40.	(3)	41.	(3)	42.	(2)
43.	(4)	44.	(4)	45.	(3)	46.	(2)	47.	(3)	48.	(3)	49.	(1)
50.	(4)	51.	(3)	52.	(4)	53.	(2)	54.	(3)	55.	(1)	56	(2)

Chapter 4 : Digestion and Absorption

1.	(2)	2.	(2)	3.	(3)	4.	(3)	5.	(3)	6.	(3)	7.	(3)
8.	(2)	9.	(4)	10.	(1)	11.	(4)	12.	(3)	13.	(1)	14.	(3)
15.	(4)	16.	(4)	17.	(4)	18.	(1)	19.	(3)	20.	(2)	21.	(3)
22.	(4)	23.	(3)	24.	(3)	25.	(4)	26.	(4)	27.	(3)	28.	(3)
29.	(2)	30.	(3)	31.	(2)	32.	(4)	33.	(4)	34.	(4)	35.	(4)
36.	(4)	37.	(2)	38.	(1)	39.	(1)	40.	(2)	41.	(2)		

Chapter 5 : Breathing and Exchange of Gases

1.	(4)	2.	(4)	3.	(3)	4.	(4)	5.	(4)	6.	(2)	7.	(4)
8.	(1)	9.	(1)	10.	(4)	11.	(2)	12.	(3)	13.	(4)	14.	(2)
15.	(2)	16.	(2)	17.	(3)	18.	(3)	19.	(1)	20.	(2)	21.	(2)
22.	(4)	23.	(2)	24.	(1)	25.	(1)	26.	(1)	27.	(3)	28.	(4)
29.	(3)	30.	(2)	31.	(2)	32.	(1)	33.	(3)	34.	(1)	35.	(3)
36.	(3)	37.	(3)	38.	(1)	39.	(3)	40.	(3)	41.	(4)	42.	(4)
43.	(2)	44.	(3)	45.	(4)	46.	(3)	47.	(2)	48.	(1)	49.	(1)
50.	(1)												

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Practice Question Bank for NEET - 2013

Booklet -3

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CONTENTS

2012-13

PHYSICS

[Chapter-9 : Thermal Properties of Matter]

1. A black body having temperature T K emits energy at the rate of E watt per minute. If the temperature is reduced to $\frac{T}{2}$K, then rate of emission becomes

(1) $\frac{1}{16}E$ (2) $\frac{1}{32}E$

(3) 16 E (4) 32 E

2. Two rods having length l_1 and l_2 made by two material having thermal expansion coefficient α_1 and α_2. If the difference between their lengths is independent of temperature, then

(1) $l_1\alpha_1 = l_2\alpha_2$ (2) $l_1\alpha_2 = l_2\alpha_1$

(3) $l_1^2\alpha_1 = l_1^2\alpha_2$ (4) $l_2 + l_1 = \alpha_2 + \alpha_1$

3. How much amount of energy must be given to a mixture of 10 g hydrogen and 20 g of He to change the temperature by 30°C, while they are kept in a closed vessel?

(1) 500 R (2) 600 R

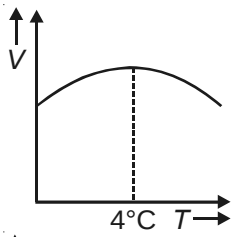
(3) 300 R (4) 400 R

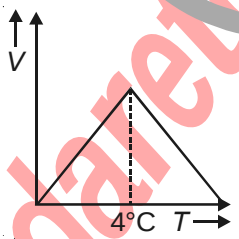
4. When a room is heated upto a temperature 30°C, the outside temperature is –30°C and when it is heated upto 20°C, outside temperature is –60°C. Then the temperature of heater used to heat the room is (Newton's law of cooling is valid)(Assume same time duration of heating)

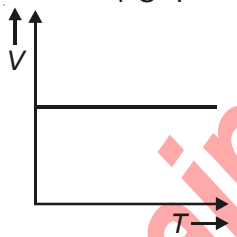
(1) 20°C (2) 40°C

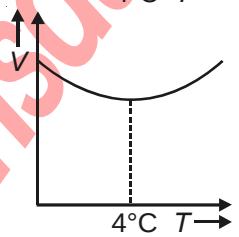
(3) 80°C (4) 60°C

5. Which of the following graph correctly shows, the behaviour of volume of water (V) with temperature (T)?

(1) 

(2) 

(3) 

(4) 

6. J is mechanical equivalent of heat, R is radius of earth, ω is angular velocity of earth and S is specific heat of earth. If earth suddenly stop the rotation about it's polar axis, then the maximum change in temperature of earth will be

(1) $\frac{R\omega}{5SJ}$ (2) $\frac{R^2\omega^2}{5SJ}$

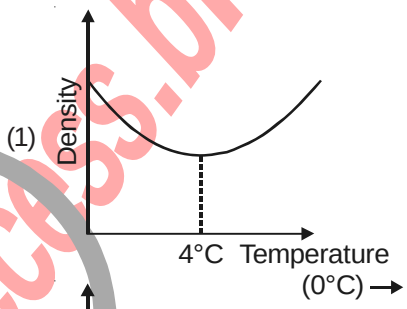
(3) $\frac{1}{3}\frac{R^2\omega^2}{SJ}$ (4) $\frac{R\omega}{3SJ}$

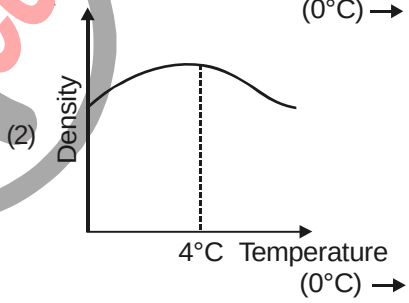
7. A bullet having velocity V, collides against a wall and one-third of its kinetic energy is converted into heat. If specific heat of bullet is S, then the temperature of the bullet rises by (Given, J=mechanical equivalent of heat)

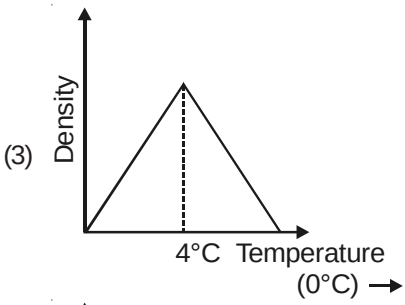
(1) $\frac{V^2j}{6S}$ (2) $\frac{V^2}{6}jS$

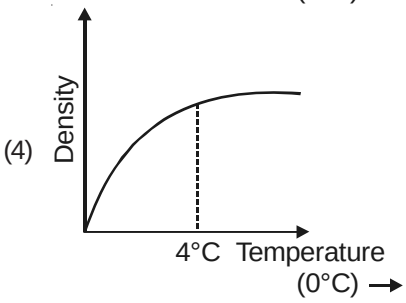
(3) $\frac{V^2}{6jS}$ (4) $\frac{V^2j}{3S}$

8. Which of the following curve shows the behaviour of density of water with temperature accurately?

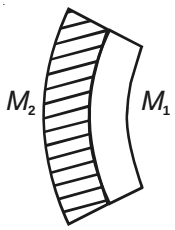
(1) 

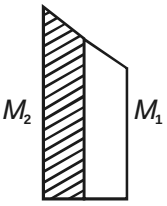
(2) 

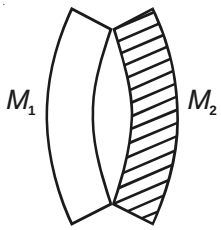
(3) 

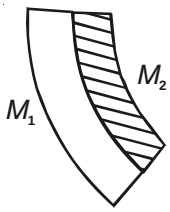
(4) 

9. A bimetallic strip is made of two metals M_1 and M_2 having coefficient of linear expansion α_1 and α_2, respectively ($\alpha_1 > \alpha_2$). When the strip is heated then shape of strip will be

(1) 

(2) 

(3) 

(4) 

10. The mass of the cube of an unknown metal is 5 kg. When 15,000 J of heat energy is supplied to it, its temperature rises by 3ºC. The heat capacity of the cube is

(1) 5000 J/ºC (2) 1000 J/ºC

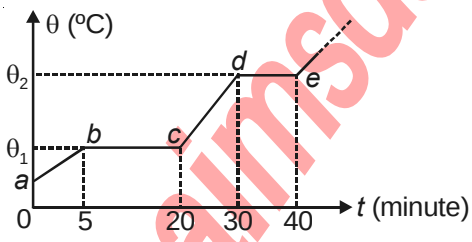
(3) 3000 J/ºC (4) 3 J/ºC

11. A calorimeter 'A' contains 100 g water at 50ºC and another calorimeter 'B' contains 150 g water at 20ºC. If the water of both the calorimeters is mixed together, the temperature of the mixture will be

(1) 70ºC (2) 35ºC

(3) 32.0ºC (4) 15.0ºC

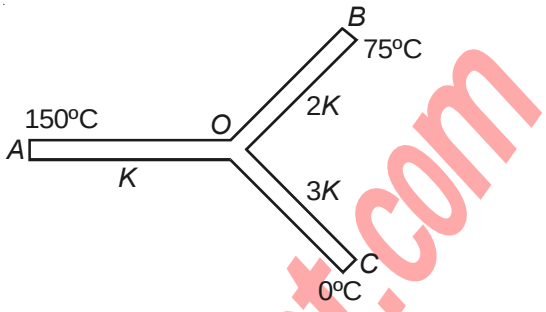
12. The heat energy is supplied to a 100 g solid with a rate of 200 cal/minute. The temperature (θ) versus time (t) plot is shown below. The latent heat of fusion of the substance is



(1) 30 cal/g (2) 20 cal/g

(3) 10 cal/g (4) 5 cal/g

13. The three rods of identical dimensions and made of different materials are joined as shown in the diagram below. The temperatures of the ends A, B, C are given in the diagram itself. Which of the following is incorrect statement?



(1) The temperature at the junction O is 50ºC

(2) The heat current in the rod AO is from A to O

(3) The heat current in the rod BO is from O to B

(4) The heat current in the rod OC is from O to C

14. Temperature of water in a lake is at 0ºC and atmospheric temperature is –10ºC. If 1 cm thickness of ice formed on the lake takes 2 days, then time taken to form next 2 cm thickness of ice is

(1) 8 days (2) 6 days

(3) 16 days (4) 10 days

15. The temperature of spherical black body falls from 80ºC to 76ºC in 10 minutes and from 76ºC to 74ºC in next 10 minutes. Assuming that the body follows Newton's law of cooling, the temperature of surroundings is

(1) 72ºC (2) 74ºC

(3) 70ºC (4) 65ºC

16. A liquid of mass m and specific heat c is heated to a temperature θ. The temperature of another liquid of mass 2m and specific heat 2c is at temperature $\frac{\theta}{2}$. If the two liquids are mixed, the temperature of the mixture will be

(1) $\left(\frac{5}{3}\right)\theta$ (2) $\left(\frac{3}{5}\right)\theta$

(3) θ (4) $\frac{\theta}{2}$

17. If α_x, α_y and α_z are the co-efficients of linear expansion of a solid along x-axis, y-axis and z-axis respectively, then the volume expansion of solid is

(1) $3(\alpha_x + \alpha_y + \alpha_z)$ (2) $\alpha_x + \alpha_y + \alpha_z$

(3) $\frac{1}{3}(\alpha_x + \alpha_y + \alpha_z)$ (4) $\alpha_x + \alpha_y$

18. A black-body has maximum wavelength λ_m at 2500 K. Corresponding wavelength at 4000 K will be

(1) $\frac{16}{81}\lambda_m$ (2) $\frac{3}{2}\lambda_m$

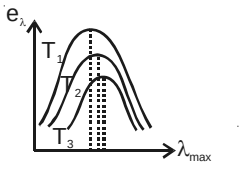
(3) $\frac{2}{3}\lambda_m$ (4) $\frac{5}{8}\lambda_m$

19. Two spheres of radius r and R at temperature 1000 K and 1500 K respectively radiates energy at same rate then
(1) $16r^2 = 81R^2$ (2) $16R^2 = 81r^2$
(3) $2R^2 = 3r^2$ (4) $3R^2 = 2r^2$

20. A steel meter scale is to be ruled so that the millimeter intervals are accurate upto 1×10^{-3} mm at certain temperature. The maximum temperature variation allowed during ruling is ($\alpha = 1 \times 10^{-4}$/K)
(1) 5°C (2) 2°C
(3) 10°C (4) 4°C

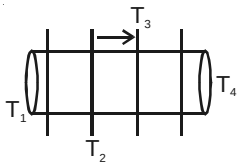
21. Ice starts forming on the surface of lake and takes 8 hours to form a layer of 1 cm thick. To increase the thickness of layer to 2 cm, it will take (assume water is at 0°C)
(1) 8 hours (2) < 8 hours
(3) < 16 hours (4) > 16 hours

22. The following graph shows power of a black body radiation vs temperature at three temperatures. Then



(1) $T_1 > T_2 > T_3$ (2) $T_3 > T_2 > T_1$
(3) $T_1 = T_2 = T_3$ (4) $T_2 > T_1 > T_3$

23. The shown rod is in steady state with $T_1 > T_4$ then which of the following statement is true

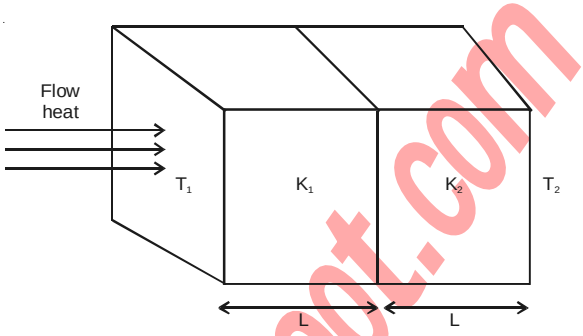


(1) Heat is flowing from T_4 to T_1
(2) T_2, T_3 are are increasing with time
(3) T_2, T_3 are constant with time
(4) $T_3 = T_2$

24. A rod of length L and cross sectional area A is subjected to a temperature difference ΔT at two ends and the rate of heat flow is Q. If the rod is cut in two pieces from the middle lengthwise and now the two rods are connected in series and subjected to same temper ature difference. Then new rate of heat flow is
(1) 4Q (2) $\frac{Q}{4}$
(3) 2Q (4) $\frac{Q}{2}$

25. A body cools in 10 minutes from 60°C to 40°C. What will be its temperature after next 10 minutes, if surrounding temperature is 10°C (Assume Newton's law of cooling valid)
(1) 29 °C (2) 50 °C
(3) 28 °C (4) 35 °C

26. The thermal conductivity of the combination of slabs



(1) $K_1 + K_2$ (2) $(2K_1K_2) / (K_1 + K_2)$
(3) K_1K_2 (4) $(K_1 + K_2)/(2K_1K_2)$

27. Two rods of length l and 2l, thermal conductivities 2k and k are connected end to end. If cross-sectional area of the rods are equal, then equivalent thermal conductivity of the system is
(1) $\left(\frac{5}{6}\right)$K (2) 1.5k
(3) 1.2k (4) $\left(\frac{8}{9}\right)$K

28. Steam at 100°C is passed through 2 kg water maintained at 25°C in a calorimeter having water equivalent 50 g. If final temperature of water is 95°C, then the amount of steam passed is about
(1) 153 g (2) 263 g
(3) 311 g (4) 381 g

29. Two identical cubes of metals are connected as shown in figure A. 50 cal heat flows through it in 2 minute. If the cubes are connected as figure B, then the same amount of heat will flow through the rods in

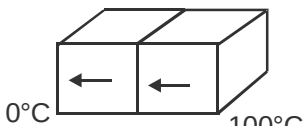


Figure A

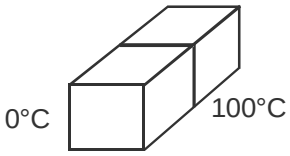
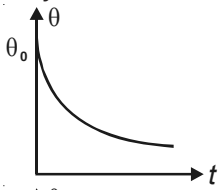
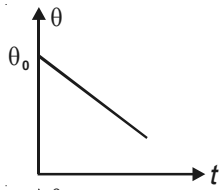


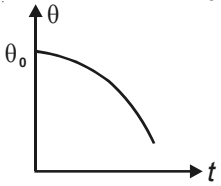
Figure B

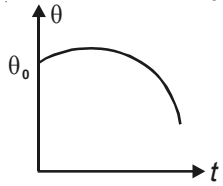
(1) 0.5 minute (2) 1 minute
(3) 2 minute (4) 8 minute

30. A liquid kept in an open vessel cools according to Newton's law of cooling. The temperature of the liquid (θ) is plotted with time (t). Which of the following graphs correctly shows the variation of θ with t?

(1) 

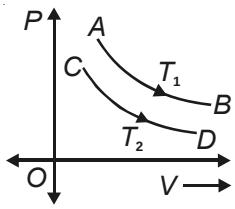
(2) 

(3) 

(4) 

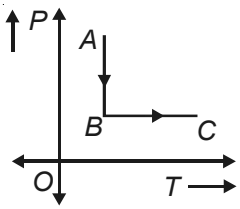
1. An ideal gas, $\left(\gamma = \frac{5}{3}\right)$ is changed from initial state (100 kPa, 100 cc) to (200 kPa, 200 cc) linearly. Temperature of the gas
   (1) Increases continuously
   (2) Decreases continuously
   (3) First increases to a maximum value then decreases
   (4) First decreases to a minimum value then increases

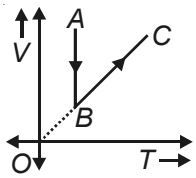
2. T_1 and T_2 represent the absolute temperatures of a given mass of an ideal gas undergoing isothermal changes AB and CD. Which of the following is correct?

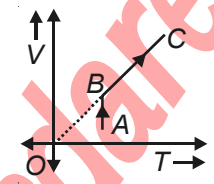


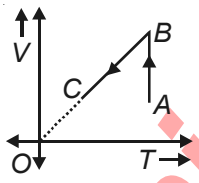
   (1) $T_1 > T_2$ (2) $T_1 < T_2$
   (3) $T_1 = T_2$ (4) $T_1 \le T_2$

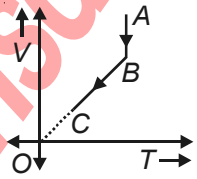
3. P-T diagram for an ideal gas undergoing a change ABC is as shown in figure. Corresponding V-T graph will be



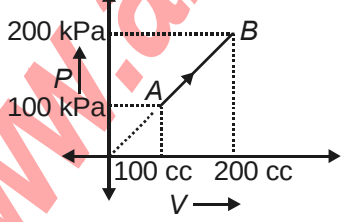
   (1)


   (2)


   (3)


   (4)


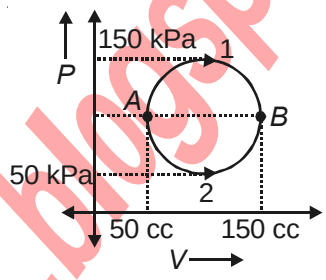
4. Workdone by the ideal gas during the process AB is



   (1) 15 J (2) 30 J
   (3) 10 J (4) 25 J

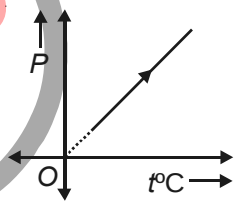
5. An ideal gas expands isothermally from a volume V_1 to V_2 and then compressed to original volume V_1 adiabatically. Initial pressure is P_1 and final pressure is P_3. The total work done is W. Then
   (1) $P_3 > P_1$, $w > 0$ (2) $P_3 < P_1$, $w < 0$
   (3) $P_3 > P_1$, $w < 0$ (4) $P_3 = P_1$, $w = 0$

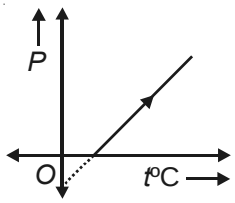
6. The processes 1 and 2 enclose a circular area. An ideal gas is changing from A to B through process 1 absorbs 5π J. Heat absorbed by the same gas changing from A to B through process 2 is

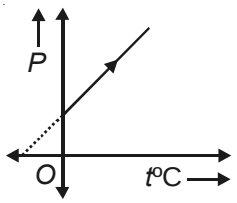


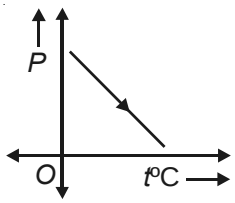
   (1) 2.5π J (2) Zero
   (3) 5π (4) 7.5π

7. If a graph is plotted between pressure (P) and temperature (t^oC) for an ideal gas at constant volume, then the nature of the graph is

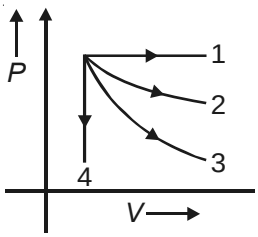
   (1)


   (2)


   (3)


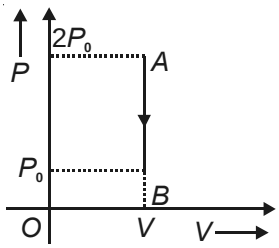
   (4)


8. Which of the following can represent an adiabatic process (assuming each one of them represents either of the four processes –isothermal, –isochoric, –isobaric, –adiabatic)



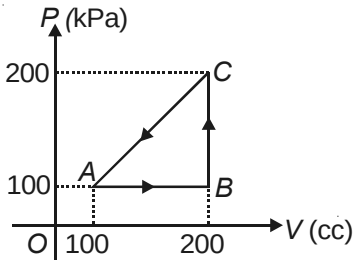
   (1) 4 (2) 3
   (3) 2 (4) 1

9. Work done by the gas in the process AB is



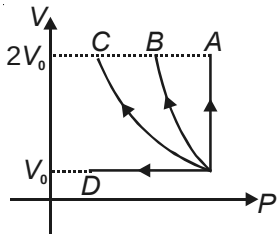
(1) P_0V (2) $2P_0V$
(3) Zero (4) $4P_0V$

10. Change in internal energy of the gas during the process ABC is 20 J. Change in internal energy in the process CA will be



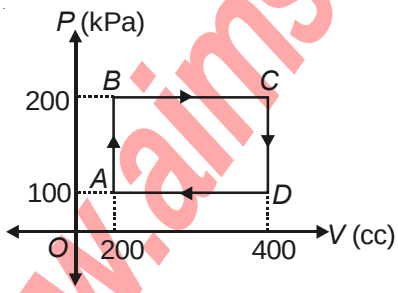
(1) –20 J (2) –10 J
(3) 20 J (4) 25 J

11. In which of the following processes work done is more?



(1) A (2) B
(3) C (4) D

12. The heat absorbed by an ideal gas during one cycle of the cyclic process ABCD is

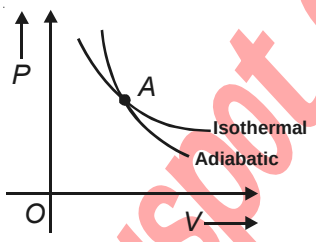


(1) 10 J (2) 20 J
(3) 40 J (4) 30 J

13. m kg ice is melted at 0ºC. Increase in entropy of the ice is (in SI units)

(1) Zero (2) $\frac{mL_f}{273}$
(3) $\frac{mL_f}{373}$ (4) Infinity

14. Slope of the adiabatic at A is 5/3 times the slope of the isothermal at A. The gas is

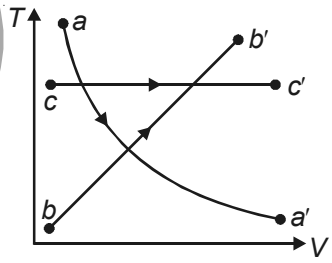


(1) Monoatomic (2) Diatomic
(3) Polyatomic (4) Triatomic

15. Efficiency of heat engine is 0.5 when its sink temperature is 500 K. If the sink temperature is made 400 K at same source temperature, then the efficiency becomes / remains

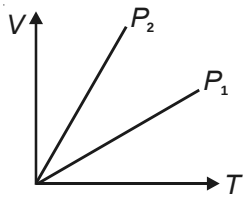
(1) 0.5 (2) 0.4
(3) 0.6 (4) 0.8

16. In the diagram shown below some thermodynamic processes are drawn. Which one is an isothermal process?



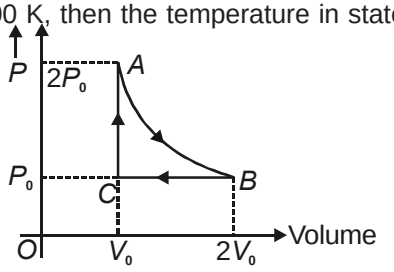
(1) aa′ (2) bb′
(3) cc′ (4) All of these

17. For a perfect gas the volume (V) versus temperature (T) graphs are drawn at pressures P_1 and P_2 as shown below. From the graphs, we can conclude that



(1) $P_1 < P_2$
(2) $P_1 > P_2$
(3) $P_1 = P_2$
(4) The information is insufficient to predict

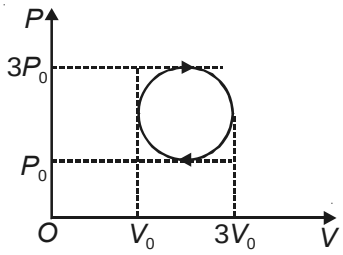
18. The following figure is the PV diagram for a cyclic process for an ideal gas. If the temperature in state B is 600 K, then the temperature in state C will be



(1) 900 K (2) 600 K

(3) 300 K (4) 150 K

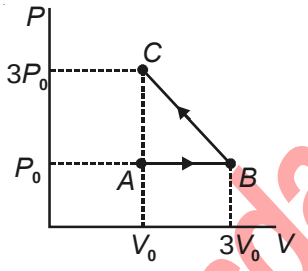
19. In the cyclic process shown by indicator diagram, the work done by the gas is



(1) πP_0V_0 (2) $4\pi P_0V_0$

(3) $\frac{\pi}{4}P_0V_0$ (4) $\frac{3}{4}\pi P_0V_0$

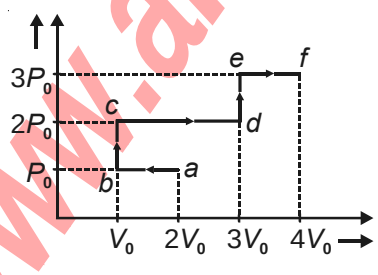
20. A thermodynamic system goes from state A to state C via a state B as indicated by P-V diagram. Find the work done by the gas for the process $A \rightarrow B \rightarrow C$



(1) $-P_0V_0$ (2) Zero

(3) $-2P_0V_0$ (4) $-3P_0V_0$

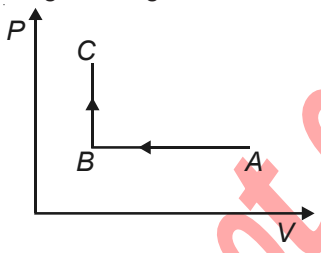
21. P-V diagram for an ideal gas as is shown in figure. The work done by the gas during the process abcdef is

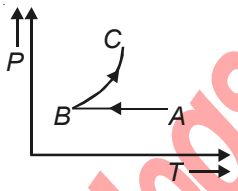


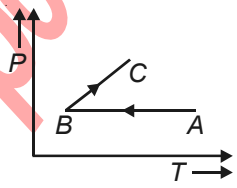
(1) $8\ P_0V_0$ (2) $17\ P_0V_0$

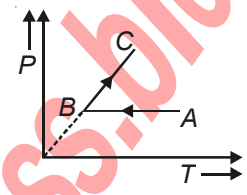
(3) $5\ P_0V_0$ (4) $6\ P_0V_0$

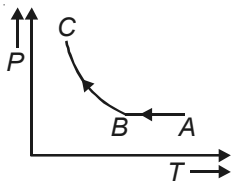
22. P-V graph for an ideal gas is shown in the figure. Corresponding P-T diagram will be



(1)


(2)


(3)


(4)


23. In an adiabatic process; the pressure and absolute temperature of a gas are related as $P \propto T^3$. Then, the value of $\frac{C_p}{C_v}$ is

(1) $\frac{4}{3}$ (2) $\frac{3}{2}$

(3) $\frac{7}{3}$ (4) $\frac{5}{3}$

24. An ideal gas with adiabatic exponent 1.5 is heated at constant pressure. Fraction of heat absorbed used in increasing the temperature is

(1) $\frac{1}{2}$ (2) $\frac{1}{3}$

(3) $\frac{2}{3}$ (4) $\frac{3}{4}$

25. A container have two part in which the gases are in the volume V_1 and V_2 under pressure P_1 and P_2 at same temperature. If the position of the separator is withdrawn the new pressure is

(1) $\frac{P_1V_1 + P_2V_2}{V_1 + V_2}$ (2) $P_1 + P_2$

(3) $\frac{P_1V_1 + P_2V_2}{PT(V_1 + V_2)}$ (4) Both (1) & (2)

26. An ideal heat engine exhausting heat at 27°C have 40% efficiency. Then it takes heat from a reservoir at

(1) 127°C (2) 227°C

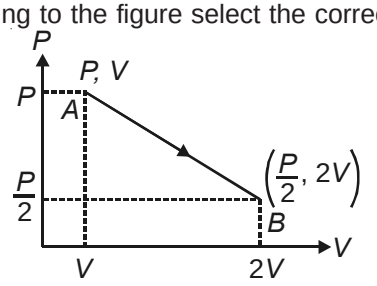
(3) 327° (4) 427°

27. The pressure (P), volume V and temperature (T) of a certain gas are related as $P = \frac{\alpha T}{V}$. Then the work done by the gas when temperature changes from T_0 to $3T_0$ at constant pressure will be

(1) $2\alpha T_0$ (2) 2α

(3) $2\alpha T_0^2$ (4) $2\alpha^2 T_0^2$

28. According to the figure select the correct statement



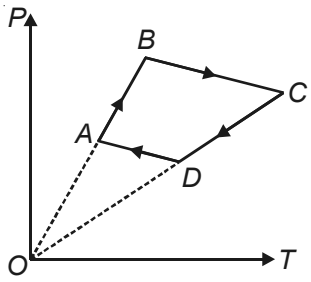
(1) The work in this process greater than isothermal process between A & B

(2) The corresponding V - T curve is a parabola

(3) Both (1) & (2) are correct

(4) Only (2) is correct

29. One mole of an ideal monoatomic gas perform a cycle as shown in figure



Mark correct option

(1) Work done in process AB is zero

(2) Work done in process BC is non-zero

(3) Work done in process CD is zero

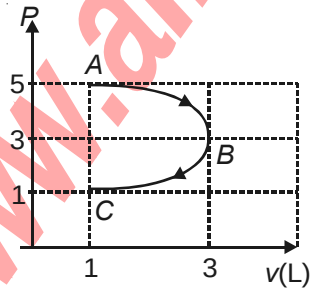
(4) All of these

30. A refrigerator, whose coefficient of performance K = 5. extracts heat from the cooling compartment at the rate of 250 J/cycle. The work done per cycle to operate the refrigerator will be

(1) 30 J (2) 50 J

(3) 40 J (4) 20 J

31. If the thermodynamic process ABC is a semicircle, then work done in the process ABC is



(1) + 2π unit (2) –2π unit

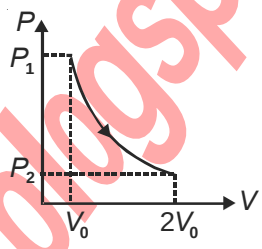
(3) +4 unit (4) –4 unit

32. An ideal gas is supplied with Q amount of heat at constant volume to increase the temperature of gas by ΔT. If the same sample is supplied with heat at constant pressure, then to increase the temperature by the same amount heat must be (γ is the adiabatic exponent)

(1) $Q' = \frac{Q}{\gamma}$ (2) $Q' = \gamma Q$

(3) $Q' = Q$ (4) $Q' = (\gamma - 1)Q$

33. Find the work done by an ideal monoatomic gas during an adiabatic expansion shown in P-V diagram



(1) $(P_1 - 2P_2)V_0$ (2) $\frac{1}{2}(P_1 - 2P_2)V_0$

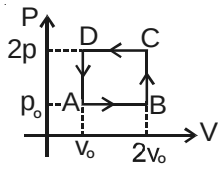
(3) $\frac{3}{2}(P_1 - 2P_2)V_0$ (4) $\frac{3}{5}(P_1 - 2P_2)V_0$

34. A Carnot engine takes heat from a reservoir at 627°C and rejects at 27°C. Calculate its efficiency

(1) $\frac{200}{209}$ (2) $\frac{3}{5}$

(3) $\frac{1}{3}$ (4) $\frac{2}{3}$

35. An ideal gas is taken round the cycle as shown on an PV diagram.



Work done by the gas during the cycle is

(1) P_0V_0 (2) $2\ P_0V_0$

(3) $-\ P_0V_0$ (4) $-\frac{P_0V_0}{2}$

36. One mole of an ideal monoatomic gas at temperature T_0 expands slowly according to the law P/v = constant. If the final temperature is $2T_0$, heat supplied to the gas is

(1) $2RT_0$ (2) $\frac{3}{2}RT_0$

(3) RT_0 (4) $\frac{1}{2}RT_0$

37. When 'Q' amount of heat energy is supplied to a diatomic gas, it does a work of $\frac{'Q'}{4}$. Then molar specific heat capacity of the process is

(1) $\frac{2}{5}R$ (2) $\frac{5}{2}R$

(3) $\frac{10}{3}R$ (4) $\frac{6}{7}R$

38. With reference to the diagram (a) and (b) select the correct option (W refers to work done)

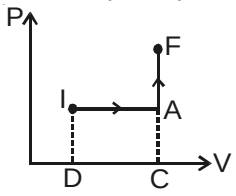


Fig (a)

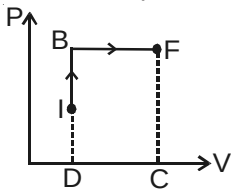
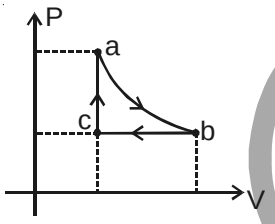


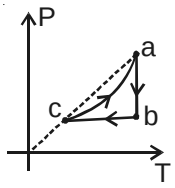
Fig (b)

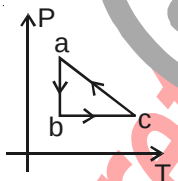
(1) $W_a > W_b$ (2) $W_a < W_b$

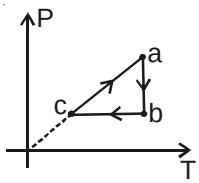
(3) $W_a = W_b$ (4) None of the above

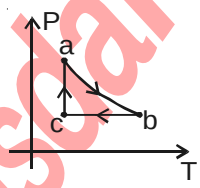
39. Figure shows a cyclic process abca for one mole of an ideal gas. If a $\rightarrow$ b is isothermal process, then the which one represents P – T diagram for the given cyclic process



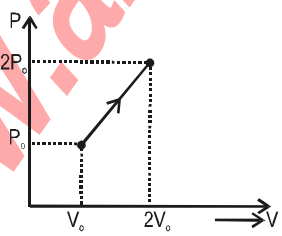
(1)


(2)


(3)


(4)


40. The P–V diagram of 2g of Helium gas for a certain process $A \rightarrow B$. is shown in figure. Heat given to the gas during the process is



(1) P_oV_o (2) $1.5\ P_oV_o$

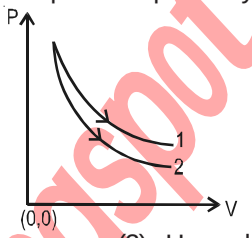
(3) $4.5\ P_oV_o$ (4) $6\ P_oV_o$

41. A carnot engine working between 300K and 600K perform work of 800 Jper cycle. The amount of heat energy supplied to engine from the source in each cycle is

(1) 800J (2) 1600J

(3) 3200J (4) 6400J

42. The P–V plot for two gases during adiabatic processes are shown in the figure. The graphs 1 and 2 should correspond respectively to



(1) O_2 and He (2) He and O_2

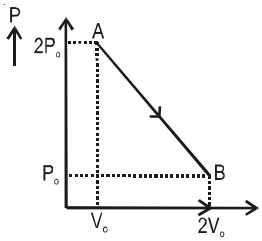
(3) O_2 and CO (4) N_2 and O_2

43. One mole of an ideal gas at a temperature T_1K expands slowly according to the law $\frac{P}{V}$ constant . The final temperature is T_2K. The work done by the gas is

(1) $R(T_2-T_1)$ (2) $2R(T_2-T_1)$

(3) $\frac{R}{2}(T_2-T_1)$ (4) $\frac{2R}{3}(T_2-T_1)$

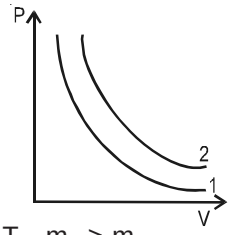
44. A sample of gas follows process AB, then which of the following is incorrect about AB?



(1) $\Delta U = 0$ (2) $W > 0$

(3) $Q = W$ (4) $\Delta U < 0$

45. The P–V diagram of a gas at constant temperature are drawn. The curve 1 is for a constant mass m_1 and temperature T_1 and curve T_2 is for a constant mass m_2 and temperature T_2. Select the incorrect alternative



(1) When $T_1 = T_2$, $m_2 > m_1$

(2) When $m_1 = m_2$, $T_2 > T_1$

(3) When $T_1 = T_2$, $m_1 > m_2$

(4) $m_1T_1 < m_2T_2$

46. A polyatomic gas with six degree of freedom does 25J of work when it is expanded at constant pressure. The heat given to the gas is

(1) 100J (2) 150J

(3) 200J (4) 250J

1. A diatomic gas is at very high temperature T such that it possesses translatory, rotational as well as vibrational motion. The energy associated with each molecule due to their vibration is (k = Boltzman constant)

(1) kT (2) $\frac{kT}{2}$

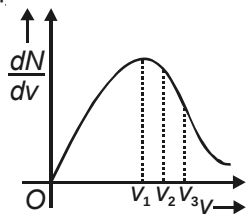
(3) 2kT (4) $\frac{kT}{4}$

2. If N_1 and N_2 are the number of air molecules in an open room in peak winter and peak summer respectively, then

(1) $N_1 = N_2$ (2) $N_1 < N_2$

(3) $N_1 > N_2$ (4) $N_1 > 2N_2$

3. In Maxwell speed distribution curve v_1 represents



(1) r.m.s. speed (2) Average speed

(3) Most probable speed (4) Average velocity

4. If ratio of density ρ and pressure P of an ideal gas is x, then the root mean square speed of gas molecules is

(1) $\sqrt{3x}$ (2) $\sqrt{\frac{3}{x}}$

(3) $\sqrt{3x^2}$ (4) $\sqrt{\frac{3}{x^2}}$

5. A vessel contains a mixture of oxygen gas and hydrogen gas. The average kinetic energy of a H_2 molecule is K_1 and that of O_2 molecule is K_2, then the ratio $\frac{K_1}{K_2}$ is equal to (the temperature in the vessel is uniform)

(1) 1 : 16 (2) 1 : 8

(3) 1 : 4 (4) 1 : 1

6. The mean free path for a gas is equal to (n is the number density and d is the diameter of a molecule of the gas)

(1) $\frac{1}{\sqrt{2}\, n\pi d}$

(2) $\frac{1}{\sqrt{2}\, n\pi d^2}$

(3) $\frac{1}{\sqrt{2}\, n\pi d^3}$

(4) $\frac{1}{\sqrt{2}\, n\pi d^{3/2}}$

7. n moles of ideal gas is heated at constant pressure from 50°C to 100°C, the increase in internal energy of the gas is

$\left(\frac{C_P}{C_V} = r \text{ and } R = \text{gas constant}\right)$

(1) $\frac{50nR}{\gamma - 1}$ (2) $\frac{100nR}{\gamma - 1}$

(3) $\frac{50n\gamma R}{\gamma - 1}$ (4) $\frac{25n\gamma R}{\gamma - 1}$

8. An insulated box containing 1 mole O_3 gas of mass M moving with velocity v_0 and suddenly stopped. Find the increase in temperature as a result of stopping the box

(1) $\frac{8Mv_0^2}{R}$ (2) $\frac{Mv_0^2}{8R}$

(3) $\frac{12Mv_0^2}{R}$ (4) $\frac{Mv_0^2}{6R}$

9. The specific heat of a diatomic gas undergoing the process $P^2 = V^5$ is

(1) $\frac{7}{2}R$ (2) $\frac{31R}{14}$

(3) $\frac{39R}{14}$ (4) $\frac{10R}{14}$

10. If pressure of a gas is increased at constant temperature by 2%, then the rms velocity of the gas will

(1) Increase by 2% (2) Increase by 1%

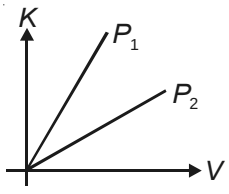
(3) Not change (4) Decrease by 1%

11. Four moles of O_2 gas and two moles of Argon gas and one mole of water vapour is mixed. Then molar heat capacity at constant pressure of the mixture is

(1) $\frac{16}{7}R$ (2) $\frac{7}{16}R$

(3) R (4) $\frac{23}{7}R$

12. Two gases of same amount under different pressure and volume. The graph of their total kinetic energy (K) versus volume (V) as shown in figure, then



(1) $P_1 > P_2$ (2) $P_1 < P_2$

(3) $P_1 = P_2$ (4) Cannot be calculate

13. During an experiment an ideal gas obeys an additional law P^2V = constant. The initial temperature and volume of the gas are T and V respectively. If it expands to a volume 2V, then its temperature will be

(1) 2T (2) $\sqrt{3}T$

(3) $\sqrt{2}T$ (4) T

14. Which of the following is wrong?

(1) The average distance through which a molecule moves freely between successive collisions is called mean free path

(2) Formula for mean free path is $\frac{KT}{\pi d^2 P\sqrt{2}}$

(3) Formula for mean free path is $\frac{1}{\pi^2 d^2\sqrt{2}}$

(4) Mean free path is directly proportional to the number density of the gas

15. If the speed of sound in a gas is v and the rms velocity of the gas molecule is v_{rms}, then the ratio of $\frac{v}{v_{rms}} =$

(1) $\frac{\gamma}{r}$ (2) $\frac{\gamma}{3}$

(3) $\sqrt{\frac{\gamma}{r}}$ (4) $\sqrt{\frac{\gamma}{3}}$

16. The pressure and density of two di-atomic mixture of gases $\left(\gamma = \frac{7}{5}\right)$ change adiabatically from (P, ρ) to (P′, ρ′). If $\frac{P}{P'} = 128$, the value of $\frac{\rho}{\rho'}$ is equal to

(1) 16 (2) 32

(3) 64 (4) 128

17. The mean or average speed of gas molecules of a gas having molar mass M at absolute temperature T is given by

(1) $\sqrt{\frac{3RT}{M}}$ (2) $\sqrt{\frac{8RT}{\pi M}}$

(3) $\sqrt{\frac{2RT}{M}}$ (4) $\sqrt{\frac{8RT}{M}}$

18. If pressure, absolute temperature and Boltzman constant for a gas are P, T and K respectively for a gas, then mean free path of the gas molecules of diameter d is

(1) $\frac{KT}{\pi d^2 P\sqrt{2}}$ (2) $\frac{PT}{\pi d^2 K\sqrt{2}}$

(3) $\frac{KP}{\pi d^2 T\sqrt{2}}$ (4) $\frac{KPT}{\pi d^2\sqrt{2}}$

19. Four particles have speeds 2 c m/s, 3 c m/s, 4 c m/s and 5 cm/s respectively. Their rms speed is

(1) 3.5 c m/s (2) $\sqrt{54}$ cm/s

(3) $\frac{27}{2}$ cm/s (4) $\frac{\sqrt{54}}{2}$ cm/s

20. If E is the energy density of one mole of monoatomic in an ideal gas, then the pressure of the ideal gas is

(1) $P = \frac{2}{3}E$ (2) $P = \frac{3}{2}E$

(3) $P = \frac{5}{2}E$ (4) $P = \frac{2}{5}E$

21. A mixture of ideal gases has 2 moles of He, 4 moles, of oxygen and 1 mole of ozone at absolute temperature T. The internal energy of mixture is

(1) 13RT (2) 11RT

(3) 16RT (4) 14RT

22. The rms speed of gas molecules of molecular weight M at temperature T is given by

(1) $\sqrt{\frac{5RT}{M}}$ (2) $\sqrt{\frac{2RT}{M}}$

(3) $\sqrt{\frac{8RT}{M}}$ (4) $\sqrt{\frac{3RT}{M}}$

[Chapter-12 : Oscillations]

1. Which among the following is incorrect?

(1) x = sinωt + cosωt represents S.H.M.

(2) x = sin2ωt + cosωt represents S.H.M.

(3) For a particle to execute oscillatory motion about x = 0 the force must satisfy the condition, F < 0 for x > 0 and F > 0 for x < 0

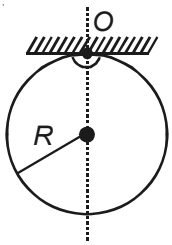
(4) None of these

2. The time period of a simple pendulum in lift accelerating vertically upward with acceleration g is

(1) $2\pi\sqrt{\frac{\ell}{g}}$ (2) $2\pi\sqrt{\frac{\ell}{\sqrt{2}g}}$

(3) $2\pi\sqrt{\frac{\ell}{2g}}$ (4) $2\pi\sqrt{\frac{\sqrt{3}\ell}{g}}$

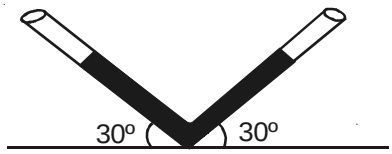
3. The time period of uniform disc of radius R, pivoted at a point O on its periphery is



(1) $2\pi\sqrt{\frac{R}{g}}$ (2) $2\pi\sqrt{\frac{2R}{g}}$

(3) $2\pi\sqrt{\frac{R}{2g}}$ (4) $2\pi\sqrt{\frac{3}{2}\frac{R}{g}}$

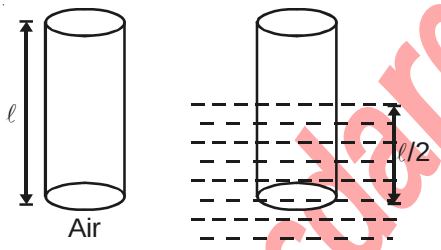
4. The time period of oscillation of liquid column of length ℓ placed in narrow V-tube of uniform cross-section as shown in the figure is



(1) $2\pi\sqrt{\frac{2\ell}{g}}$ (2) $2\pi\sqrt{\frac{\ell}{g}}$

(3) $2\pi\sqrt{\frac{\ell}{2g}}$ (4) $2\pi\sqrt{\frac{\ell\sqrt{3}}{g}}$

5. The fundamental frequency of an open organ pipe is f_0 in air. When it is placed half way in water, then the new fundamental frequency is



(1) f_0 (2) $\frac{f_0}{2}$

(3) $2f_0$ (4) None of these

6. A simple pendulum consisting of a ball of mass m tied to a string of length ℓ is made to oscillate with small amplitude a about mean position. If a stationary heavy obstacle is at a distance x from the mean position and ball hits it elastically then impulse imparted by ball on the wall is

(1) $m\sqrt{\frac{g(a^2-x^2)}{\ell}}$ (2) $2m\sqrt{\frac{g(a^2-x^2)}{\ell}}$

(3) $\sqrt{\frac{mgx^2}{\ell}}$ (4) $\sqrt{\frac{mgx^2}{A}}$

7. A particle performing SHM with amplitude A and time period T. At some instant it is at a position $-\frac{A}{2}$ and moving in +ve direction. The time after which its potential energy will be equal to its total energy is

(1) T (2) $\frac{T}{2}$

(3) $\frac{T}{3}$ (4) $\frac{T}{4}$

8. A ring of mass m and radius R is pivoted at a point on its periphery. It oscillates with time period T. If a point mass m is gently attached at lowest point, then new time period is

(1) $\frac{T}{2}$ (2) $\frac{T}{\sqrt{2}}$

(3) T (4) $\sqrt{2}\,T$

9. A uniform spring has a force constant K. It is cut into two pieces of lengths ℓ_1 and ℓ_2 such that $\ell_1 = n\ell_2$. Time period of oscillation of m with spring of length ℓ_1 is

(1) $2\pi\sqrt{\frac{mn}{K(n+1)}}$ (2) $2\pi\sqrt{\frac{m}{K(n+1)}}$

(3) $2\pi\sqrt{\frac{K(n+1)}{m}}$ (4) $2\pi\sqrt{\frac{m(n+1)}{nK}}$

10. A simple pendulum is immersed in a liquid of density ρ. If its length is ℓ, the time period of the pendulum for small oscillation (density of bob is σ)

(1) $T = 2\pi\sqrt{\frac{\ell}{g}}$ (2) $T = 2\pi\sqrt{\frac{\rho\ell}{\sigma g}}$

(3) $T = 2\pi\sqrt{\frac{(\sigma-\rho)\ell}{\sigma g}}$ (4) $T = 2\pi\sqrt{\frac{\sigma\ell}{(\sigma-\rho)g}}$

11. A particle of mass 50 g is performing S.H.M. with amplitude 20 cm and time period 0.2 s. Maximum force acting on the particle is

(1) π^2 N (2) π N

(3) $\frac{1}{\pi^2}$ N (4) $\sqrt{\pi}$ N

12. A particle is performing S.H.M. Its velocity is v_1 when it is at a distance x_1 from mean position and v_2 when it is at a distance x_2 from mean position. Then its time period is

(1) $2\pi\sqrt{\frac{y_2^2-y_1^2}{v_1^2-v_2^2}}$ (2) $2\pi\sqrt{\frac{y_2^2}{v_1^2}}$

(3) $2\pi\sqrt{\frac{y_1^2}{v_2^2}}$ (4) $2\pi\sqrt{\frac{y_1^2+y_2^2}{v_1^2+v_2^2}}$

13. The potential energy of a particle executing SHM is given by $U(x)=\frac{kx^2}{2}$, where k = 0.5 N/m (force constant of oscillation) and x → position of particle from equilibrium position. If total mechanical energy of a particle is 1 joule, then it will turn back from position

(1) x = +2 m (2) x = –2 m

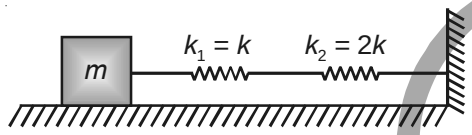
(3) $x=\sqrt{2}$ m (4) Both (1) & (2)

14. A simple pendulum is performing SHM with amplitude A and time period T. Speed of the pendulum when it is at a displacement $\frac{A}{\sqrt{2}}$ from mean position is

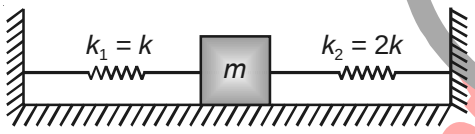
(1) $\frac{\sqrt{2}\pi A}{T}$ (2) $\frac{\pi A}{T}$

(3) $\frac{\pi A}{2T}$ (4) $\frac{2\pi A}{T}$

15. The ratio of time periods of oscillations of block in the situations shown in figure (i) and (ii) is



(i)

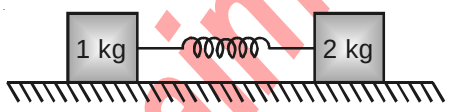


(ii)

(1) $\sqrt{2}$: 3 (2) 3 : $\sqrt{2}$

(3) 4 : 3 (4) 1 : 1

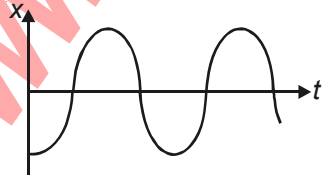
16. Two blocks of 1 kg and 2 kg are attached to opposite ends of a horizontal spring whose spring constant is 726 N/m as shown in figure. The natural vibrational frequency of the system is about



(1) 5.25 Hz (2) 300 Hz

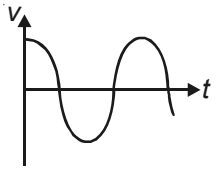
(3) 1 Hz (4) 100 Hz

17. Position time curve for a particle executing SHM is shown

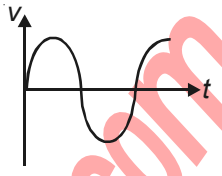


Corresponding velocity time curve will be

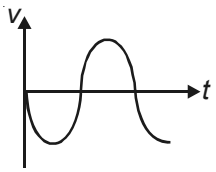
(1)



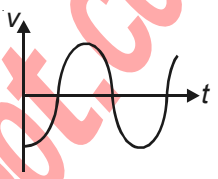
(2)



(3)



(4)



18. Position of a particle during SHM is represented by $y=4\sin\left(2t+\frac{\pi}{4}\right)$. The ratio of velocity amplitude to acceleration amplitude (in s) will be

(1) 4 (2) $\frac{1}{4}$

(3) 8 (4) $\frac{1}{2}$

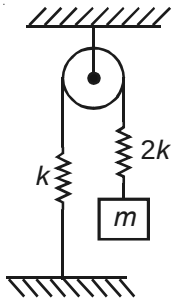
19. Time period of oscillation of block is (adjacent figure)

(1) $2\pi\sqrt{\frac{m}{3k}}$

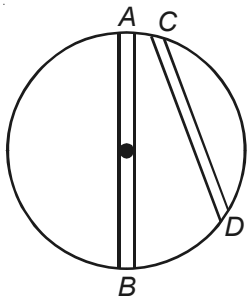
(2) $2\pi\sqrt{\frac{3k}{m}}$

(3) $2\pi\sqrt{\frac{3m}{2k}}$

(4) $2\pi\sqrt{\frac{2k}{3m}}$



20. Two bottomless frictionless wells AB and CD of length 2R and R are dug through the earth of radius R. If T_1 and T_2 are time periods of small oscillations of bodies dropped into these wells then which of the following is correct?



(1) $T_1 = T_2$

(2) $T_1 = \sqrt{2}\,T_2$

(3) $T_1 = 2T_2$

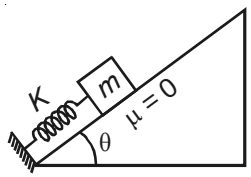
(4) $T_2 = \sqrt{2}\,T_1$

21. A block rests on a horizontal table which is executing SHM in the horizontal plane with an amplitude A. The coefficient of friction between the block and the table is μ, the block just starts to slip when the frequency of oscillation exceeds

(1) $\sqrt{\frac{\mu g}{A}}$ (2) $\frac{1}{2\pi}\sqrt{\frac{A}{\mu g}}$

(3) $2\pi\sqrt{\frac{\mu g}{a}}$ (4) $\frac{1}{2\pi}\sqrt{\frac{\mu g}{A}}$

22. If the inclined surface is frictionless, then time period of vibration of the block on the inclined plane is



(1) $2\pi\sqrt{\frac{m}{K}}$ (2) $2\pi\sqrt{\frac{m}{K\cos\theta}}$

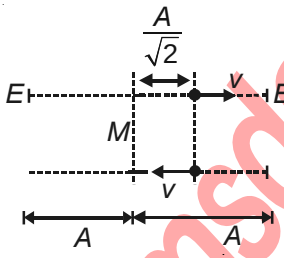
(3) $2\pi\sqrt{\frac{m}{K\sin\theta}}$ (4) $2\pi\sqrt{\frac{m\cos\theta}{K}}$

23. The equation of an SHM is given as, $x = a + b\sin(\omega t + \delta)$. The amplitude of the SHM is

(1) a (2) b

(3) (a + b) (4) $\frac{1}{2}$(a + b)

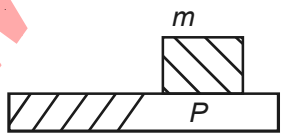
24. Two particles execute simple harmonic oscillations with same amplitude and same time period as shown in the diagram. At the instant shown what is the phase difference between the two particles?



(1) $\frac{\pi}{3}$ (2) $\frac{\pi}{2}$

(3) $\frac{2\pi}{3}$ (4) π

25. A horizontal platform P oscillates along vertical direction with amplitude A as shown in diagram. The maximum frequency of the platform so that the block does not detach from the platform, is



(1) $\frac{1}{2\pi}\sqrt{\frac{g}{A}}$ (2) $2\pi\sqrt{\frac{A}{g}}$

(3) $\frac{1}{2\pi}\sqrt{\frac{m}{g}}$ (4) $2\pi\sqrt{\frac{Ag}{m}}$

26. The maximum speed of a particle of mass executing SHM is v_0. What is the kinetic energy of the particle when it is at distance $\left(\frac{1}{\sqrt{2}}\right)$ times the amplitude form its mean position?

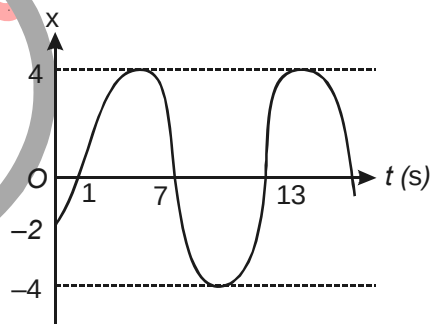
(1) $\frac{1}{2}mv_0^2$

(2) $\frac{1}{3}mv_0^2$

(3) $\frac{1}{4}mv_0^2$

(4) $\frac{\sqrt{3}}{2}mv_0^2$

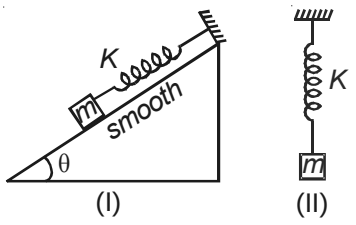
27. The displacement (x) is plotted with time (t) for a particle executing SHM as shown below. The correct equation of SHM is



(1) $x = 4\sin\left(\frac{\pi t}{6} + \frac{\pi}{6}\right)$ (2) $x = 4\sin\left(\frac{\pi t}{6} - \frac{\pi}{6}\right)$

(3) $x = 2\sin\left(\frac{2\pi}{6} + \frac{\pi}{6}\right)$ (4) $x = 2\sin\left(\frac{\pi t}{6} - \frac{\pi}{6}\right)$

28. Identical spring-block systems oscillate in two arrangements (I) and (II) as shown. The ratio of time-periods in the two arrangements is



(1) $\cos\theta : 1$ (2) $\tan\theta : 1$

(3) $\sin\theta : 1$ (4) 1 : 1

29. The potential energy of a simple harmonic oscillator in mean position and extreme position are 20 J and 100 J respectively. The mean value of potential energy for whole cycle of oscillation is

(1) 50 J (2) 60 J

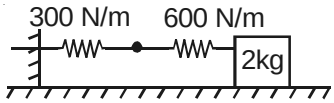
(3) 70 J (4) 120 J

30. The acceleration of a particle executing SHM is given as $a = -4\pi^2 x$, where x is displacement from mean position in meters and a is in m/s^2. The frequency of oscillations is

(1) 2 Hz (2) 1 Hz

(3) 0.5 Hz (4) $\left(\frac{4}{\pi}\right)$ Hz

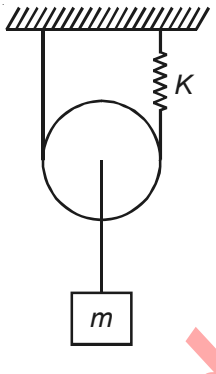
31. What is the angular frequency of the oscillations of the block in the arrangement shown below?



(1) 20 rad/s (2) 15 rad/s

(3) 10 rad/s (4) 5 rad/s

32. The frequency of oscillation of the block attached with the spring as shown in figure is (spring and pulley are ideal)



(1) $\frac{1}{2\pi}\sqrt{\frac{K}{m}}$ (2) $\frac{1}{2\pi}\sqrt{\frac{4K}{m}}$

(3) $\frac{1}{2\pi}\sqrt{\frac{K}{4m}}$ (4) $\frac{1}{2\pi}\sqrt{\frac{2K}{m}}$

33. A particle executes SHM along x-axis with origin at mean position. At a certain instant the particle is at $x = \frac{A}{2}$, where A is the amplitude and is moving towards positive x-axis. After what minimum time the particle will be at the same position if period of oscillation is T?

(1) $\frac{T}{12}$ (2) $\frac{T}{6}$

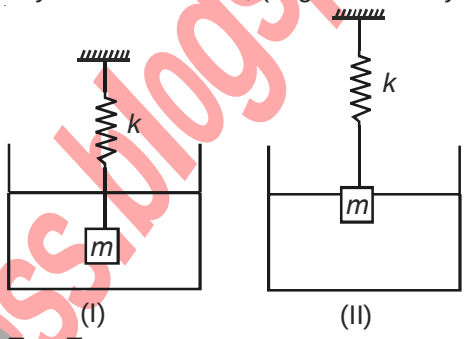
(3) $\frac{T}{4}$ (4) $\frac{T}{3}$

34. A particle of mass m executes SHM with speed v_0 at the mean position. Mean value of kinetic energy for the whole cycle is

(1) $\frac{1}{8}mv_0^2$ (2) $\frac{1}{4}mv_0^2$

(3) $\frac{1}{2}mv_0^2$ (4) mv_0^2

35. Two identical spring block systems oscillate in two different arrangements as shown in the diagram (I) and (II) with time-periods T_1 and T_2 respectively. In arrangement (I) the block remains always inside water and in arrangement (II) the block is always partially immersed. Then, (neglect viscosity of water)



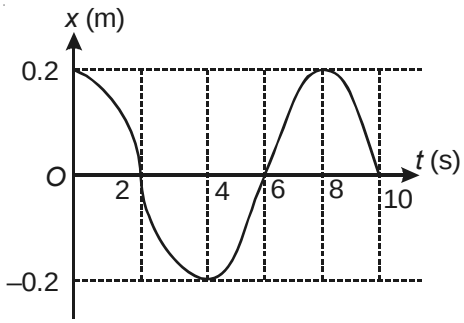
(1) $T_1 = T_2$

(2) $T_1 < T_2$

(3) $T_1 > T_2$

(4) Any of the above depending on the value of k

36. The displacement (x) of simple harmonic oscillator with respect to mean position is plotted with time (t) as shown in the diagram. The incorrect statement about the oscillator is



(1) The period of oscillations is 4 s

(2) The frequency of oscillations is 0.125 Hz

(3) The amplitude is 0.2 m

(4) Initially the particle is at extreme position

37. The maximum and minimum potential energies of a simple harmonic oscillater of mass 2 kg are 40 J and 140 J respectively. The speed of the oscillater at mean position is

(1) 40 m/s (2) 20 m/s

(3) 10 m/s (4) 5 m/s

38. The resonance frequency of a forced oscillator is given by [where symbols have their usual meaning]

(1) $\sqrt{\omega_0^2 - \left(\frac{2b}{m}\right)^2}$ (2) $\sqrt{\omega_0^2 - \frac{b^2}{2m^2}}$

(3) $\sqrt{\omega_0^2 - \left(\frac{bm}{2}\right)^2}$ (4) $\sqrt{\omega_0^2 - \frac{b^2}{4m^2}}$

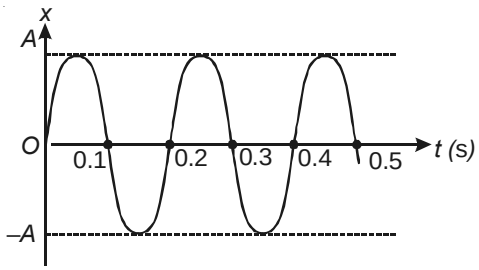
39. The displacement (x) of a simple harmonic oscillator varies with time (t) as shown in diagram. What is the frequency of variation of kinetic energy?

(1) 5 Hz

(2) 10 Hz

(3) 20 Hz

(4) 40 Hz



40. Which of the following equations represents a simple harmonic motion?

(1) $x = \sin^2\omega t + \cos^2\omega t$ (2) $x = A + B\sin\omega t$

(3) $x = A\tan\omega t$ (4) $x = A\sec\omega t$

41. Due to small damping present in the system amplitude is reduced to 80% of the initial value in five hours. If initial amplitude is A_0, then after 15 hours, the amplitude will be

(1) $\frac{A_0}{3}$ (2) $\frac{A_0}{4}$

(3) $\frac{5A_0}{36}$ (4) $\frac{64}{125}A_0$

42. A uniform spring of length ℓ, mass m and force constant k is hung from a rigid support and is loaded with a mass 5m at its lower end. The time period of vibration of the loaded mass is

(1) $2\pi\sqrt{\frac{5m}{k}}$ (2) $2\pi\sqrt{\frac{m}{2k}}$

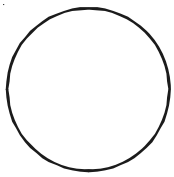
(3) $8\pi\sqrt{\frac{m}{k}}$ (4) $8\pi\sqrt{\frac{m}{3k}}$

43. Two simple pendulum of effective length of 10 m and 40 m respectively start oscillate in same direction at the same time with same phase. They will again be in the same phase when the pendulum of shorter length has completed n oscillations. Here n equal to

(1) 5 (2) 1

(3) 2 (4) 3

44. A disc of mass M and radius R is suspended from one point on its periphery as shown in figure. It is given little displacement to oscillate. The angular frequency of oscillations is



(1) $\sqrt{\frac{3g}{2R}}$ (2) $\sqrt{\frac{g}{R}}$

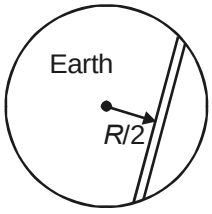
(3) $\sqrt{\frac{2g}{3R}}$ (4) $\sqrt{\frac{2R}{3g}}$

45. The differential equation of a SHM along x axis is given as $a\frac{d^2x}{dt} + bx = 0$, where a and b are constants. The time period of SHM is

(1) $2\pi\sqrt{\frac{a}{b}}$ (2) $2\pi\sqrt{\frac{b}{a}}$

(3) $2\pi\sqrt{ab}$ (4) $2\pi\sqrt{\frac{b^2}{a}}$

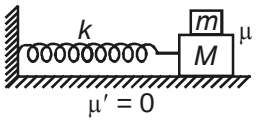
46. An object of mass 2 kg is dropped into a frictionless tunnel through the earth as shown in figure. The time interval in which body will reach at the mid-point of tunnel



(1) 21.1 minute (2) 42.3 minute

(3) 84.6 minute (4) 169.2 minute

47. The maximum amplitude of oscillations of system shown in the figure for which no relative motion exist between two blocks is (μ = coefficient of friction between blocks and floor is smooth)



(1) $\frac{\mu mg}{k}$ (2) $\frac{\mu Mg}{k}$

(3) $\frac{\mu(M+m)g}{k}$ (4) $\frac{\mu(M-m)g}{k}$

48. The displacement of a particle from mean position in SHM is given by $x = 5\sin\left(\pi t + \frac{\pi}{3}\right)$ where x is in meter and t is in second. The maximum velocity V_{max} and maximum acceleration a_{max} respectively are

(1) 5π, 5π (2) 5π, $5\pi^2$

(3) $5\pi^2$, $5\pi^2$ (4) $5\pi^2$, 5π

49. Starting from the origin, a body oscillates simple harmonically with a period of 2 second. After what time, its kinetic energy will be 75% of the total energy?

(1) $\frac{1}{6}$s (2) $\frac{1}{4}$s

(3) $\frac{1}{3}$s (4) $\frac{1}{12}$s

50. A simple pendulum with a metallic bob has a time period T. The bob is now immersed in a non viscous liquid and made to oscillate. If the density of the liquid is $\frac{1}{4}$ times that of metal, then the time period of the pendulum will be

(1) $\frac{T}{\sqrt{3}}$ (2) $\frac{2T}{\sqrt{3}}$

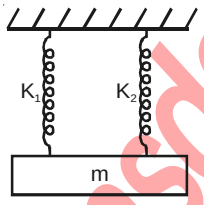
(3) $\frac{4}{3}$T (4) $\frac{2}{3}$T

51. A simple pendulum performs simple harmonic motion about x = 0 with an amplitude a and time period T. The speed of the pendulum at $x = \frac{a}{2}$ will be

(1) $\frac{\pi a}{T}$ (2) $\frac{3\pi^2 a}{T}$

(3) $\frac{\pi a\sqrt{3}}{T}$ (4) $\frac{\pi a\sqrt{3}}{2T}$

52. A mass is suspended seperately by two different springs in successive order then time periods are t_1 and t_2 respectively. If it is connected by both springs as shown in figure then time period is t_0, then correct relationship is



(1) $t_0^2 = t_1^2 + t_2^2$ (2) $t_0^{-2} = t_1^{-2} + t_2^{-2}$

(3) $t_0^{-1} = t_1^{-1} + t_2^{-1}$ (4) $t_o = t_1 + t_2$

53. For a particle executing SHM has a kinetic energy $K_o\cos^2\omega t$. The maximum values of the potential energy and the total energy are respectively

(1) $\frac{K_o}{2}$ and K_o (2) K_o and $2K_o$

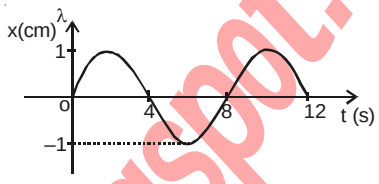
(3) K_o and K_o (4) 0 and 2K

54. If x, v and a denote the displacement, velocity and acceleration respectively of a particle executing simple harmonic motion of time period T, then which of the following does not change with time

(1) $a^2T^2 + 4a^2v^2$ (2) $\frac{aT}{v}$

(3) $aT + 2\pi v$ (4) $\frac{aT}{x}$

55. The x–t graph of a particle undergoing simple harmonic motion is shown below. The acceleration of the particle at $t = \frac{4}{3}$s is



(1) $\frac{\sqrt{3}}{32}\pi^3 cm/s^2$ (2) $\frac{-\pi^2}{32}cm/s^2$

(3) $\frac{\pi^2}{32}cm/s^2$ (4) $-\frac{\sqrt{3}}{32}\pi^2 cm/s^2$

56. For a particle executing SHM having amplitude A, the speed of the particle is half of its maximum speed when displacement of the particle from mean position is

(1) $\frac{A}{2}$ (2) $\frac{A}{\sqrt{2}}$

(3) $\frac{\sqrt{3}A}{2}$ (4) $\frac{\sqrt{3}A}{\sqrt{2}}$

57. The motion equation of a particle executing SHM is given by :

x = (0,01) sin[100π(t + 0.005)], where

x is in metre and t is in second. The time period in second is

(1) 0.01 (2) 0.02

(3) 0.1 (4) 0.2

58. A block of mass M is suspended from a uniform wire of area of cross section 'A', length 'L' and young's modulus 'Y'. Time period of small vertical oscillations of block is

(1) $2\pi\sqrt{\frac{MY}{AL}}$ (2) $2\pi\sqrt{\frac{ML}{YA}}$

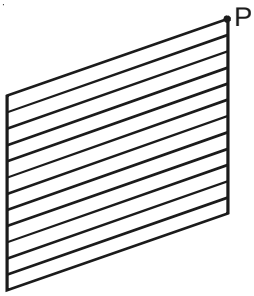
(3) $2\pi\sqrt{\frac{YAM}{L}}$ (4) $2\pi\sqrt{\frac{M}{YAL}}$

59. A particle executing SHM along x-axis about x = 0 has amplitude A and angular frequency ω. If at t = 0, the particle is $x = -\frac{A}{2}$ moving towards mean position, then equation of SHM is

(1) $x = A\sin\left(\omega t - \frac{\pi}{4}\right)$ (2) $x = A\sin\left(\omega t - \frac{\pi}{3}\right)$

(3) $x = A\sin\left(\omega t - \frac{\pi}{6}\right)$ (4) $x = A\sin\left(\omega t - \frac{2\pi}{3}\right)$

60. A thin uniform square plate of mass 'M' and side length 'L' is pivoted from one vertex on a vertical plane as shown, Time period of small oscillation in its plane



(1) $2\pi\sqrt{\left(\frac{\sqrt{2}L}{3g}\right)}$ (2) $2\pi\sqrt{\left(\frac{L}{3\sqrt{2}g}\right)}$

(3) $2\pi\sqrt{\left(\frac{2\sqrt{2}L}{3g}\right)}$ (4) $2\pi\sqrt{\left(\frac{3g}{\sqrt{2}L}\right)}$

61. A particle is moving on x–y plane in such a way that x and y co-ordinates of the particle are changing with time 't', as

$x = A_1 \sin\omega t$ and $y = A_2 \sin\left(\omega t + \frac{\pi}{4}\right)$

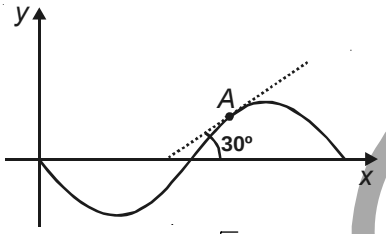
A_1, A_2 and ω are constants

Then path of the particle must be

(1) Straight line
(2) Circular
(3) Elliptical
(4) Parabolic

[Chapter-13 : Waves]

1. At t = 0, photograph of the wave is shown in the figure.



If the wave speed is $10\sqrt{3}$ m/s, then the speed of particle at point A is

(1) 30 m/s (2) 10 m/s

(3) $10\sqrt{3}$ m/s (4) $\frac{10}{\sqrt{3}}$ m/s

2. A tuning fork of frequency 480 Hz sounded with a second tuning fork gives 9 beats in 3 s. Then, the frequency of second tuning fork is

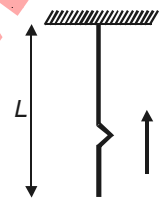
(1) 471 Hz (2) 477 Hz
(3) 483 Hz (4) Either (2) or (3)

3. In a resonance tube, if the resonance is obtained first at length ℓ_1 and then at length ℓ_2 with a tuning fork of frequency ν then the velocity of sound is

(1) $2\nu(\ell_2 + \ell_1)$ (2) $\frac{\nu(\ell_2 - \ell_1)}{2}$

(3) $2\nu(\ell_2 - \ell_1)$ (4) $\nu(\ell_2 - \ell_1)$

4. A transverse wave pulse is generated at lower end of a hanging rope of uniform linear density and length L. The time taken by the pulse to reach the upper end of rope is



(1) $2\sqrt{\frac{L}{g}}$ (2) $\sqrt{\frac{2L}{g}}$

(3) $\sqrt{\frac{L}{2g}}$ (4) $\sqrt{\frac{L}{g}}$

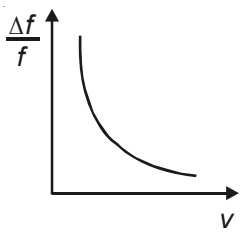
5. Which among the following is equation of transverse progressive wave

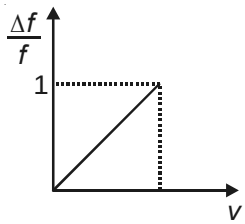
(1) y = 2A sin ωt cos kx (2) y = 2A cos ωt sin ωt
(3) y = A sin (ωt – kx) (4) All of these

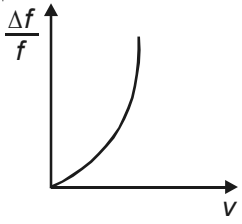
6. Two wires made of same material having same length and of radii r and 2r respectively are welded together end to end. The combination is used as a sonometer wire and is kept under a tension T. The ratio of the number of loops formed in the wires such that the joint is a node, when stationary waves are set up in the wires is

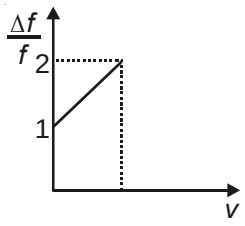
(1) 2 : 3 (2) 1 : 2
(3) 1 : 4 (4) 1 : 1

7. An observer approaches a stationary source with speed v, which of the following correctly represent the variation of fractional change in observed frequency with speed of observer?

(1) 

(2) 

(3) 

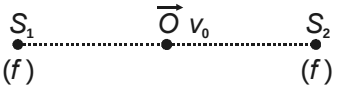
(4) 

8. If velocity of sound in air at 0ºC is 330 m/s, then the velocity of sound in air at 2ºC is

(1) 331.22 m/s (2) 332.22 m/s

(3) 328.22 m/s (4) 333 m/s

9. An observer is moving with velocity v_0 on the line joining two identical sources at rest as shown. Beat frequency observed by observer is, where v is the velocity of sound



(1) $\frac{2v_0}{v}f$ (2) $\frac{v_0}{v}f$

(3) $\frac{v}{2v_0}f$ (4) $\frac{v}{v_0}f$

10. In a stationary wave distance between two nearest antinodes is 30 cm. Two particles are at a distance 60 cm. Phase difference between them is

(1) π (2) $\frac{\pi}{2}$

(3) $\frac{3\pi}{4}$ (4) Zero

11. A stationary wave is given by the equation

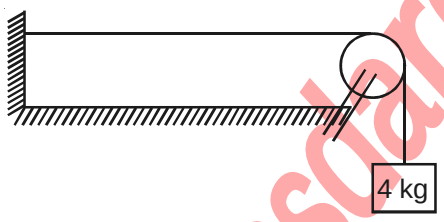
y = 1.5 sin200tcos10πx.

The wavelength of the wave is (y and x are in cm and t in second)

(1) 0.2 cm (2) 0.1 cm

(3) 2 cm (4) 0.5 cm

12. A block of mass 4 kg is supported by a string as shown mass per unit length of wire is 2 g/cm. Velocity of transverse wave in the string is



(1) 8 m/s (2) 7 m/s

(3) 13 m/s (4) 14 m/s

13. The equation of a stationary wave is

$$y = 6\sin\left(\frac{2\pi x}{15}\right)\cos(84\pi t)$$

where x and y are in cm and t in second. The distance between a node and adjacent antinode is

(1) 3.75 cm (2) 7.5 cm

(3) 15 cm (4) 5 cm

14. Sound wave travelling in air is represented by y = 2sin(2t + 3x) cm. The equation of the wave, which is reflected completely from water surface, will be

(1) 2sin(2t + 3x) cm (2) – 2sin(2t + 3x) cm

(3) 2sin(2t – 3x) cm (4) – 2sin(2t – 3x) cm

15. The string of a sonometer wire is divided into 2 parts so that frequencies of vibrations of the two parts of string are corresponding to 3rd and 5th overtone of a closed organ pipe. The ratio in the length of two parts will be

(1) 3 : 5 (2) 5 : 3

(3) 11 : 7 (4) 2 : 3

16. Equation $y = 8\sin\left(\frac{\pi x}{80}\right)\cos(90\pi t)$ (where x and y in cm and t in s) represents vibration in a stretched string of length l = 30 cm. The amplitude of the particle at $x = \frac{40}{3}$ cm will be

(1) 8 cm (2) 4 cm

(3) $4\sqrt{3}$ cm (4) 60 cm

17. In case of travelling wave the minimum distance between two particles having same speed at every instant, is

(1) λ (2) $\frac{\lambda}{2}$

(3) $\frac{\lambda}{4}$ (4) $\frac{\lambda}{8}$

18. The number of nodes in a string of length 4 cm, fixed at both the ends, if the equation for the stationary wave is given by y = A sin πx sinωt is (where x is in cm and t is in seconds)

(1) 3 (2) 4

(3) 5 (4) 6

19. Which of the following is incorrect?

(1) Transverse wave can be polarised

(2) Longitudinal wave can be polarised

(3) Speed of sound does not depend on pressure at constant temperature

(4) The differential equation of wave motion is $v^2\frac{d^2y}{dx^2} = \frac{d^2y}{dt^2}$

20. The equation of a wave is given as

$$y = (4.0\text{ m})\sin 2\pi\left(\frac{t}{10} - \frac{x}{5}\right),$$

where x is in meters and t in seconds. Then which of the following is incorrect?

(1) The wave is transverse

(2) The wave moves towards, negative x-axis

(3) Wave speed is 0.5 m/s

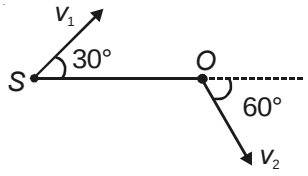
(4) Wavelength is 5.0 m

21. The equation of a wave pulse is given as $y = \frac{A}{B+(at-bx)^2}$, where a, b, A, B are constants. The speed of the wave is

(1) $\frac{A}{B}$ (2) $\frac{a}{b}$

(3) $\frac{B}{A}$ (4) $\frac{b}{a}$

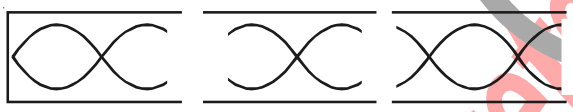
22. An observer O and sound source S move with velocities shown in the diagram. For what value of the ratio $\frac{v_1}{v_2}$, the perceived frequency by the observer will be equal to original frequency at the instant shown?



(1) $\frac{1}{\sqrt{3}}$ (2) $\frac{1}{\sqrt{2}}$

(3) $\frac{1}{2}$ (4) $\sqrt{3}$

23. Displacement nodes and antinodes are shown in the three pipes of same lengths. The ratio of frequencies of the notes in the three pipes is



(*I*) (*II*) (*III*)

(1) 3 : 2 : 4 (2) 2 : 3 : 4

(3) 3 : 4 : 2 (4) 4 : 3 : 2

24. A uniform rope of length L is suspended from the ceiling of a room. The speed of a transverse wave pulse at $x = \frac{L}{4}$, from the lower end is

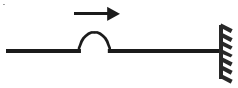
(1) $\sqrt{Lg}$ (2) $\frac{1}{2}\sqrt{Lg}$

(3) $\sqrt{\frac{Lg}{2}}$ (4) $\sqrt{\frac{3Lg}{4}}$

25. The equation of the wave pulse moving on stretched string, as shown in the diagram, is given as

$y = A\sin(\omega t - kx)$,

The equation of the reflected wave pulse is



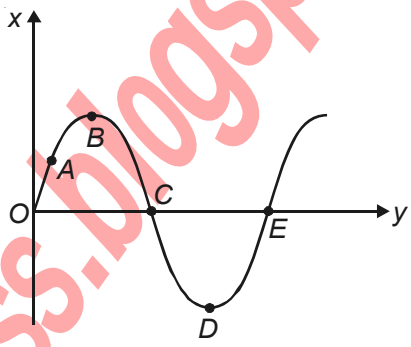
(1) $y = A \sin(\omega t + kx)$

(2) $y = A \sin(\omega t - kx + \pi)$

(3) $y = A \sin(\omega t + kx + \pi)$

(4) $y = A \sin(\omega t - kx)$

26. The position (x) of medium particles is plotted with displacement (y) as shown in the diagram. Which of the following is incorrect?



(1) Velocity of particles C and E is same

(2) Speed of B and D is zero

(3) Speed of C and E is equal

(4) Particles A and E move in the same direction

27. The speed of sound in oxygen gas is v_0, then under the same conditions of temperature and pressure, the speed of sound in hydrogen will be

(1) v_0 (2) $2v_0$

(3) $4v_0$ (4) $16v_0$

28. A sonometer wire under a given tension T has a fundamental frequency of 400 Hz. When tension is decreased by 1 kgf, the fundamental frequency becomes 300 Hz. The value of T in kgf units is

(1) $\frac{16}{7}$ (2) $\frac{16}{9}$

(3) $\frac{25}{16}$ (4) 1.5

29. Two sonometer wires of same length oscillate in unison. When length of one wire is increased by 1%, 5 beats per second are heard. The frequency of oscillation of the other wire is

(1) 250 Hz (2) 500 Hz

(3) 1000 Hz (4) 2000 Hz

30. The fundamental frequency of the air column in an open organ pipe is 400 Hz. It half length of the pipe is dipped in water, the new fundamental frequency of the air column in the pipe will be

(1) 800 Hz (2) 400 Hz

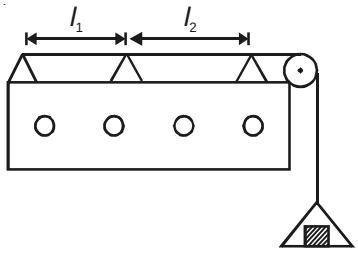
(3) 300 Hz (4) 150 Hz

31. Three successive frequencies of the notes produced by a closed organ pipe are 150 Hz, 250 Hz, 350 Hz. The fundamental frequency is

(1) 50 Hz (2) 100 Hz

(3) 150 Hz (4) 200 Hz

32. A sonometer wire of length 75 cm is divided into two segments of length l_1 and l_2 as shown.



If ratio of the fundamental frequencies of these segments is 1 : 4 then

(1) l_1 = 20 cm, l_2 = 55 cm

(2) l_1 = 60 cm, l_2 = 15 cm

(3) l_1 = 15 cm, l_2 = 60 cm

(4) l_1 = 25 cm, l_2 = 50 cm

33. When temperature of air (on absolute scale) increases by 1%, the speed of sound in air

(1) Remains unchanged (2) Increases by 1%

(3) Increases by 0.5% (4) Decreases by 0.5%

34. The minimum separation between a node and an antinode in the stationary wave y = 20sin(2x) cos(400πt)

(1) $\frac{\pi}{2}$ (2) $\frac{\pi}{4}$

(3) $\frac{\pi}{6}$ (4) $\frac{\pi}{8}$

35. Standing waves are produced in 10 m long stretched string. If the string vibrates in 5 segments and wave velocity is 20 m/s. Its frequency is

(1) 2 Hz (2) 4 Hz

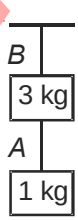
(3) 5 Hz (4) 10 Hz

36. Due to interference of two coherent waves a minimum intensity of I and maximum intensity of 9I are detected. The ratio of amplitudes of waves is

(1) 1 (2) 2

(3) 3 (4) 9

37. Two strings A and B of same material are used to hang blocks of mass 1 kg and 3 kg. If velocity of transverse wave is same in two strings, then their radii are in ratio of



(1) $\frac{1}{2}$ (2) $\frac{5}{1}$

(3) $\frac{4}{1}$ (4) 1

38. If two tuning forks have frequencies 250 Hz and 256 Hz respectively, then on sounding together, the time interval between two successive minimum intensities will be

(1) 6 s (2) 3 s

(3) $\frac{1}{3}$ s (4) $\frac{1}{6}$ s

39. A source of sound of frequency f_0 is revolving in a circle of radius R with angular speed ω. The frequency observed by an observer at a distance 2R from centre on the line perpendicular to the plane of circle and passing through centre is

(1) f_0 (2) $2f_0$

(3) Zero (4) ∞

40. The equation of a stationary wave along a stretched string is given by $y = 0.2\sin\left(\frac{\pi}{9}x\right)\cos 20\pi t$, where x is in cm, y is in meter and t is in minute. The distance between two consecutive nodes is

(1) 9 cm (2) 18 cm

(3) 9 m (4) 18 m

41. A sound source and an observer are moving away from each other with equal speeds 15 m/s. Speed of sound is 330 m/s. If observer detects the frequency 840 Hz, then original frequency of source is

(1) 660 Hz (2) 1680 Hz

(3) 920 Hz (4) 880 Hz

42. In a stretched string equation of a transverse wave is $y = 2\sin\left[2\pi\left(\frac{x}{10} - \frac{t}{0.01}\right)\right]$, where x and y are in metre and t in second. The maximum particle velocity is

(1) 400π m/s (2) 40π m/s

(3) 100π m/s (4) 10π m/s

43. A wave propagating through a medium is represented by $y = 20\sin\left\{\frac{\pi}{4}t - \frac{\pi}{3}x\right\}$, where x and y are in metre. The phase difference between two particles of medium separated by distance 1.5 m will be

(1) Zero (2) $\frac{\pi}{2}$

(3) π (4) 2π

44. A pipe open at both ends has fundamental frequency f_1. When $\frac{3}{4}$th of its length is in water, it produces fundamental note of f_2. Then $\frac{f_1}{f_2}$ is

(1) $\frac{1}{2}$ (2) 2

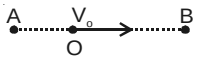
(3) $\frac{3}{4}$ (4) $\frac{4}{3}$

45. When two tuning forks (fork 1 and 2) are sounded simultaneously, 4 beats per second are heard. Now some tape is attached on the prong of the fork 2. When the tuning forks are sounded again, 4 beats per second are heard. If the frequency of fork 1 is 200 Hz, then what was the original frequency of fork 2?

(1) 204 Hz (2) 196 Hz

(3) 202 Hz (4) 200 Hz

46. Two sources A and B are sounding notes of frequency 660 Hz. A listener moves from A and B with a constant velocity v. If the speed of sound is 330 m/s. What must be the value of v_0 so that he hears 8 beats per second?



(1) 2.8 m/sec (2) 2 m/sec

(3) 3.0 m/sec (4) 3.5 m/sec

47. Seperation between two particles vibrating with a phase difference of $\frac{7\pi}{3}$ rad in a progressive transverse mechanical wave in terms of wavelength λ is

(1) $\frac{7\lambda}{3}$ (2) $\frac{7\lambda}{6}$

(3) $\frac{14\lambda}{3}$ (4) $\frac{6\lambda}{7}$

48. A wave disturbance propagating along x-axis is given by

$y = \frac{1}{1+x^2}$ at t = 0 and $y = \frac{1}{1+(x-2)^2}$ at t = 4s

where y is in mm and x is in cm. The shape of the wave disturbance does not change with time. The speed of wave is

(1) 0.5 cm/s (2) 1 cm/s

(3) 3 cm/s (4) 4 cm/s

49. Velocity of sound in air is 320 m/s. A pipe closed at one end has a length 1 m. Neglecting end correction, the air column in the pipe can not resonate with a sound of frequency :

(1) 80 Hz (2) 240 Hz

(3) 320 Hz (4) 400 Hz

50. A cylindrical tube open at both ends, has fundamental frequency f in air. The tube is dipped in water, so that half of it is in water. The fundamental frequency of air column is now

(1) $\frac{f}{2}$ (2) $\frac{3f}{4}$

(3) f (4) 2f

CHEMISTRY

[Chapter-12 : Organic Chemistry]

1. Consider the following alkyl cations

$\overset{+}{C}H_3$, $CH_3\overset{+}{C}H_2$, $(CH_3)_2\overset{+}{C}H$, $(CH_3)_3\overset{+}{C}$

Which is more stable and why?

(1) $\overset{+}{C}H_3$ (Resonance)

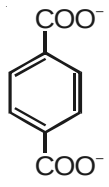
(2) $CH_3\overset{+}{C}H_2$ (Polarity)

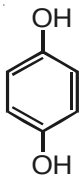
(3) $(CH_3)_3\overset{+}{C}$ (Hyperconjugation)

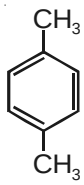
(4) $(CH_3)_2\overset{+}{C}$ (Inductive effect)

2. Non-zero dipole moment is found in

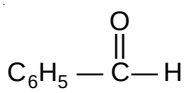
(1) 

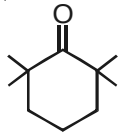
(2) 

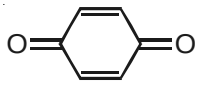
(3) 

(4) 

3. Which of the following cannot exhibit tautomerism?

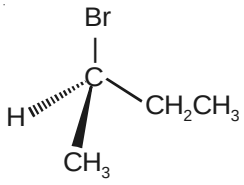
(1) 

(2) 

(3) 

(4) All of these

4. Consider the following compound

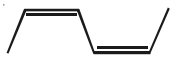
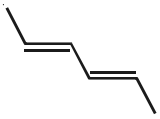


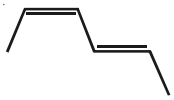
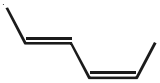
This compound is

(1) (S)-2-Bromobutane (2) (R)-2-Bromobutane

(3) (S)-3-Bromobutane (4) (R)-3-Bromobutane

5. Consider the following geometrical isomers

I.  II. 

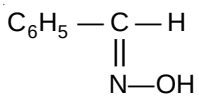
III.  IV. 

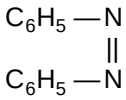
Which are identical to each other?

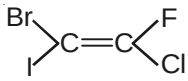
(1) (I) & (II) (2) (I) & (III)

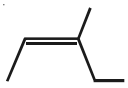
(3) (III) & (IV) (4) (II) & (III)

6. Which is incorrectly matched?

(1)  (syn-Benzaldoxime)

(2)  (syn-Azobenzene)

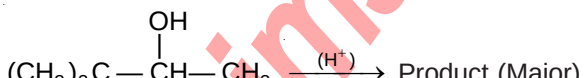
(3)  (Z-isomer)

(4)  (E-isomer)

7. Which of the following shows free radical mechanism in presence of peroxide upon double bond?

(1) HCl (2) HBr

(3) HF (4) HI

8. 

(1) $(CH_3)_3$—CH=CH_2

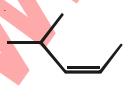
(2) $(CH_3)_2C$=$C(CH_3)_2$

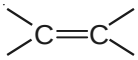
(3) $(CH_3)_2$CH—CH=CH_2

(4) $(CH_3)_2$CH—CH_2—CH=CH_2

9. Which of the following will not exhibit geometrical isomerism?

(1)  (2) 

(3)  (4) 

10. Arrange the following alkenes in decreasing  bond length

I. H_3C—CH=CH—CH_3

II. H_3C—CH=CH_2

III. H_3C—CH=$C(CH_3)_2$

IV. H_2C=CH_2

(1) I > III > II > IV (2) III > I > II > IV

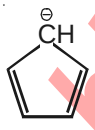
(3) I > IV > III > II (4) IV > II > III > I

11. Which reagent of following gives anti-hydrogenation product of alkene ?

(1) $Na/NH_3(l)$ (2) $Pd/BaSO_4$

(3) $NaBH_4$ (4) DIBAL

12. Which are aromatic compounds?

I.  II. 

III.  IV. 

(1) I, II, III (2) II, III, IV

(3) I, III, IV (4) All of these

13. Which are the correct match/es?

(i) Sulphonation of Benzene – SO_3 as an electrophile

(ii) Nitration of Benzene – $\overset{\oplus}{N}O$ as an electrophile

(iii) Halogenation of Benzene – Br_2/CCl_4 as a reagent

(1) (i) & (iii) (2) (i) only

(3) (i) & (ii) (4) All of these

14. The correct statement is

(1) Carbocations are not prone to rearrangement

(2) Rearrangement of carbocation occurs much faster than proton elimination

(3) In elimination reaction if the major product is capable to show cis-trans isomerism then the cis product predominates

(4) All of these

15. During estimation of nitrogen by Kjeldahl method the ammonia evolved from 0.4 g of an organic compound was absorbed in 30 ml of 0.25 M H_2SO_4. The excess of acid was neutralised by 30 ml of 0.2 M NaOH. The percentage of nitrogen in the compound is

(1) 25.25% (2) 31.50%

(3) 39.65% (4) 51.60%

16. Which of the following is most stable carbanion?

(1) $CH{\equiv}C^-$ (2) $CH_2{=}\overline{C}H$

(3) CH_3—$\overline{C}H_2$ (4) $(CH_3)_2\overline{C}H$

17. The correct order among the following is

(1) $F^- > Cl^- > Br^- > I^-$ (Basicity order)

(2) $F^- < Cl^- < Br^- < I^-$ (Nucleophilicity order)

(3) F > Cl > Br > I (Electronegativity order)

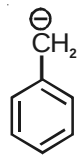
(4) All of these

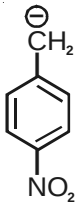
18. Which of the following method is not related to the detection or determination of nitrogen?

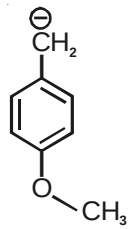
(1) Duma's method (2) Kjeldahl's method

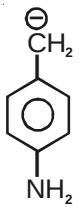
(3) Soda lime method (4) Carius method

19. Which of the following carbanion is most stable?

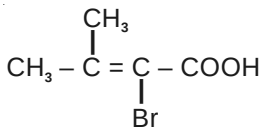
(1) 

(2) 

(3) 

(4) 

20. The IUPAC name of the compound



(1) 3 Methyl-2-bromobut-3-enoic acid

(2) 2 Bromo-3-methyl but-3-enoic acid

(3) 2 Bromo-3-methyl but-2-enoic acid

(4) 3 Bromo-2-methyl but-2-enoic acid

21. IUPAC name of neopentyl alcohol is

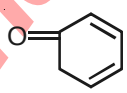
(1) 2, 2 dimethyl pentan-2-ol

(2) 2, 3 dimethyl propan-2-ol

(3) 2-methyl butan-2-ol

(4) 2, 2 dimethyl propanol

22. Tautomerism is shown by

(1) $CH_3-COCH_2COCH_3$ (2) 

(3) $CH_3CH_2NO_2$ (4) All of these

23. Total number of possible structural isomers of $C_4H_{10}O$ are

(1) 6 (2) 7

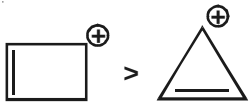
(3) 4 (4) 5

24. Which of the following is correct order of stability of carbocation?

(1) $CH_2 = \overset{\oplus}{C}H > CH_3 - \overset{\oplus}{C}H_2$

(2) $CH_3 - O - \overset{\oplus}{C}H_2 > CH_3 - \overset{\oplus}{C}H_2$

(3) $CH_3 - CH_2 - \overset{\oplus}{C}H_2 > CH_2 = CH - \overset{\oplus}{C}H_2$

(4) 

25. The type of isomerism due to different types of alkyl group on either side of functional groups in the molecule of compounds $CH_3CH_2OCH_2CH_3$ and $CH_3OC_3H_7$ is referred as

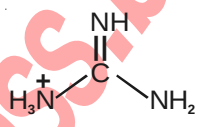
(1) Metamerism

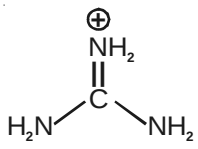
(2) Chain isomerism

(3) Functional isomerism

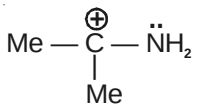
(4) Position isomerism

26. In which of the following molecule positive charge is not delocalized because of resonance?

(1) 

(2) 

(3) 

(4) 

27. A mixture contains 3 solids (x), (y) & (z). On heating, (y) changes from solid to vapour state. The compound (y) can be separated from the mixture by

(1) Distillation (2) Sublimation

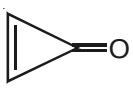
(3) Crystallization (4) Separating funnel

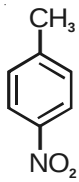
28. In Lassaigne's test, the sodium extract of an organic compound containing both N & S. On treatment with $FeCl_3$ solution produces a blood red colour. The appearance of blood red colour is due to

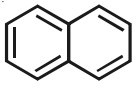
(1) $[Fe(CN)_5NOS]^{4-}$ (2) $Fe_4[Fe(CN)_6]_3 .xH_2O$

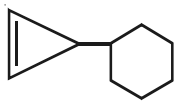
(3) $[Fe(CN)_6]^{4-}$ (4) $Fe(NCS)^{2+}$

29. Which of the following compound will have all electronic effect namely inductive, mesomeric and hyperconjugative effects?

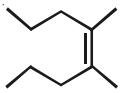
(1) 

(2) 

(3) 

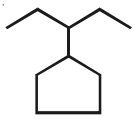
(4) 

30. The IUPAC name of given compound is



(1) 4, 5 dimethyl oct-5-ene
(2) 3, 4 dimethyl oct-5-ene
(3) 4, 5 dimethyl oct-4-ene
(4) 2, 3 dipropy but-2-ene

31. Total number of 2º carbon atom present in the given compound is

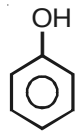
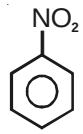
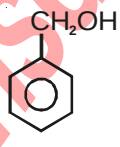


(1) 2 (2) 4
(3) 6 (4) 8

32. Nitration of benzene and sulphonation of benzene is an example of (respectively)
(1) Nucleophilic, Nucleophilic substitution
(2) Nucleophilic, Electrophilic substitution
(3) Electrophilic, Nucleophilic substitution
(4) Electrophilic, Electrophilic substitution

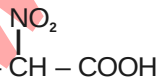
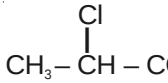
33. The correct order of bond length of C – C in C_2H_6, C_2H_4, C_2H_2 & C_6H_6 are
(1) $C_2H_2 < C_6H_6 < C_2H_4 < C_2H_6$
(2) $C_2H_6 < C_6H_6 < C_2H_4 < C_2H_2$
(3) $C_2H_2 < C_2H_4 = C_6H_6 < C_2H_6$
(4) $C_2H_2 < C_2H_4 < C_6H_6 < C_2H_6$

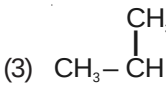
34. Which one of the following is most reactive towards electrophilic attack?

(1) 
(2) 
(3) 
(4) 

35. In $(t-Bu)_3\dot{C}$, the hybridization of central carbon atom is
(1) sp (2) sp^2
(3) sp^3 (4) dsp^2

36. Which of the following is least acidic species?

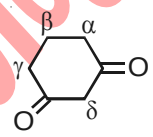
(1)  (2) 

(3)  (4) CH_3CH_2COOH

37. The shape of methyl carbocation & methyl carbanion are respectively
(1) Trigonal planar & tetrahedral
(2) Trigonal planar & pyramidal
(3) Pyramidal & pyramidal
(4) Tetrahedral & trigonal planar

38. In an estimation of sulphur by Carius method, 0.468 g of organic sulphur compound gave 0.668 g of $BaSO_4$. The % of sulphur in the compound is nearly (Mol. mass of $BaSO_4$ = 233)
(1) 20% (2) 80%
(3) 40% (4) 60%

39. Which carbon has most acidic hydrogen?



(1) C_α (2) C_β
(3) C_γ (4) C_δ

40. How many primary amines are possible of the formula $C_4H_{11}N$?
(1) 3 (2) 4
(3) 5 (4) 8

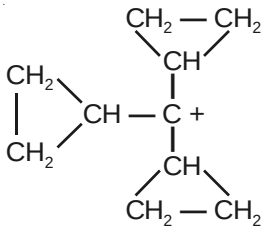
41. Which of the following is strongest electron withdrawing group?
(1) $-NO_2$ (2) –I
(3) $-CH_3$ (4) –COOH

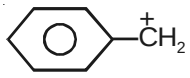
42. The number of 'C'-atoms in alkene having lowest molecular mass which can show chain and position isomerism are respectively
(1) 4 and 3 (2) 4 and 4
(3) 4 and 5 (4) 4 and 6

43. In the following carbocations, the stability order is

I. $R-CH_2-\overset{+}{C}H_2$

II. $CH_3\overset{+}{C}HCH_3$

III. 

IV. 

(1) III > II > IV > I (2) IV > I > II > III
(3) IV > III > II > I (4) III > IV > II > I

44. The nucleophilicity order of F^-, $\overline{C}H_3, \overline{O}H, \overline{N}H_2$ in decreasing order is

(1) $\overline{F} > \overline{O}H > \overline{N}H_2 > \overline{C}H_3$

(2) $\overline{C}H_3 > \overline{N}H_2 > \overline{O}H > \overline{F}$

(3) $\overline{F} > \overline{C}H_3 > \overline{N}H_2 > \overline{O}H$

(4) $\overline{C}H_3 > \overline{F} > \overline{O}H > \overline{N}H_2$

45. In which of the following molecules, all the carbon atoms are not in the same hybrid state?

(1) Benzene (2) 

(3) $CH_2 = C = CH_2$ (4) $CH_2 = CH–CH = CH_2$

46. Which of the following sets in options explains increasing dipole moment?

I. Toluene II. m-dichlorobenzene

III. o-dichlorobenzene IV. p-dichlorobenzene

(1) I < IV < II < III (2) IV < I < II < III

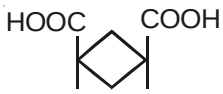
(3) IV < I < III < II (4) IV < II < I < III

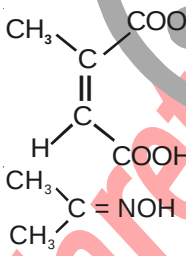
47. During nitration of an organic compound, HNO_3 acts as

(1) Acid (2) Base

(3) Neutral (4) Salt

48. Which molecule can not show goemetrical isomerism?

(1) 

(2) 

(3) $CH_3–CH=NOH$ (4)

49. Which of the following are m-directing groups?

I II

III IV

(1) I, II, III, IV (2) II, III

(3) I, III, IV (4) II, IV

50. The IUPAC name of the given compound

 is

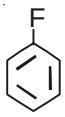
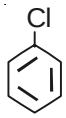
(1) 3-Cyclopropaneprop-1-ene

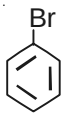
(2) 3-Cyclopropylprop-1-ene

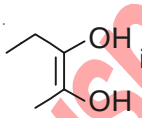
(3) 1-Allylcyclopropane

(4) 3-Allylcyclopropane

51. Towards electrophilic substitution, the most reactive haloarene is

(1)  (2) 

(3)  (4) 

52. IUPAC name of  is

(1) But-2-ene-2, 3-diol

(2) Pent-2-ene-2, 3-diol

(3) 2-methyl but-2-ene-2, 3-diol

(4) Hex-2-ene-2, 3-diol

53. The correct increasing order of nucleophilicity is

(1) $Me_3CO^- < Me_2\overset{H}{\overset{|}{C}}O^- < MeO^-$

(2) $MeO^- < Me_2\overset{H}{\overset{|}{C}}O^- < Me_3CO^-$

(3) $Me_2\overset{H}{\overset{|}{C}}O^- < Me_3CO^- < MeO^-$

(4) $Me_3O^- < MeO^- < Me_2\overset{H}{\overset{|}{C}}O^-$

54. Which of the following statement is correct?

(1) A singlet carbene has bent structure

(2) A triplet carbene is more stable than singlet carbene

(3) Simple alkyl carbanions are pyramidal in shape

(4) All of these

55. The composition of prussian blue formed in the test of nitrogen by Lassaigne's test is

(1) $Na_4[(Fe(CN)_6]$

(2) $Fe_4[Fe(CN)_6]_3$

(3) $K_2Fe[Fe(CN)_6]$

(4) $Fe(SCN)_3$

56 . Sodium nitroprusside is used in test of

(1) Nitrogen (2) Phosphorus

(3) Sulphur (4) Halogen

1. Kharasch effect (Peroxide effect) is observed only by HBr, because
   (1) Low bond energy & Endothermic reaction
   (2) Low bond energy & Exothermic reaction
   (3) High bond energy & Exothermic reaction
   (4) High bond energy & Endothermic reaction

2. $H_3C—C\equiv CH$ on reaction with HI gives
   (1) $H_3C—CH_2—CHI_2$ (2) $H_3C—CH=CH_2I$
   (3) $H_3C—CH(I)—CH_3$ (4) $H_3C—Cl_2—CH_3$

3. $H_3C—CH_2—CH(CH_3)_2$ on bromination in the presence of light gives which product as the major one?
   (1) $BrCH_2—CH_2—CH(CH_3)_2$
   (2) $H_3C—\underset{\displaystyle Br}{\underset{|}{CH}}—CH(CH_3)_2$
   (3) $H_3C—CH_2—CBr(CH_3)_2$
   (4) $H_3C—CH_2—\underset{\displaystyle CH_3}{\underset{|}{CH}}—CH_2(Br)$

4. Which alkene on ozonolysis gives the mixture of three products HCHO, $H_3C—\underset{\displaystyle O}{\underset{\|}{C}}—CH_3$,
   $H_3C—\underset{\displaystyle O}{\underset{\|}{C}}—CH_2—\underset{\displaystyle O}{\underset{\|}{C}}—CH_3$?
   (1) $(H_3C)CH=C(CH_3)—CH_2—C(CH_3)=CH—CH_2$
   (2) $H_3C—\underset{\displaystyle C(CH_3)_2}{\underset{\|}{C}}—CH_2—CH_2—CH=CH_2$
   (3) $(H_3C)_2C=C(CH_3)—CH_2—C(CH_3)=CH_2$
   (4) $H_2C=CH—CH_2—\underset{\displaystyle CH_3}{\underset{|}{CH}}—CH=C(CH_3)$

5. By which reagent alkene can be distinguished from alkanes?
   (1) Dil. H_2SO_4 (2) Dilute alkaline $KMnO_4$
   (3) H_2O_2 (4) Both (1) & (2)

6. Which of the following is not responsible for green house effect?
   (1) CO_2 (2) Water vapours
   (3) CFCs (4) O_2

7. Bhopal gas tragedy is caused by
   (1) Methyl isocyanate (2) Methyl isocyanide
   (3) DDT (4) CFCs

8. A conjugated alkadiene having molecular formula $C_{13}H_{22}$ on ozonolysis yielded ethyl methyl ketone glyoxal and cyclohexanecarbaldehyde. The alkadiene is
   (1) 1-cyclohexyl-4-methylhexa-1, 3 diene
   (2) 6-cyclohexyl-3-methylhexa-3,5-diene
   (3) 1-heptenyl cyclohexane
   (4) 5-Methyl hexadine-1, 3-glcyclohexane

9. $CH_3—C\equiv C—CH_3$ —(Birch reduction)→ x; —(Lindlar catalyst)→ y
   x and y respectively are
   (1) trans but-2-ene, cis-but-2-ene
   (2) cis-but-2-ene, trans-but-2-ene
   (3) trans-but-2-ene, trans-but-2-ene
   (4) cis-but-2-ene, cis-but-2-ene

10. $CH_3—CH=CH_2 + HCl \xrightarrow[\text{Peroxide}]{\text{Organic}} \underset{\text{(Major)}}{A}$,
    The product A is
    (1) $CH_3—\underset{\displaystyle Cl}{\underset{|}{CH}}—CH_3$ (2) $CH_3—CH_2—CH_2—Cl$
    (3) $\underset{\displaystyle Cl}{\underset{|}{CH_2}}—CH=CH_2$ (4) $CH_3—CH=CH—Cl$

11. Which reaction will not give ethane?
    (1) Electrolysis of potassium acetate solution
    (2) Reaction of methyl alcohol with ethyl magnesium bromide
    (3) Reaction of Al_4C_3 with water
    (4) Reaction of methyl chloride with Na/ether

12. $CH_3—\underset{\displaystyle CH_3}{\underset{|}{CH}}—CH_3 \xrightarrow{Cl_2/h\nu}$ Monochlorination product (major)
    (1) $CH_3—\underset{\displaystyle CH_3}{\underset{|}{CH}}—CH_2Cl$
    (2) $CH_3—\underset{\displaystyle Cl}{\underset{|}{\underset{\displaystyle CH_3}{\underset{|}{C}}}}—CH_3$

(3) $CH_3-CH_2-\underset{\displaystyle CH_3}{\overset{|}{CH}}-Cl$

(4) $CH_3CH_2CH_2CH_2Cl$

13. Product of Kolbe's electrolysis of HCOONa on cathode and anode are respectively

(1) CH_4 and H_2 (2) H_2 and CH_4

(3) CH_4 and CH_4 (4) H_2 and H_2

14. $Al_4C_3 \xrightarrow{\text{Hydrolysis}}$ (A)

$Mg_2C_3 \xrightarrow{\text{Hydrolysis}}$ (B)

The products (A) and (B) are respectively

(1) CH_4 & $CH_3-CH_2-CH_3$

(2) CH_4 & CH_4

(3) CH_4 & $CH_3-C\equiv CH$

(4) CH_4 & $CH_3-CH=CH_2$

15. During reaction

$$CH_3C\equiv CH \xrightarrow[333K]{H^+, Hg^{++}} A \xrightarrow{\text{Tautomerise}} B\ ;$$

A and B are

(1) $CH_3-\underset{\displaystyle OH}{\overset{|}{CH}}=CH_2$ and $CH_3-\overset{\displaystyle O}{\overset{\|}{C}}-CH_3$

(2) $CH_3-CH=CHOH$ and $CH_3\ CH_2\ \overset{\displaystyle O}{\overset{\|}{C}}H$

(3) $CH_3CH_2CH_2OH$ and $CH_2=CH-CH_2OH$

(4) $CH_3CH=CHOH$ and $CH_2=CH-CH_2OH$

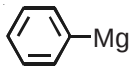
16. Arrange the following in order of increasing boiling point

(a) $CH_3-\underset{\displaystyle CH_3}{\overset{\displaystyle CH_3}{\overset{|}{\underset{|}{C}}}}-CH_3$ (b) $CH_3\underset{\displaystyle CH_3}{\overset{|}{CH}}CH_2CH_3$

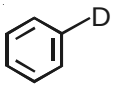
(c) $CH_3CH_2CH_2CH_2CH_3$

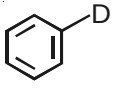
(1) (a) < (b) < (c) (2) (c) < (b) < (a)

(3) (c) = (b) = (a) (4) (c) < (b) = (a)

17.  $\xrightarrow{D_2O}$ A + B.

What are A and B?

(1)  + $Mg(OH)_2$ (2)  + $Mg(OD)_2$

(3)  + Mg(OD)Br (4)  + $Mg(OH)_2$

18. Terminal alkynes react with Na metal and gives hydrogen gas because

(1) All hydrocarbons give hydrogen when react with sodium metal

(2) All hydrogens present in alkynes are acidic in nature

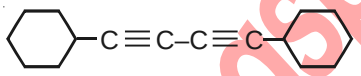
(3) Hydrogen linked with sp hybridised carbon is acidic in nature

(4) α-carbon in alkynes are acidic in nature

19. Major components of photochemical smog are

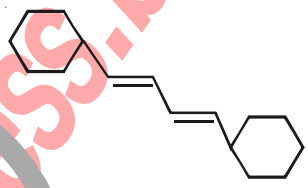
(1) CO_2, SO_3, SO_2 (2) O_3, Cl_2, SO_3

(3) O_2, Cl_2, HNO_3 (4) NO, N_2O, PAN

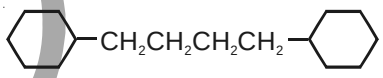
20.  $\xrightarrow{Li/NH_3}$ A.

The product 'A' is

(1) 

(2) 

(3) Both (1) & (2)

(4) 

21. $CH\equiv CH \xrightarrow[NH_4Cl]{CuCl(aq)\ \&}$ (A) $\xrightarrow{HCl}$ (B) $\xrightarrow{\text{Polymerised}}$ (C),

(C) is

(1) Poly cis-isoprene (2) Poly-trans-isoprene

(3) Chloroprene (4) Neoprene

22. Arrange the following in increasing order of bond energy of C–H bond (Assuming homolytic cleavage)

CH_3-CH_2-H (I)

$CH_3-\underset{\displaystyle CH_3}{\overset{|}{CH}}-H$ (II)

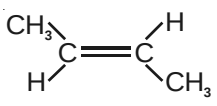
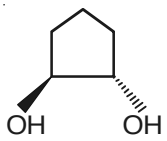
$CH_2=CH-H$ (III)

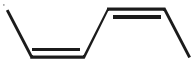
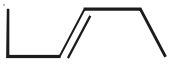
$C_6H_5-CH_2-H$ (IV)

(1) I < II < III < IV (2) IV < II < I < III

(3) IV < III < II < I (4) III < IV < II < I

23. Which of the following is a Z-isomer?

(1)  (2) 

(3)  (4) 

24. Which of the following on heating with hot alkaline potassium permanganate will generate?

(1) $CH_3 - CH = CH_2$ (2) 

(3)  (4) 

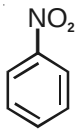
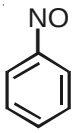
25. Match the following

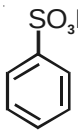
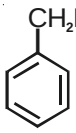
	Column-I Substance		Column-II Property
a.	Cis-1, 2-dichloroethene	(i)	Zero dipole moment
b.	Trans-2, 3-dichlorobutene	(ii)	Reacts with Tollen's reagent
c.	But-2-yne	(iii)	Does not form salts with $NaNH_2$
d.	But-1-yne	(iv)	Relatively high boiling point

(1) a(iv), b(i), c(iii), d(ii) (2) a(i), b(iv), c(iii), d(ii)

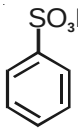
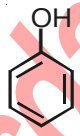
(3) a(i), b(iv), c(ii), d(iii) (4) a(iv), b(i), c(ii), d(iii)

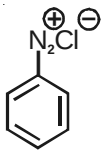
26. $C_6H_{14} \xrightarrow[873\ K]{Al_2O_3/Cr_2O_3} (A) \xrightarrow[Conc.\ H_2SO_4]{Conc.\ HNO_3} (B)$, (B) is

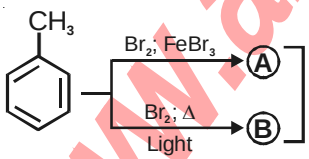
(1)  (2) 

(3)  (4) 

27. Toluene will be obtained on treatment with H_3PO_2

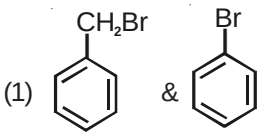
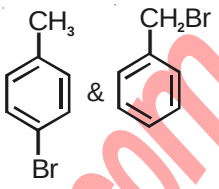
(1)  (2) 

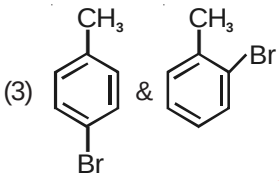
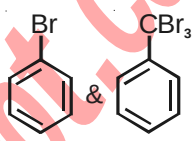
(3)  (4) 

28. 

Major products (Monosubstitution)

(A) & (B) are respectively

(1)  (2) 

(3)  (4) 

29. The product(s) obtained by the reductive ozonolysis of buta–1,3–diene is(are)

(1) HCHO & CH_3CHO

(2) CH_3–CHO only

(3) HCHO & CHO · CHO

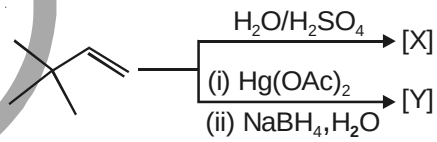
(4) H–CHO & CH_3–CO · CHO

30. The product obtained by the oxidation of propyne with SeO_2 is

(1) Glyoxal (2) Methyl glyoxal

(3) Oxalic acid (4) Glyceraldehyde

31. Consider the following reactions



The major product [X] and [Y] respectively are

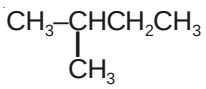
(1) 2, 3-Dimethyl-2-butanol and 3, 3-Dimethyl-2-butanol

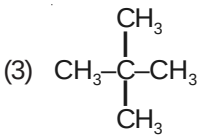
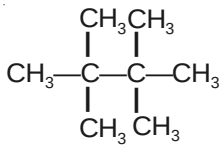
(2) 2, 3-Dimethyl-2-butanol and 2, 3-Dimethyl-2-butanol

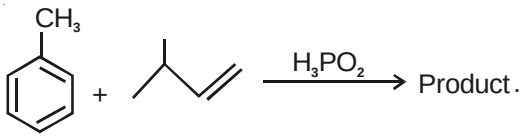
(3) 3, 3-Dimethyl-2-butanol and 2, 3-Dimethyl-2-butanol

(4) 3, 3-Dimethyl-2-butanol and 3, 3-Dimethyl-2-butanol

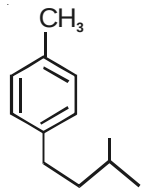
32. A hydrocarbon (A) was found to have vapour density 36. It forms only a single monochloro substitution product. The hydrocarbon (A) is

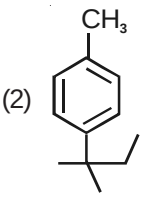
(1) $CH_3CH_2CH_2CH_2CH_3$ (2) 

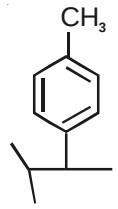
(3)  (4) 

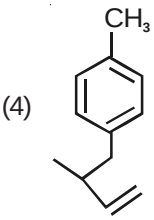
33. 

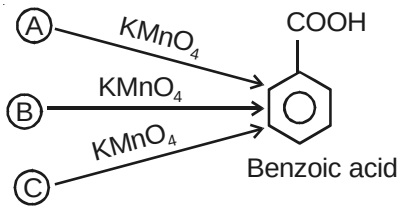
Major product of the reaction is

(1) 

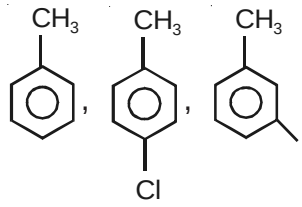
(2) 

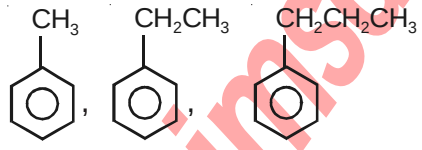
(3) 

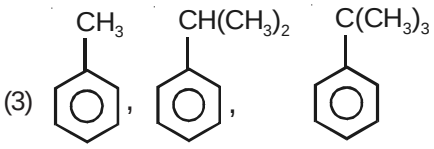
(4) 

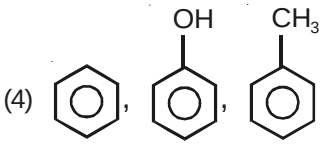
34. 

Which set represents A, B, C?

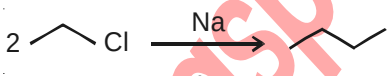
(1) 

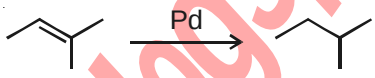
(2) 

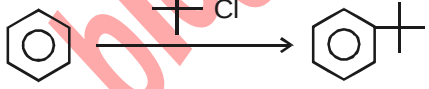
(3) 

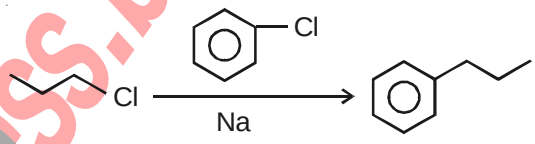
(4) 

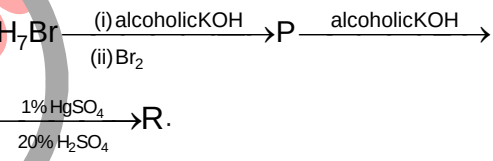
35. Which of the following is Wurtz–Fittig reaction?

(1) 

(2) 

(3) 

(4) 

36. 

P, Q, R respectively are

(1) $CH_3-CH=CH_2$, $CH_3-\underset{\displaystyle Br}{\underset{|}{CH}}-CH_3$, CH_3-CH_2-OH

(2) $CH_3-\underset{\displaystyle Br}{\underset{|}{CH}}-CH_2-Br$, $CH_3-CH=CH_2$, $CH_3-\underset{\displaystyle OH}{\underset{|}{C}}=CH_2$

(3) $CH_3-C\equiv CH$, $CH_3-\underset{\displaystyle Br}{\underset{|}{CH}}-CH_2-Br$, $CH-\underset{\displaystyle O}{\underset{\|}{C}}-CH_3$

(4) $CH_3-\underset{\displaystyle Br}{\underset{|}{CH}}-CH_2-Br$, $CH_3-C\equiv CH$, $CH_3-\underset{\displaystyle O}{\underset{\|}{C}}-CH_3$

BOTANY

[Chapter 9 : Mineral Nutrition]

1. Criterion of essentiality is applicable to
   (1) Only micronutrients
   (2) Only macronutrients
   (3) Both micro and macronutrients
   (4) Essential and functional elements

2. The N, P and K are called critical elements because
   (1) They are required in critical phase of flowering
   (2) They are commonly deficient in soil
   (3) They are required in small amount
   (4) Their deficiency can not be corrected

3. Nitrite is reduced into ammonia in the process of nitrate assimilation especially in the leaves because
   (1) The enzyme nitrate reductase occurs in chloroplast in leaves only
   (2) Ferredoxin is direct source of electron for its reduction
   (3) Nitrite reductase contain copper and iron both
   (4) Nitrite reductase does not require molybdenum
4. Curling of root hair tip in legume during nodule formation is due to
   (1) Formation of infection thread
   (2) Chemical secretion by bacteroid
   (3) Lectin receptors on surface
   (4) Oligosaccharide secreted by *Rhizobium*
5. Select an **incorrect** statement regarding hydroponics
   (1) Soil borne diseases can be prevented
   (2) Uniform growth and high yield
   (3) Water and fertilisers can be reused
   (4) Less expensive than conventional agriculture
6. Grey speck of oat and marsh spots of peas are caused by
   (1) Deficiency of Mn
   (2) Deficiency of Mn and Mo respectively
   (3) Deficiency of Mo and Mn respectively
   (4) Excess of Mo
7. Find out the **correct** match
   (1) Reclamation disease : Mn
   (2) Whiptail of cauliflower : B
   (3) Brown heart of turnip : Mg
   (4) Exanthema : Cu
8. Which of the following is released by *Rhizobium* in symbiotic N_2-fixation?
   (1) Oligosaccharides, Auxin, ATP
   (2) Lectins, Oligosaccharides, Heme
   (3) Nod-factor, CK, Heme
   (4) Nod-factor, Auxin, Globin
9. The formation of aspartic acid from oxaloacetic acid in presence of enzyme and glutamic acid represents the process of
   (1) Catalytic amidation (2) Reductive amination
   (3) Transamination (4) Deamination
10. Which of the following is not a criteria of essentiality of an element?
   (1) Deficiency symptoms of essential element are irreversible
   (2) A plant is unable to complete its vegetative or reproductive phase in its absence
   (3) Element is directly involved in metabolism of plants
   (4) Element cannot be replaced by any other element
11. The toxicity symptoms of Mn are actually combined deficiency symptoms of
   (1) N, S, Mo (2) K, Cu
   (3) Fe, Mg, Ca (4) P, Mg, Cu
12. Which of these is released by bacteria during symbiotic N_2 fixation?
   (1) Auxins
   (2) Heme of Lb
   (3) ATP for reduction of N_2
   (4) Globin of Hb
13. α – ketoglutaric acid + NH_4^+ + NAD(P)H $\xrightarrow[dh]{Glutamate}$ Glutamate + H_2O + NAD(P)
   The above reaction shows
   (1) Catalytic amidation
   (2) Reductive amination
   (3) Transamination
   (4) Nitrification
14. Plants of legume family contain usually more protein than other plants because
   (1) Plant can fix atmospheric nitrogen
   (2) Bacteria in their root nodule convert atmospheric nitrogen to ammonia
   (3) Bacteria in their root nodule convert ammonia to amino acid
   (4) Plants store atmospheric nitrogen as ammonia
15. Final step of nitrate assimilation in plants occur inside leaf because
   (1) Nitrate reductase is molybdoflavoprotein
   (2) Fd is direct source of electron for reduction of NO_2^- into NH_3
   (3) NADH + H^+ cannot act as electron donor
   (4) Nitrite reductase has Cu and Mo
16. The porins
   (1) Have been reported in eukaryotes only
   (2) Allow passage of very large sized solutes
   (3) Are protein lined pores present in all prokaryotes
   (4) Are proteins that form huge pores in outer membranes
17. Essential element which is an activator of enzyme pyridine nucleotide dehydrogenase and needed for synthesis of auxin is
   (1) Mo (2) Zn
   (3) Mn (4) Ca
18. Active mineral absorption
   (1) Does not require carriers
   (2) Leads towards ionic equilibrium
   (3) Result in accumulation of salt in cell
   (4) Is movement of ions along ecp

19. The concentration of essential elements below which plant growth is retarded is termed as
(1) Toxic level
(2) Critical concentration
(3) Hunger sign
(4) Deficiency symptom

20. Molybdenum is a component of enzymes involved in nitrogen metabolism. Its deficiency also shows retardation of growth and interveinal chlorosis. Its deficiency also cause
(1) Nitrogen deficiency
(2) Copper deficiency
(3) Potassium deficiency
(4) Magnesium deficiency

21. Ureides are / have
(1) Amino acid derivatives in which -OH component of carboxylic group is replaced by amino group
(2) Double aminated keto acids
(3) Degraded urea products
(4) High carbon to nitrogen ratio

22. Find out **correct** match

	Column-I		**Column-II**
a.	Ammonification	(i)	$N_2 \rightarrow NH_3$
b.	Nitrification	(ii)	Proteins $\rightarrow NH_3$
c.	Denitrification	(iii)	$NH_3 \rightarrow NO_3$
d.	N_2-fixation	(iv)	$NO_3 \rightarrow N_2$

(1) a(ii), b(iii), c(iv), d(i)
(2) a(ii), b(iii), c(i), d(iv)
(3) a(iii), b(ii), c(iv), d(i)
(4) a(ii), b(iv), c(i), d(iii)

23. In symbiotic N_2-fixation by *Rhizobium*
(1) ATP is provided by host cell
(2) Leghemoglobin is synthesised only by bacteria
(3) Bacteria enters usually in diploid cells
(4) Ferredoxin and $FMNH_2$ are not required

24. Mass flow
(1) Of substances in a suspension occurs at the differential pace
(2) Occurs through only positive hydrostatic pressure gradient
(3) Is short distance transport
(4) Can occur for water, minerals and food

25. Match the following

	Column I (Nitrogen fixer)		**Column II (Example)**
a.	Free living bacteria	(i)	*Anabaena*
b.	Free living cyanobacteria	(ii)	*Cylindrospermum*
c.	Symbiotic bacteria	(iii)	*Azotobacter*
d.	Symbiotic cyanobacteria	(iv)	*Frankia*

(1) a(iii), b(ii), c(i), d(iv) (2) a(ii), b(iii), c(i), d(iv)
(3) a(iii), b(ii), c(iv), d(i) (4) a(ii), b(i), c(iii), d(iv)

26. Enzyme nitrogenase
(1) Requires 8 ATP per H_2 release
(2) Possesses binding site for N_2 and NADH
(3) Is always associated with oxygen scavenger, leg haemoglobin
(4) Is present exclusively in prokaryotes

27. In the process of nitrate assimlation
(1) Protein is converted into ammonia
(2) Nitrite needs a metalloflavoprotein for its conversion into NO_3^-
(3) NO_3^- is converted into NH_3 through reduction in pressence of reducing agent Fd
(4) N_2 is reduced to NH_3 with the help of symbiotic N_2 fixing bacteria *Rhizobium*

28. Complete fertilizers are those chemical fertilizers which contain
(1) All essential elements
(2) Functional elements
(3) All balancing elements
(4) Critical elements

29. Consider the following statements regarding leghaemoglobin
a. It acts as oxygen scavenger
b. Heme part is produced by legume plant and globin part is produced by *Rhizobium*
c. It protects enzyme nitrogenase
d. It is present in legume as well as non-legume plants
Which of the above statements are **correct**?
(1) a, b (2) a, c
(3) c, d (4) a, d

30. For the fixation of one molecule of N_2 ..... and ..... are required
(1) 8 ATP; $8e^-$s (2) 16 ATP; $8e^-$s
(3) 8 ATP; $4e^-$s (4) 4 ATP; $4e^-$s

31. Enzyme nitrogenase is synthesized by 'nif' gene of diazotrophs. Cofactors of nitrogenase are
(1) Iron and Copper (2) Zinc and Molybdenum
(3) Iron and Boron (4) Iron and Molybdenum

32. Consider the statements given below regarding carrier concept of active ion absorption
a. Any carrier protein can transport any ion
b. Carrier proteins transport ions against the concentration gradient
c. Only cations can form carrier ion complex
d. Kinases are required to activate carrier protein

Which two of the above statements are **correct**?

(1) a, b (2) b, c

(3) b, d (4) a, c

33. Find the incorrect statement

(1) Nitrogen fixation is energy intensive

(2) Amides are transported through xylem

(3) The nitrogenase enzyme complex is separated into two components

(4) Both components of nitrogenase have Mo

34. Which of the following statement is **not correct** for the criteria for essentiality of an element?

(1) The element must be directly involved in the metabolism of the plant

(2) In the absence of the element the plants do not complete their life cycle

(3) The requirement of element must be specific and not replaceable by another element

(4) The element must be absolutely necessary for supporting normal growth and not for reproduction

35. How many ATP molecules are needed to produce 4 moles of NH_3 without release of H_2 during symbiotic N_2 fixation by *Rhizobium leguminosarum*?

(1) 32 (2) 24

(3) 16 (4) 12

36. Nod factors are considered as

(1) Proteins

(2) Glycoproteins

(3) Lipo-chito oligosaccharides

(4) Mo-Fe proteins

37. Select **incorrect** statement w.r.t. Calcium

(1) It does not help to maintain anion-cation balance

(2) It is needed during the formation of mitotic spindle

(3) It accumulates in older leaves

(4) It regulates opening and closing of stomata

38. Amides are the storage and transported forms of nitrogen because they

(1) Need less ATP for their transport

(2) Have high nitrogen to carbon ratio

(3) Are transported through xylem of tracheary elements

(4) Can easily be deaminated to form organic acid and ammonia

[Chapter 10 : Photosynthesis in Plants]

1. Choose the **correct** sequence of steps occuring in C_4 pathway

(a) Decarboxylation of malic acid

(b) Carboxylation of PEP

(c) Dehydrogenation of OAA

(d) Phosphorylation of pyruvate

(1) (b), (c), (a), (d) (2) (a), (b), (c), (d)

(3) (c), (a), (b), (d) (4) (d), (b), (c), (a)

2. Which one of the following is a visible product of photosynthesis?

(1) Glucose (2) Starch

(3) Sucrose (4) Raffinose

3. Which of the following is **incorrect** w.r.t. plant pigments?

(1) In chlorophyll c, phytol tail is absent

(2) Phycobilins are proteinaceous pigments

(3) Oxygenated xanthophyll acts as shield pigments

(4) In chlorophyll a, 4 methyl groups are present

4. For the formation of 12 ATP through CF_0–CF_1 complex how many hydrogen atoms are involved?

(1) 12 (2) 36

(3) 24 (4) 18

5. Cyclic photophosphorylation in favoured by

(1) Aerobic condition

(2) Low CO_2 availability

(3) High light intensity

(4) High CO_2 concentration

6. For the synthesis of one molecule of maltose during photosynthesis in C_3 plants, number of ATP molecules required are

(1) 18 (2) 36

(3) 12 (4) 24

7. How many ATP and NADPH molecules are required to reduce 3 CO_2 molecules in *Amaranthus*?

(1) 9 ATP and 18 NADPH

(2) 30 ATP and 12 NADPH

(3) 15 ATP and 6 NADPH

(4) 9 ATP and 6 NADPH

8. ATP synthesis in chloroplast and mitochondria is due to proton gradient across the membrane. Select **correct** statement w.r.t. ATP formation in chloroplast

(a) Proton accumulates in lumen of thylakoid

(b) Splitting of water occurs on inner side of membrane

(c) Proton accumulates in stroma side of chloroplast

(d) NADP reductase is located on stroma side of membrane

(1) Only (a) and (b) are correct

(2) Only (b) and (c) are correct

(3) Only (c) and (d) are correct

(4) (a), (b) and (d) are correct

9. How many ATP molecules are required for synthesis of one sucrose molecule by C_4 plants?
(1) 30 (2) 60
(3) 36 (4) 18

10. How many ATP and NADPH molecules are required to reduce 3 CO_2 molecules in a C_3 plant?
(1) 9 ATP and 18 NADPH
(2) 30 ATP and 12 NADPH
(3) 15 ATP and 6 NADPH
(4) 9 ATP and 6 NADPH

11. How many e^- are required to reduce two molecules of CO_2?
(1) $2e^-$ (2) $4e^-$
(3) $8e^-$ (4) $1e^-$

12. Identify the reaction for which the C_4 plants require some extra ATP molecules in comparison to C_3 plants
(1) Conversion of PEP to OAA
(2) Conversion of Pyruvate to PEP
(3) Conversion of Malate to Oxaloacetate
(4) Conversion of PEP to Malate

13. CO_2 concentration of the atmosphere is _____ and is a limiting factor for _____ plants
(1) 360 ppm, C_4 plants
(2) 360 ppm, C_3 plants
(3) 600 ppm, C_3 plants
(4) 600 ppm, C_3 and C_4 both

14. Moll's half leaf experiment has proved that
(1) O_2 is released during photosynthesis
(2) H_2O is the source of oxygen
(3) CO_2 is essential for photosynthesis
(4) Chlorophyll is essential for photosynthesis

15. First action spectrum of photosynthesis was described by T.W. Engelmann. Which of the following statement is not concerned with this experiment?
(1) Anoxygenic photosynthesis by experimental algae
(2) Using a pirsm he split light into its spectral components
(3) A green algae was placed in a suspension of aerobic prokaryote
(4) Aerobic prokaryote accumulated mainly in the region of blue and red light

16. Which of the following component is made up of one type of pigment molecule only?
(1) Photosystem
(2) LHC
(3) Reaction centre
(4) Quantasome

17. Cyclic flow of electrons in light reaction
(1) Can produce NADPH
(2) Is operated under optimum light and aerobic conditions
(3) Is dominant in higher plants
(4) Can induce H^+ pumping

18. Water splitting complex is associated with the ____, which itself is physically located on the _____ of the thylakoid membrane
(1) PS-II, outer side
(2) PS-II, inner side
(3) PS-I, inner side
(4) PS-I, outer side

19. The whole reactions of Calvin cycle can be divided in three parts
(a) Carboxylation
(b) Glycolytic reversal
(c) Regeneration of RuBP
How many turns of part 'c' are required to regenerate the 4 molecules of RuBP?
(1) 6 (2) 2
(3) 4 (4) 12

20. Affinity of Rubisco for CO_2 decreases and its affinity for O_2 increases with
(1) Increase in light intensity
(2) Decrease in temperature
(3) Increase in O_2 concentration
(4) More than one option is correct

21. Warburg effect is concerned with
(1) C_3-plants
(2) C_4-plants
(3) Photosynthetic enhancement effect
(4) CO_2 concentration effect

22. End product of photosynthetic carbon oxidative cycle is
(1) CO_2 and PGA
(2) Glycolic acid
(3) Serine and NADH
(4) RUBP and glyoxylate

23. In cyclic photophosphorylation
(1) Splitting of water is necessary
(2) NADPH molecules are produced
(3) ATPs are not synthesized
(4) External e^- donor is not required

24. The electrons needed to replace those removed from photosystem I are provided by
(1) PQ pump (2) LHC
(3) Pigment system-II (4) Cyt a_3

25. Match the following

Column-I	Column-II
a. Chlorophyll-b	(i) 55 'C', 72 'H'
b. Carotene	(ii) 55 'C', 70 'H'
c. Chlorophyll-c	(iii) 40 'C', 56 'H'
d. Chlorophyll-a	(iv) 35 'C', 32 'H'

(1) a(ii), b(iii), c(iv), d(i)
(2) a(iii), b(ii), c(iv), d(i)
(3) a(i), b(iv), c(iii), d(ii)
(4) a(iv), b(i), c(iii), d(ii)

26. Chlorophylls are synthesised from the precursor 'protochlorophyll'. Its synthesis starts from
(1) Glycine and Acetyl CoA
(2) Serine and Succinyl CoA
(3) Succinyl CoA and an aminoacid
(4) Glycerol and an intermediate of TCA cycle

27. Photosynthetic pigments with open chain tetrapyrrole structure
(1) Lacks Mg^{+2} and phytol tail
(2) Are associated with autumn colouration
(3) Acts as shield pigments
(4) More than one option is correct

28. Select **correct** statement w.r.t. CAM plants photosynthesis
(1) Enzymes of C_3-cycle and CAM-cycle are found in mesophyll cell
(2) Decarboxylation of malic acid occurs when stomata are open
(3) Plenty of organic acids and carbohydrates are synthesized when stomata are open
(4) Number of assimilatory powers used for 1 CO_2 reduction is similar to C_3-plants

29. Select a **correct** statement w.r.t. carotenoids
(1) These are antenna molecules, they take up energy from reaction centre
(2) They absorb light in blue-red part of spectrum
(3) They protect plant from excessive heat and prevents quantum conversion
(4) They can protect chlorophyll from oxidative destruction

30. Photorespiration is light dependent process because
(1) Its substrate is glycolate
(2) RUBP regeneration occurs in presence of light
(3) O_2 is used in chloroplast and peroxisome both
(4) It occurs at high light intensity

31. PS II differs forms PSI in
(1) Formation of ATP
(2) Its reaction centre and location
(3) Having cyclic electron transfer
(4) Absence of splitting of water

32. One of the following is a facultative CAM plant
(1) *Mesembryanthemum* (2) *Opuntia*
(3) *Kalanchoe* (4) *Sedum*

33. The chlorophyll which is found in all oxygenic photosynthetic organisms has molecular formula
(1) $C_{55}H_{70}O_6N_4Mg$ (2) $C_{55}H_{72}O_5N_4Mg$
(3) $C_{35}H_{32}O_5N_4Mg$ (4) $C_{40}H_{56}O_2$

34. Assimilatory power for bacterial photosynthesis is
(1) NADPH (2) NADH + NADPH
(3) NADPH + ATP (4) NADH + ATP

35. Choose the **correct** sequence of steps occuring in CAM pathway
a. Involvement of PEPcase activity
b. Carboxylation of RuBP
c. Dehydrogenation of OAA
d. Decarboxylation of malic acid
(1) a, b, c, d (2) c, d, a, b
(3) a, c, d, b (4) a, b, d, c

36. In C_2 cycle, the transamination is possible during the conversion of
(1) Glycolate → Glyoxylate
(2) Glycine → Serine
(3) Hydroxy pyruvate → Glycerate
(4) Glyoxylate → Glycine

37. CO_2 compensation point for C_4 plant is
(1) 0–10 ppm (2) 25-–50 ppm
(3) 40–100 ppm (4) 100–120 ppm

38. A proton motive force develops when
(1) H^+ concentration in stroma increases by 200 times
(2) H^+ concentration in thylakoid lumen decrease by 1000 – 2000 times
(3) H^+ concentration in stroma increases by 1000-2000 times
(4) H^+ concentration in thylakoid lumen increases by 1000-2000 times

39. C_4 plants are more sensitive to low temperature than C_3 because
(1) They have chloroplast dimorphism
(2) Regeneration of RUBP in bundle sheath cells is afected at low temperature
(3) Primary fixation of carbon is inhibited as pepcase becomes less active
(4) PEP regeneration is decreased as PEP synthetase is sensitive to low temperature

40. Which is not a role of carotenoids?
(1) As antenna molecule
(2) Dissipation of excess energy by converting into heat
(3) Production of vitamin A in vertebrates
(4) Complementary chromatic adaptation in oxyphotobacteria

41. PS-II differs from PS-I in
(1) Its occurrence on the outer surface of thylakoid membrane
(2) The involvement of non cyclic ETC only
(3) Absence of cytochromes
(4) Having more than twice the amount of chlorophyll 'a' than chlorophyll 'b'

42. Cyclic photophosphorylation operates when
(1) Light intensity is high or optimum
(2) Light wavelength beyond 680 nm are available for excitation
(3) CO_2 and O_2 are sufficiently available
(4) Excited electrons pass to $NADP^+$

43. Rubisco
(1) Is monofunctional enzyme
(2) Activation does not require Mg^{++}
(3) Is present in C_3 plants only
(4) Has a much greater affinity for CO_2 than for O_2

44. Number of electrons needed to pass through ETS for reduction of $3CO_2$ molecules in C_3 plants is
(1) 24 (2) 12
(3) 6 (4) 18

45. Which of these crops are allowed to grow in carbon dioxide enriched atmosphere that leads to higher yield?
(1) Tomato and bell pepper
(2) *Sorghum* and sugarcane
(3) Tobacco and maize
(4) Pineapple and *Amaranthus*

46. Biosynthetic phase of carbon assimilation
(1) Uses NADPH + H^+ only
(2) Depends upon the products of light reaction
(3) Directly depends on the presence of light
(4) Is temperature independent

47. In the CAM plants, which of the following events will not occur during day time?
(1) Activity of PEPCO and malic acid formation
(2) Carboxylation by chloroplast based enzyme
(3) Decarboxylation of malic acid
(4) Conversion of malic acid into pyruvic acid

48. What is true about cyclic photophosphorylation?
(1) It requires an external source of electron
(2) It produces ATP only
(3) Both PS I and PS II are involved
(4) It is associated with photolysis of water and liberation of O_2

49. Consider the following statements about pigment system of photosynthesis
a. Pigment system II is involved in both cyclic and non-cyclic photophosphorylation
b. Pigment system I is involved in cyclic photophosphorylation only
c. PS I is found in non-appressed regions of grana thylakoid
d. PS II is found in appressed regions of grana thylakoid
Which of the above statements are **correct**?
(1) a & b (2) b & d
(3) c & d (4) a & c

50. Which of the given enzyme is found in cytoplasm and is activated by blue light?
(1) Rubisco (2) Carboxydismutase
(3) Catalase (4) PEPCase

51. Methyl as well as ethyl group both are present in a pyrrole ring of chlorophyll-a. It is
(1) I pyrrole ring
(2) II pyrrole ring
(3) III pyrrole ring
(4) IV pyrrole ring

[Chapter 11 : Respiration in Plants]

1. First step of alcoholic fermentation from pyruvate is
(1) Dehydrogenation
(2) Oxidation
(3) Decarboxylation
(4) Oxidative decarboxylation

2. Select **incorrect** statement w.r.t. HMS
(1) It is direct oxidation of glucose
(2) Favoured by higher concentration of NAD^+
(3) Low activity in skeletal muscles
(4) Synthesis of pentose sugar

3. Decarboxylation during Kreb's cycle occurs at the time of the conversion of
(1) Citric acid to cisaconitic acid
(2) Isocitric acid to oxalosuccinic acid
(3) Oxalosuccinic acid to α-ketoglutaric acid
(4) Succinic acid to fumaric acid

4. The respiratory inhibitors which interferes with electron transport between cyt b and cyt c_1 is
(1) DNP (2) CO
(3) Antimycin A (4) Oligomycin

5. How many ATP are produced by substrate level phosphorylations when PEP molecules produced from one glucose are completely oxidised?
(1) Two (2) One
(3) Four (4) Three

6. How many reactions in a Krebs cycle are associated with the release of $NADH_2$?
(1) Three (2) Two
(3) Four (4) One

7. Brown fat on oxidation produces
(1) ATP and $NADH_2$ (2) ATP but no $NADH_2$
(3) No ATP and no heat (4) No ATP but heat

8. Ubiquinone is a mobile carrier in ETS and
a. It functions as e^- acceptor for complex I only
b. It can accept $2e^-$ from the donor
c. It helps to transport one e^- to a carrier which can accept only one e^- at a time.
d. It is also called as CoQ
(1) Only a is incorrect
(2) a, c and d are correct
(3) Only b and d are correct
(4) Only d is incorrect

9. Glyoxylate cycle
a. Is a variant of TCA cycle
b. Is a method of using stored fat for respiration
c. Consumes more Acetyl CoA than Kreb's cycle
d. Occurs in fatty seed of a plant
(1) All are correct
(2) a, b and c are correct
(3) b and d are incorrect
(4) a and c are incorrect

10. In Kreb cycle/TCA cycle
(1) 6C, 5C and 4C acids are produced
(2) Water is not used or produced
(3) There is no substrate level synthesis of ATP
(4) CO_2 is not released

11. Which of the following statement is **incorrect**?
(1) The breaking of C – C bonds of complex organic molecules by oxidation cells leading to release of a lot of energy
(2) All types of fermentation takes place under anaerobic conditions
(3) Acetyl CoA is oxidised in mitochondrial matrix in an eukaryotic cell
(4) Fats and proteins are poor in oxygen

12. How many light quanta are required for the production of 12 molecules of $\frac{1}{2}O_2$?
(1) 96 (2) 8
(3) 48 (4) 12.5

13. Consider
a. α ketoglutaric acid
b. Succinic acid
c. Citric acid
d. Fumaric acid
e. Oxalosuccinic acid
Choose the **correct** order in order to their formation in Kerb's cycle
(1) a, b, c, d, e (2) c, e, a, d, b
(3) c, e, a, b, d (4) e, d, c, b, a

14. Change from anaerobic to aerobic respiration decreases rate of sugar breakdown and CO_2 evolution. This process is called as
(1) Pasteur effect (2) Crabtree effect
(3) Warburg effect (4) Kutusky effect

15. Enolase enzyme in the glycolytic pathway performs dehydration of
(1) 2-phosphoglycerate
(2) Dihydroxyacetone phosphate
(3) Phosphoenol pyruvic acid
(4) 3-phosphoglycerate

16. In Embden - Meyerhof - Parnas pathway two redox equivalents are removed in the form of two hydrogen atoms from PGAL and transferred to a molecule of
(1) NADP (2) 1, 3-diPGA
(3) NAD^+ (4) DHAP

17. During respiration, metabolic water is produced in
(1) All living organisms
(2) Anaerobic organisms
(3) Aerobic organisms
(4) Eukaryotes only

18. Calculate the number of reduced FAD molecules produced during the complete oxidation of one fructose-6-phosphate
(1) 2 (2) 12
(3) 10 (4) 6

19. Find out the correct sequence of e^- transfer (w.r.t. oxidation of $NADH_2$ in ETC)
(1) FMN $\rightarrow$ FAD $\rightarrow$ cyt c $\rightarrow$ cyt a_3
(2) FMN $\rightarrow$ FeS $\rightarrow$ cyt b $\rightarrow$ cyt c_1
(3) FAD $\rightarrow$ FeS $\rightarrow$ cyt c_1 $\rightarrow$ cyt a
(4) FMN $\rightarrow$ FeS $\rightarrow$ cyt a_3 $\rightarrow$ cyt a

20. R.Q. value of germinating castor seed is _____ than germinating wheat seed due to _____
(1) Less, less oxygen content
(2) More, more oxygen requirement
(3) Less, more oxygen content
(4) More, less oxygen requirement

21. Cyt a, Cu_{α}, Cu_{β}, Cyt a_3 are the components of
(1) Cyt c-reductase complex
(2) Succinate dehydrogenase complex
(3) NADH-dehydrogenase complex
(4) Cyt c-oxidase complex

22. Reduced coenzyme $NADH_2$ helps in pushing 6 protons to outer-chamber of mitochondria while $FADH_2$ sends
(1) 4 pairs of H^+ to outer chamber
(2) 2 pairs of H^+ to inner chamber
(3) 4 pairs of H^+ to inner chamber
(4) 2 pairs of H^+ to outer chamber

23. Anaerobic and aerobic glycolysis are different from each other in
(1) Consumption of O_2 molecules
(2) Production of $NADH_2$
(3) Type of end product
(4) Efficiency

24. The energy stored in NADH + H^+ is released when it is oxidised through the electron transport system. This NADH + H^+ in a bacterial cell
(1) Can be cytoplasmic or mitochondrial in origin
(2) Is cytoplasmic in origin
(3) Is always produced in mesosome
(4) Is oxidised in inner mitochondrial membrane

25. During respiratory ETS
(1) Three complexes can pass protons to matrix
(2) Complex-II is not involved in proton transport
(3) Ubiquinone is a immobile carrier located on perimitochondrial side of mitochondrial membrane
(4) Complex II, III and IV operates when $NADH_2$ is oxidised during ETS

26 Which of these inhibits electron transfer chain in mitochondria by inhibiting complex IV?
(1) Cyanide and azide
(2) Antimycin and oligomycin
(3) DNP and rotenone
(4) Cyanide and rotenone

27. HMP pathway
(1) Occurs in presence of $NADP^+$
(2) Has only one dehydrogenation
(3) Does not occur in prokaryotes
(4) 36 moles of ATP is net yield per glucose molecule

28. How many ATP. molecules are produced by one turn of Krebs cycle through ETS?
(1) 12 (2) 15
(3) 11 (4) 24

29. In the glycolysis hydrogens required for the formation of reducing power are contributed by
(1) 1, 3-diphosphoglyceric acid
(2) Pyruvic acid
(3) Phosphoenol pyruvate
(4) Phosphoglyceraldehyde

30. How many metabolic water (by ETC) molecules are produced when one molecule of acetyl CoA enters the aerobic respiration?
(1) 3 (2) 4
(3) 5 (4) 2

31. For the formation of 10 ATP, how many H^+ ions should pass through $F_0 - F_1$ complex in mitochondrial E.T.S.?
(1) 20 (2) 40
(3) 30 (4) 60

32. Which of the following is not produced during glycolysis?
(1) ATP (2) NADH + H^+
(3) Pyruvic acid (4) CO_2

33. Breakdown of 8C fatty acid through complete oxidation will yield how many net ATP?
(1) 129 (2) 61
(3) 146 (4) 43

34. Which of the following complex of mitochondrial ETC has both Cu^{+2} and Fe^{+2} ?
(1) I (2) II
(3) IV (4) III

35. How many decarboxylations occur in Krebs cycle?
(1) 1 (2) 2
(3) 3 (4) 4

36. How many molecules of ATP are formed in one turn of Krebs cycle through oxidative phosphorylation?
(1) 12 (2) 11
(3) 15 (4) 24

37. How many molecules of ATP are produced from one molecule of NADH + H^+ and one molecule of $FADH_2$ through E.T.S. respectively?
(1) 3 ATP and 2 ATP (2) 2 ATP and 3 ATP
(3) 2 ATP and 1 ATP (4) 1 ATP and 4 ATP

38. Number of ATP molecules formed by complete oxidation of one pyruvic acid is
(1) 30 (2) 15
(3) 12 (4) 24

39. Bacterial cell performing alcoholic fermentation if provided with oxygen then
(1) Rate of glycolysis decreases
(2) Formation of ethanol increases
(3) Less ATP production
(4) CO_2 is not released

40. During the conversion of succinyl Co-A to succinic acid in Krebs cycle
(1) Substrate level phosphorylation occurs
(2) There is utilisation of membrane bound enzyme
(3) Multienzymatic complex is involved
(4) Dehydrogenation occurs

41. Malonate acts as the competitive inhibitor of an enzyme and this enzyme is involved in the conversion of
(1) Succinic acid → Fumaric acid
(2) Pyruvic acid → Acetyl CoA
(3) Fumaric acid → Malic acid
(4) Malic acid → Oxaloacetic acid

42. For the breakdown of one α-ketoglutaric acid through aerobic respiration, how many oxidative decarboxylation reactions will occur?
(1) Two (2) Three
(3) One (4) Zero

43. Final product of oxidative phosphorylation is
(1) ATP + H_2O (2) NADH + H^+
(3) GTP (4) Oxygen

44. Chemi-osmotic theory of ATP synthesis in the mitochondria is based on
(1) Pumping of H^+ ions in inter membrane space by all the complexes
(2) Pumping of H^+ ions by complex II
(3) Oxidation of $FADH_2$ by complex I
(4) Generation of PMF across inner mitochondrial membrane

45. If a molecule of glucose is oxidised into pyruvic acid in aerobic condition, number of CO_2 molecules evolve in this process is
(1) Six (2) Three
(3) Two (4) Zero

46. Choose **correct** statement w.r.t. net gain of ATP
(1) Aerobic glycolysis is two times more efficient than anaerobic glycolysis
(2) Aerobic glycolysis is four times more efficient than anaerobic glycolysis
(3) Both aerobic and anaerobic glycolysis are equally efficient
(4) Anaerobic glycolysis is three times more efficient than aerobic glycolysis

47. Phosphoric acid is needed for the phosphorylation of ..... in glycolysis
(1) Glucose
(2) Fructose 6 phosphate
(3) 3-phosphoglyceric acid
(4) 3 phosphoglyceraldehyde

48. During aerobic respiration in prokaryotes and eukaryotes, CO_2 is released in
(1) Cytoplasm
(2) Matrix of mitochondria
(3) Both (1) & (2)
(4) Inner membrane of mitochondria

49. In ETC, enzyme complex III have e^- carrier prosthetic group as
(1) FMN and Fe-S (2) FAD and Fe-S
(3) Cytochrome a-a_3 (4) Cyt. b, Fe-S, Cyt c_1

[Chapter 12 : Plant Growth & Development]

1. Plant growth is not related to which of the following?
(1) Always open ended
(2) Increase in number of parts
(3) Generally inderminate
(4) Lower plants shows localized growth

2. Kinetin is _____ derivative
(1) Adenine (2) Indole
(3) Carotene (4) Cytosine

3. The application of 2, 4 - D and 2, 4, 5 - T removes
(1) Broad leaved weeds in cereal crops
(2) Grasses in cereal crops
(3) Grasses in smoother crops
(4) Cereals in smoother crops

4. Seeds which need presence of light for their germination are positive photoblastic in which the phytochrome is
(1) Converted to active form at 660 nm wavelength
(2) Converted to active form at 730 nm wavelength
(3) Converted to inactive form at 660 nm and is present in cytosol
(4) Converted to inactive form at 730 nm and is present in cytosol

5. Which condition is essential for accelerating flowering ability of biennial plants or winter annuals?
(1) Differentiated cells
(2) Anaerobic condition
(3) Low temperature
(4) Reduced availability of nutrients

6. The hormone whose biosynthesis is associated with transfer RNA molecule
(1) IAA (2) ABA
(3) Zeatin (4) GA_7

7. Violaxanthin acts as a precursor molecule for the biosynthesis of
(1) C_2H_4 (2) ABA
(3) Auxin (4) Gibberellin

8. Precursor of the hormone exhibiting prevention of lodging in cereals is
(1) Violaxanthin (2) Methionine
(3) Tryptophan (4) Acetyl CoA

9. Select **correct** statement w.r.t. characteristic of plant growth
a. It shows apparent growth by increase in volume or weight
b. Growth is intrinsic and quantitative
c. Shows diffused growth in higher plants
d. There is increase in number of parts
e. Secondary growth is the feature of all flowering plants
(1) a, b, c
(2) b, d, e
(3) a, b, d
(4) All are correct except e

10. Find **correct** match from column-I and column-II

Column-I (Precursor)	**Column-II (PGR)**
a. Tryptophan	(i) Auxin
b. Acetyl CoA	(ii) CK
c. t-RNA	(iii) GA
d. Methionine	(iv) Ethylene

(1) a(i), b(iii), c(ii), d(iv) (2) a(iii), b(i), c(ii), d(iv)
(3) a(i), b(ii), c(iii), d(iv) (4) a(iv), b(iii), c(ii), d(i)

11. Triple response of seedling when treated with ethylene does not include
(1) Horizontal growth habit
(2) Inhibition of stem elongation
(3) Transverse geotropism and apogeotropism
(4) Delay in ageing

12. Select the hormonal combination which induces shoot differentiation in tobacco callus
(1) High auxin and low cytokinin
(2) High cytokinin and low auxin
(3) High cytokinin and auxin
(4) Equal proportion of auxin and cytokinin

13. Phytochrome is a chromo-protein pigment which is associated with many physiological processes. Select the group of **correct** role
a. Photomorphogenesis
b. Vernalin synthesis
c. Florigen synthesis
d. Stem elongation in genetically dwarf plant
e. Seed germination
f. Chlorophyll synthesis
(1) a, c and e (2) a, c, e and f
(3) c, d and e (4) b, c, d and e

14. The α-amylase induced metabolism in seed can be counteracted by
(1) Gibberellin (2) IAA
(3) Ethylene (4) Abscisic acid

15. Which one of the following events is not an example of differentiation?
(1) Lignocellulosic wall thickening
(2) Formation of cells by apical meristem
(3) Loss of end wall in case of vessel element
(4) Loss of nucleus and perforation of end wall in sieve tube members

16. Vernalization can not be demonstrated in
(1) Dry seeds (2) Germinating seeds
(3) Embryo tips (4) Active meristem

17. There are more than 100 gibberellins reported from
(1) Fungi (2) Higher plants
(3) Both 1 and 2 (4) Prokaryotes

18. Tropic movement is
(1) Curvature movement of variation only
(2) Autonomic curvature movement of growth
(3) Paratonic curvature movement of growth
(4) Paratonic movement of locomotion

19. Amino acid derived hormone formed in juvenile cells and showing membrane associated polar transport is not concerned with one of the following functions, *i.e.*,
(1) Xylem differentiation
(2) Prevention of pre-harvest fruit drop
(3) Richmond Lang effect
(4) Feminising effect

20. Ethylene causes
(1) Horizontal growth of seedlings
(2) Swelling of axis
(3) Apical hook formation in dicot seedlings
(4) More than one option is correct

21. Most widely used PGR in agriculture
a. Is formed from its precursor methionine
b. Can fit in both categories *i.e.* inhibitor and promoter of growth
c. Causes femaleness in *Cucumber*
d. Induces flowering in LDP
(1) a and d are incorrect
(2) b and c are incorrect
(3) a and c are incorrect
(4) Only d is incorrect

22. Hydrotropic movement is more powerful than
(1) Geotropic (2) Phototropic
(3) Chemotropic (4) All of these

23. Gibberellic acid stimulates all **except**
(1) α-amylase activity in seeds
(2) Parthenocarpy
(3) Internode elongation
(4) Prevention of lodging in cereals

24. Cork cambium resembles root vascular cambium in
(1) Being geometric in growth
(2) Being product of dedifferentiation
(3) Being responsible for longitudinal growth
(4) Having similar types of meristematic initial

25. Which among the following statements is **not correct** for phytochrome?
(1) It exists in photoreversible forms
(2) It is blue green chromoprotein
(3) It is only concerned with flowering
(4) It is absent in photosynthetic bacteria

26. Biennials
(1) Are polycarpic plants
(2) Are monocarpic plants
(3) Do not respond to vernalization
(4) More than one option is correct

27. Choose a biennial
(1) Sugarbeet
(2) Carrot
(3) Cabbage
(4) More than one option is correct

28. Lateral axillary buds are not allowed to grow by
(1) Auxin (2) Cytokinin
(3) Gibberellin (4) TIBA

29. Richmond Lang effect due to cytokinin pertains to
(1) Root formation
(2) Apical dominance
(3) Leaf abscission
(4) Delay of senescence

30. 'Stress Hormone' is
(1) ABA (2) Cytokinin
(3) Gibberellin (4) Auxin

ZOOLOGY

[Chapter - 6 : Body Fluids and Circulation]

1. Injection of _____ into the heart results in bradycardia
(1) Epinephrine (2) Acetylcholine
(3) Nor-adrenaline (4) Adrenaline

2. All the veins have deoxygenated blood except
(1) Renal vein only
(2) Pulmonary vein only
(3) Umbilical vein and pulmonary vein
(4) Renal vein and hepatic portal vein

3. If the nerves supplying the human heart are cut, then heart will beat
(1) Rhythmically
(2) Arhythmically
(3) Stop beating
(4) First arythmically followed by rhythmically

4. When atria contract, blood does not enter into pulmonary vein or superior vena cava because
(1) These openings are guarded by semilunar valves
(2) Pulmonary vein has Thebesian valve and superior vena cava has oblique opening
(3) Both pulmonary vein and superior vena cava has oblique openings
(4) Eustachian valve close superior vena cava and semilunar valve close pulmonary vein

5. Find the disorder indicating conduction abnormality
(1) Myocardial infarction
(2) Myocardial ischaemia
(3) Adam's stoke syndrome
(4) Heart attack

6. In foetus, blood from right ventricle is pumped into pulmonary artery. But little amount of this blood reaches non functional foetal lungs. So its maximum blood enters the aorta through _____
(1) Ductus venosus (2) Pulmonary vein
(3) Ductus arteriosus (4) Foramen ovale

7. Find the **incorrect** statement
(1) Composition of lymph is same as that of plasma but has low protein content
(2) Lymph capillaries are more permeable than blood capillaries
(3) Lymph cannot coagulate
(4) Lymph nodes are associated with the lymphatic system of mammals

8. Rheumatic fever is an acute systemic inflammatory disease, it may weaken the entire heart wall but mostly it damages
(1) The tricuspid and bicuspid valves
(2) The bicuspid and aortic valves
(3) The mitral and thebasian valves
(4) Aortic valves and tricuspid valves

9. Which of the following valve/s is/are in contact with only deoxygenated blood?
(1) Eustachius valve (2) Thebesian valve
(3) Tricuspid valve (4) All of these

10. Mark the **incorrect** statement
(1) Thickest chamber of heart is left ventricle
(2) Isovolumetric contraction appear just after dup sound
(3) Pulse rate is same as that of heart beat
(4) Pulse rate can felt in the regions where arteries are present superficially like wrist, neck and temples

11. Normally there is no sugar in the urine although blood entering into kidney have more sugar than the blood leaving the kidney because
(1) Sugar is absorbed in the urinary bladder
(2) Sugar is used up by kidney cells in metabolism
(3) Sugar is absorbed in the proximal convoluted tubule
(4) Sugar is absorbed by Loop of Henle

12. "Greater the heart muscle is stretched during filling, greater will be the quantity of blood pumped into aorta" is
(1) Marey's law (2) Stoke - Adam's law
(3) Bohr effect (4) Frank - starling law

13. The lymphatic vessels of left side begins at the cisterna chyli and it discharges its lymph into the
(1) Left subclavian vein (2) Right subclavian vein
(3) Superior vena cava (4) Inferior vena cava

14. During first rapid filling of heart
(1) Atria contract to force open the AV valves
(2) Atria do not contract
(3) Papillary muscles contract to open up AV valves
(4) Ventricle contract to become empty

15. The link between the AV valves and the papillary muscles of heart is
(1) Columnae carnaeae
(2) Musculi pectinati
(3) Trabeculae carnae
(4) Chordae tendinae

16. A puffy appearance, lack of alertness, intelligence, slow heart rate, low BP and decreased body temperature is caused by
(1) Hyposecretion of thyroxine in children
(2) Deficiency of thyroxine in adults
(3) Deficiency of parathormone
(4) Excessive secretion of aldosterone

17. Insufficient blood supply to heart walls is referred to as
(1) Dextrocardia (2) Ischaemia
(3) Cardiomegaly (4) Atherosclerosis

18. Of the three portal systems, which of the following is/are absent in humans?
(1) Hepatic portal system
(2) Renal portal system
(3) Hypophysial portal system
(4) Both (1) & (2)

19. What is the number of leucocytes per mm^3 of blood ? The leucocytes have been drawn and marked as a, b, c and d.

(1) a – 70 –300 ; b – 4000 – 5000 ; c – 200–700 ; d – 35-150
(2) a – 200–700 ; b – 70–300 ; c – 4000–5000 ; d – 35-150
(3) a – 1500 -2500 ; b – 200-700 ; c – 35-150 ; d – 70-300
(4) a – 70-300 ; b – 35-150 ; c – 4000-5000 ; d – 1500-2500

20. Defective or leaky valves leads to
(1) Murmur (2) Haematoma
(3) Rheumatic fever (4) Ischemia

21. In case, the foramen ovale were not to close after birth; which of the following statement(s) would be correct?
a. Mixing of deoxygenated and oxygenated blood would take place.
b. Blood from left atrium would enter right atrium
c. Blood from right atrium would enter left atrium
(1) a & c
(2) a & b
(3) Only a
(4) There will be no mixing at all

22. Heart sound 'Dupp' is produced during the closure of
(1) Bicuspid valves (2) Tricuspid valves
(3) Semilunar valves (4) Both (1) & (2)

23. Find the disorder indicating conduction abnormality
(1) Myocardial infarction
(2) Myocardial ischemia
(3) Adam's stoke syndrome
(4) Heart attack

24. Right and left atria of the mammalian foetus are connected through
(1) Foramen of magnum (2) Foramen ovale
(3) Fossa ovalis (4) Ductus arteriosus

25. Which of the following statement is incorrect w.r.t. myogenic heart?
(1) Impulse of heart beat develops within the heart
(2) Impulse is generated by a special muscular tissue
(3) Nerve fibres are spread over the heart to bring about contraction and expansion
(4) It will continue to beat for sometime, if detached heart is supplied with proper nourishment and favourable conditions

26. Match the following

	Column I		Column II
a.	Haemorrhoids	(i)	Vessel that supplies blood to other blood vessels
b.	Vasa vasorum	(ii)	Atherosclerosis
c.	Angina pectoris	(iii)	Varicose vein
d.	Coronary artery disease	(iv)	Chest pain

(1) a(iii), b(i), c(iv), d(ii) (2) a(i), b(ii), c(iii), d(iv)
(3) a(ii), b(iii), c(i), d(iv) (4) a(iv), b(i), c(iii), d(ii)

27. The heart beat rate could decrease under which of the following conditions?
(1) Fear, anxiety and depression
(2) Increase in Na and decrease in Ca
(3) Decrease in Na
(4) Decrease in K

28. Thoracic duct begins at the cisternae chyli which is a sac -like dilation situated in front of first and second lumbar vertebrae. It discharges its lymph into
(1) Left sub clavian artery
(2) Right sub clavian vein
(3) Left sub clavian vein
(4) Right sub clavian artery

29. Cardiac output is the amount of blood pumped by heart in
(1) One second (2) One beat
(3) One minute (4) One circulation

30. Which of the following is incorrect?
(1) Carotid artery - Head
(2) Superior mesentric artery - Small intestine
(3) Hypogastric - Spleen
(4) Renal artery - Kidney

31. Pulse pressure is
(1) $\frac{\text{Systolic pressure}}{\text{Diastolic pressure}}$
(2) $\frac{\text{Diastolic pressure}}{\text{Systolic pressure}}$
(3) Systolic pressure – Diastolic pressure
(4) Systolic pressure × Diastolic pressure

32. With reference to electrocardiogram, match the following

	Column I		Column II
a.	P wave	(i)	Depolarization of ventricles
b.	QRS wave	(ii)	Ventricular contraction
c.	ST wave	(iii)	Auricular depolarization

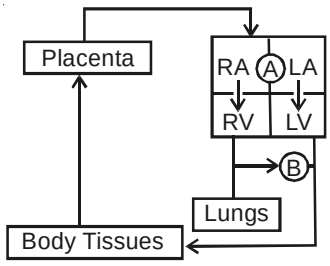
(1) a(ii), b(i), c(iii) (2) a(iii), b(i), c(ii)
(3) a(i), b(ii), c(iii) (4) a(ii), b(iii), c(i)

33. In atrium and ventricle of the same side are separated by the atrio-ventricular septum. Such septum is histologically made up of
(1) Muscular tissue(skeletal)
(2) Muscular tissue(cardiac)
(3) Fibrous tissue
(4) Peritoneum(Squamous epithelial)

34. Heart rate is increased by
a. Excess of calcium ions
b. Fear, anger and anxiety
c. Depression and grief
d. Increased levels of K^+ and Na^+ ions
(1) a & b (2) a, b & c
(3) c & d (4) a, c & d

35. Which of the following is **correct** for stroke volume?
(1) Stroke volume = End diastolic volume – End systolic volume
(2) Stroke volume = End systolic volume + End diastolic volume
(3) Stroke volume = Residual volume
(4) Stroke volume = Volume of blood pumped by heart per min

36. Identify the foetal bypasses A and B in the given diagram of foetal circulation



(1) A – Ductus arteriosus ; B – foramen ovale
(2) A – Foramen ovale ; B – ductus arteriosus
(3) A – Ductus venosus ; B – foramen ovale
(4) A – Foramen ovale ; B – ductus venosus

[Chapter-7 : Excretory Products and their Elimination]

1. If human nephrons were without loop of Henle which of the following would be expected?
(1) No change in the quality and quantity of urine
(2) Urine formation will stop
(3) Urine will be highly concentrated
(4) Urine will be very dilute

2. In ornithine cycle _____ enzyme is concerned with synthesis of urea
(1) Urease
(2) Arginase
(3) Protease
(4) Synthetase

3. The stimulation of which nerve causes contraction of detrusor muscle and relaxation of internal sphincter leading to emptying of urinary bladder?
   (1) Sympathetic nerve
   (2) Somatic nerve
   (3) Pudendal nerve
   (4) Parasympathetic nerve
4. Angiotensinogen is produced by
   (1) Juxtaglomerular cells (2) Liver
   (3) Macula densa (4) Lungs
5. A chordate animal having flame cells as excretory structure is _____
   (1) *Planaria* (2) *Flatworms*
   (3) Prawn (4) Cockroach
6. All the statements about, Atrial Natriuretic factor are correct but one is wrong. Which one is wrong?
   (1) The walls of the atria of heart release ANF in response to an increase in the blood volume and pressure
   (2) ANF can increase GFR
   (3) ANF is released in response to decrease in blood volume and blood pressure
   (4) ANF inhibits the release of renin from the JGA and reduces aldosterone release from adrenal gland
7. Creatine is not produced by
   (1) Children (2) Pregnant woman
   (3) Starving person (4) Normal males
8. With the help of which covering membrane kidney is anchored to the abdominal wall?
   (1) Renal capsule (2) Adipose capsule
   (3) Renal fascia (4) Peritoneum
9. Renal calculi are mainly formed of
   (1) Uric acid (2) Calcium sulphate
   (3) Calcium oxalate (4) Creatinine
10. If renal plasma flow is 1000 ml/min and filtration fraction is 24%. What will be glomerular filtration rate per hour?
   (1) 240 ml (2) 125 ml
   (3) 14.4 ml (4) 14.4 lit.
11. Choose the correct statement regarding the flow of filtrate
   (1) Collecting duct → Collecting tubule → Duct of Bellini → Papillary duct → Minor calyx
   (2) Duct of Bellini → Collecting tubule → Collecting duct → Papillary duct → Minor calyx
   (3) Collecting tubules → Collecting duct → Duct of Bellini → Papillary duct → Minor calyx
   (4) Collecting tubules → Collecting duct → Duct of Bellini → Papillary duct → Major calyx → Minor calyx
12. Hippuric acid a waste metabolite of mammals produced from
   (1) Carbohydrates
   (2) Proteins + glycine
   (3) Benzoic acid + glycine
   (4) Nucleic acid + glycine
13. In urea cycle/ornithine cycle, all occur **except**
   (1) Ornithine converted into citrulline
   (2) Arginine converted into ornithine
   (3) Argininosuccinate converted into arginine
   (4) The two nitrogen atoms that are incorporated into the urea cycle as ammonia and alanine
14. If in an animal GFR is 110 ml/min and RPF is 990 ml/min. Its filteration fraction is
   (1) 10% of RPF (2) 11.11% of RPF
   (3) 16% of RPF (4) 0.9% of RPF
15. If an osmoregulator is placed in fresh water which of the following will not occur?
   (1) Pass out dilute urine
   (2) As a general rule, do not drink water
   (3) Ionocytes release salts to outside actively
   (4) Both (1) & (2)
16. Sympathetic stimulation of the kidneys
   (1) Results in the dilation of the afferent arterioles
   (2) Decreases blood flow to the glomerulus
   (3) Increases the glomerular filtration rate
   (4) Increases glomerular permeability
17. Under which of the following condition there will be presence of abnormally high ketone bodies in urine?
   (1) Excessive breakdown of proteins
   (2) Excessive breakdown of nucleic acids
   (3) Starvation and diabetes mellitus
   (4) Fasting and diabetes insipidus
18. Ornithine transcarbamoylase of the 'Krebs-Henseleit Cycle" catalyzes
   (1) Synthesis of carbamoyl phosphate by condensation of NH_4^+ and CO_2
   (2) Synthesis of citrulline from carbamoyl phosphate
   (3) Condensation of ornithine with asparate to produce arginosuccinate
   (4) Formation of urea and resynthesis of ornithine from arginine
19. Malphigian tubules are the main excretory structures in
   (1) Crab (2) Silver fish
   (3) *Planaria* (4) Lobster
20. Juxtaglomerular apparatus is a mechanism for the autoregulation of glomerular filtration rate. It is formed by cellular modifications in _____ at the location of their contact

(1) Afferent arteriole and proximal convoluted tubule
(2) Afferent arteriole and distal convoluted tubule
(3) Efferent arteriole and proximal convoluted tubule
(4) Afferent arteriole and collecting ducts

21. Which of the following statements is incorrect about the PCT of a nephron?
(1) It is lined by simple cuboidal brush bordered epithelium
(2) PCT helps to maintain the pH and ionic balance of the body fluids
(3) 70-80% of electrolytes and water are reabsorbed in the peritubular capillaries around this segment
(4) Selective absorption of hydrogen ions, ammonia and potassium ions occurs in this segment

22. Excessive intake of proteins in food will result in an increase in
(1) Production of urea
(2) Transamination reaction
(3) Deamination reactions
(4) All of these

23. Out of all the parts of a nephron, least amount of reabsorption occurs in
(1) PCT (2) Loop of Henle
(3) DCT (4) Collecting duct

24. Which of the following events does not occur in case of a fall in glomerular blood flow?
(1) Release of ADH from neurohypophyses, causing vasoconstriction
(2) Release of renin from juxtaglomerular cells
(3) Stimulation of adrenal cortex by angiotensin II
(4) Release of ANF from atrium and subsequent vasodilation

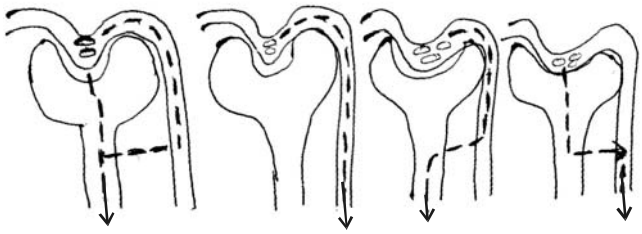
25. An adult human, on an average excretes 1 to 1.5 litres of urine per day. The total amount of urea excreted out in this process is approximately
(1) 10 - 18 mg (2) 25 - 30 g
(3) 30 - 35 mg (4) 180 mg

26. Presence of ketone bodies in urine is an indicative of
(1) Diabetes insipidus (2) Diabetes mellitus
(3) Alkaptonuria (4) Uremia

27. In Krebs-Hanseleit cycle, the enzyme that leads to production of urea is
(1) Uricase (2) Urease
(3) Arginase (4) Xanthine oxidase

28. Form of nitrogenous waste which is completely insoluble and does not require any water for its removal, it is the excretory product of spider?
(1) Hippuric acid (2) Creatinine
(3) Allantoin (4) Guanine

29. Ultrafiltration, reabsorption and tubular secretions are the steps of excretion. These have been diagrammatically represented (a,b,c and d). Find out the chemicals given in the box, which undergo these processes.



(a) (b) (c) (d)

Glucose, Inulin, PAH, Sulphate, Fat

(1) a – PAH ; b – Fat ; c – Sulphate ; d–Glucose
(2) a – Fat ; b – PAH ; c – Glucose ; d–Sulphate
(3) a – Glucose ; b – PAH ; c – Sulphate ; d–Fat
(4) a – Inulin ; b – Fat ; c – PAH ; d – Glucose

30. Which of the following is correct in case of dehydration?
(1) RPF will increase
(2) GFR will decrease
(3) FF will remain unchanged
(4) GFR and FF will increase

31. The part of nephron in which nephric filtrate is not isotonic to blood plasma is
(1) Bowman's capsule
(2) Proximal convoluted tubule
(3) Descending limb of loop of Henle
(4) All of these

32. In some marine fishes and desert amphibians, the nephrons lack a well developed glomerulus. So, formation of urine in them mostly occurs by
(1) Ultrafiltration
(2) Tubular secretion
(3) Tubular reabsorption
(4) Counter-current mechanism

33. During micturition
(1) Urinary bladder is relaxed and urethral sphincter contract
(2) Bladder contracts and urethral sphincters are relaxed
(3) Both urinary bladder & urethral sphincter contract
(4) Both urinary bladder & urethral sphincter relax

34. Find out the incorrect statement
(1) Human kidney can produce urine four times concentrated than the initial filtrate
(2) A fall in glomerular blood flow can activate the juxta glomerular cells to release renin
(3) ANF is vasoconstrictor and angiotensin is vasodilator
(4) ADH is synthesised by hypothalamus

35. Diluting segment of nephron is
(1) PCT
(2) DCT
(3) Ascending limb of nephron
(4) Descending limb of nephron

36. Maximum obligatory water reabsorption takes place in
(1) Loop of Henle (2) PCT
(3) DCT (4) Collecting duct

37. Which statement is **correct**
(1) Cortical nephrons are less in kidney than Juxta medullary nephron
(2) The descending limb of loop of Henle is permeable to salt but almost impermeable to water
(3) Tubular secretion of hydrogen and potassium ions occur in DCT
(4) The Henle's loop and vasa recta play a significant role in dilution of urine

38. Presence of RBC in urine is
(1) Glycosuria (2) Uraemia
(3) Haematuria (4) Polyuria

39. Duct of Bellini is formed by the union of several
(1) Junctional tubules (2) Collecting ducts
(3) Efferent arterioles (4) Pars recta

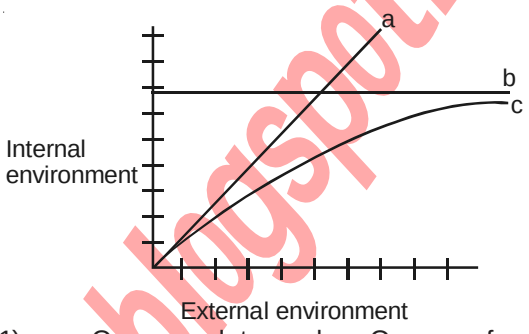
40. Which of the following can't be taken as a differentiating point for cortical nephrons when compared with Juxtamedullary nephrons?
(1) They are more abundant than Juxtamedullary nephrons
(2) They control plasma volume when water supply is normal while Juxtamedullary nephrons function when water supply is short
(3) Their loop of Henle is shorter than that of Juxta-medullary nephrons
(4) Their vasa recta is longer than that of Juxtamedullary nephrons

41. During Ultrafiltration water and many dissolved substances are filtered into the lumen of Bowman's capsule through its walls. Which of the following is not a part of glomerular filtrate?
(1) Na^+ (2) Amino acids
(3) Glucose (4) Proteins

42. The release by ADH takes place from hypothalamus when
(1) The osmolarity of blood increases
(2) The osmolarity of blood decreases
(3) Blood volume increases
(4) Urine becomes hypertonic

43. Consider the following
a. Release of aldosterone from adrenal gland
b. Absorption of more Na^+ and water from DCT
c. Release of renin from JG cells
d. Conversion of angiotensinogen to angiotensin II
Select the proper sequence of event taking place during operation of RAAS
(1) d, c, a & b (2) c, d, a & b
(3) c, a, d & b (4) a, c, d & b

44. Identify the organisms a, b and c according to their ability to adjust osmolarity of body fluid as compared to the external medium.



(1) a – Osmoregulators ; b – Osmoconformers ; c – Partially osmoregulators
(2) a – Osmoregulators ; b – Partially osmoregulators; c – Osmoconformers
(3) a – Osmoconformers ; b – Osmoregulators ; c – Partially osmoregulators
(4) a – Partially osmoregulators ; b – Osmoconformers; c – Osmoregulators

45. The parietal layer of Bowman's capsule consists of
(1) Non-specialised simple squamous epithelium
(2) Podocytes
(3) Brush bordered cuboidal epithelium
(4) Brush bordered columnar epithelium

46. Which part of nephron is impermeable to water but permeable to K^+, Cl^- and Na^+ and partially permeable to urea?
(1) PCT
(2) DCT
(3) Descending limb of loop of Henle
(4) Ascending limb of loop of Henle

47. Which of the following component of glomerular filterate are reabsorbed by secondary active transport in PCT?
(1) Sodium and potassium
(2) Glucose and amino acid
(3) Water
(4) Sulphates

48. In a man, a tumour is pressing on and obstructing the left ureter, what effect might this have on GFR of both the kidneys?
(1) GFR falls in both the kidneys
(2) GFR increases in both the kidneys
(3) GFR decreases in left kidney and GFR in right kidney remain normal
(4) GFR decreases in left kidney and increases in right kidney

49. Sympathetic stimulation
(1) Increases GFR (2) Decreases GFR
(3) GFR remains same (4) Increases micturition

50. Which of the following step of urine formation is non selective process?
(1) Glomerular filteration (2) Tubular reabsorption
(3) Tubular secretion (4) Both (2) & (3)

51. Hormones that cause vasodilation and increased renal blood flow tends to
(1) Decrease GFR
(2) Decrease glomerular hydrostatic pressure
(3) Increase capsular hydrostatic pressure
(4) Increase GFR

52. Choose the correct statement
(1) During summers when there is high temperature there is more sweating and loss of water so there is less urine output
(2) Cartilaginous fishes retain urea in blood, so that the osmolarity of body fluids is almost the same as that of sea water
(3) In adult person, voluntary control of micturition is developed
(4) All statements are correct

53. Tubular reabsorption involve all the following features except
(1) It involves the reabsorption of high & low threshold substances like glucose, amino acids
(2) It decreases volume of glomerular filtrate
(3) It takes place by only active transport
(4) All of these

54. Inflammation of urinary bladder is
(1) Renal calculi (2) Cystitis
(3) Bright's disease (4) Polynephritis

55. Podocytes are present in the
(1) Visceral layer of Bowman's capsule
(2) Parietal layer of Bowman's capsule
(3) Wall of peritubular capillary
(4) Wall of glomerulus

56. When a person is suffering from poor renal absorption, which one of the following will not help in maintenance of blood volume?
(1) Decreased glomerular filtration
(2) Increased ADH secretion
(3) Decreased arterial pressure in kidney
(4) Increased arterial pressure in kidney

57. In which part of the excretory system of mammals you can first use the term urine?
(1) Bowman's capsule (2) Loop of Henle
(3) Collecting tubule (4) Urinary bladder

58. Which part of brain is supposed to be damaged if in an accident a person has lost control of water balance, hunger and body temperature?
(1) Cerebellum (2) Cerebrum
(3) Hypothalamus (4) Medulla

59. Excessive secretion of renin may lead to
(1) Hypertension
(2) Excessive water loss
(3) Excessive salt loss
(4) Excessive glucose lose

[Chapter- 8 : Locomotion and Movement]

1. Mark the phosphagen involved in the muscle contraction in case of invertebrates
(1) Creatine phosphate
(2) Arginine phosphate
(3) Calcium phosphate
(4) Magnesium phosphate

2. During muscle contraction following events occur
a. Binding of Ca^{++} with troponin C of actin filaments and thereby remove the masking of active sites for myosin
b. Release of acetylcholine at neuromuscular junction which generate action potential in the sarcolemma
c. By utilising the energy from hydrolysis of ATP myosin head binds to exposed active site of actin forming the cross bridge
d. Releasing the ADP and P_i from myosin it goes back to relaxed state
Mark the correct sequence
(1) b, a, c, d (2) b, c, a, d
(3) a, b, c, d (4) b, c, d, a

3. Mark the **incorrect** statement
(1) Pushing an immovable object is an example of isometric contraction
(2) Striated muscle fibres follow, 'All or None Law'
(3) When we apply repeated stimuli to single muscle fibre the kymograph records a staircase like graph is called treppe
(4) Reduction in the force of contraction of a muscle after prolonged stimulation is called oxygen debt

4. Which of the following is incorrect?
(1) Atlas - Odontoid facet
(2) Deltoid ridge - Humerus
(3) Olecranon process - Humerus
(4) Glenoid cavity - Scapula

5. Time period between recieving the stimulus and beigning of contraction is called
(1) Contraction time (2) Relaxation time
(3) Latent period (4) Refractory period

6. Muscles are able to convert
(1) Chemical energy into light energy
(2) Chemical energy into mechanical energy
(3) Chemical energy into electrical energy
(4) Mechanical energy into chemical energy

7. Mark the **incorrect** match
(1) Tetany - Rapid spasm (wild contraction) in muscle due to high Ca^{++} in body fluid
(2) Muscular dystrophy - Progressive degeneration of skeletal muscle mostly due to genetic disorder
(3) Myasthenia gravis - Autoimmune disorder affecting neuromuscular junction leading to fatigue weakning and paralysis of skeletal muscle
(4) Bursitis - Bursa of joints often become inflamed

8. In case of hypertrophy there is increase in muscle mass due to increase in
(1) Number of myofibrils in muscle fibres
(2) Number of muscle fibre
(3) In amount of sarcoplasm
(4) Both (1) & (3)

9. In a muscle fibre, Ca^{++} is stored in
(1) Sarcoplasm
(2) Sarcosome
(3) Sarcoplasmic reticulum
(4) Troponin protein

10. Match the column I with column II

	Column I		**Column II**
a.	Vertebra prominens	(i)	Humerus
b.	Olecranon process	(ii)	Ulna
c.	Odontoid process	(iii)	Axis vertebra
d.	Deltoid ridge	(iv)	7^{th} cervical vertebra

(1) a(iv), b(iii), c(ii), d(i) (2) a(iii), b(iv), c(ii), d(i)
(3) a(iv), b(ii), c(iii), d(i) (4) a(i), b(ii), c(iii), d(iv)

11. Obturator foramen, the characteristic feature of pelvic girdle lying below the acetabulum is bounded by
(1) Ilium, Ischium and Pubis
(2) Ischium and Pubis
(3) Ilium and Pubis
(4) Pubis only

12. Which part of a sarcomere is formed only by myosin myofilament in a relaxed state?
(1) Isotrophic band (2) Anisotrophic band
(3) O band (4) H zone

13. Mark the **correct** statement w.r.t. isometric contraction
(1) There is no change in length of muscle, due to stretching of elastic fibres
(2) Length of the muscle remains the same but force of contraction keeps on increasing
(3) Pushing the immovable object is an example of isometric contraction
(4) All are correct

14. Which of the following is incorrect w.r.t. red muscle fibre when compared to white muscle fibre?
(1) They are dark red due to the presence of myoglobin
(2) They are rich in mitochondria
(3) These muscle fibres have fast rate of contraction
(4) Muscles on the back of human body are rich in red muscle fibre

15. During relaxation of the muscle which of the following do not occur?
(1) Ca^{++} ions pumped back to sarcoplasmic reticulum
(2) Actomyosin breaks down to form actin and myosin
(3) Return of Z lines back to the original position
(4) Decrease in the length of thin myofilaments

16. A person suffering from myasthenia gravis an auto immune disorder affecting neuromuscular junction leading to fatigue, weakening and paralysis of skeletal muscle. To increase the muscle strength he/she should be treated by
(1) Acetycholinesterase inhibitor
(2) Calmodulin
(3) Colchicine
(4) Both (2) & (3)

17. Gap junction between fibres will be present in
(1) Skeletal muscle (2) Smooth muscle
(3) Cardiac muscle (4) Both (2) & (3)

18. At the time of tetanic contraction in skeletal muscle fibre which of the following ions increases and remains at high level in intracellular fluid?
(1) Na^{+} (2) K^{+}
(3) Ca^{++} (4) Calmodulin

19. Which of the following acts as a shock absorber to cushion the joint between tibia and the femur?
(1) Cartilage (2) Ligament
(3) Tendon (4) Disc

20. Human body resting on toes is an example of second class lever. Mark the **correct** choice representing fulcrum, effort and resistance, in this
(1) Fulcrum – Resistance – Effort
(2) Resistance – Fulcrum – Effort
(3) Resistance – Effort – Fulcrum
(4) None of the above is correct

21. Match the column I with column II

	Column I		**Column II**
a.	Deltoid ridge	(i)	Ulna
b.	Odontoid process	(ii)	Axis vertebra
c.	Olecranon process	(iii)	Humerus
d.	Greater trochanter	(iv)	Femur

(1) a(ii), b(i), c(iii), d(iv) (2) a(iv), b(ii), c(i), d(iii)
(3) a(iii), b(i), c(ii), d(iv) (4) a(iii), b(ii), c(i), d(iv)

22. Costal cartilage of vertebro chondral ribs are attached with
(1) Sternum
(2) 7^{th} vertebro sternal rib
(3) Thoracic vertebrae
(4) 11^{th} rib (floating rib)

23. Which of the following diseases is diagnosed by presence of IgM and involve inflammation of synovial membrane?
(1) Osteoarthritis (2) Rheumatoid arthritis
(3) Gouty arthritis (4) Bursitis

24. Which of the following bone is not a component of olfactory capsule?
(1) Nasal bone (2) Vomer bone
(3) Zygomatic bone (4) Maxillary bone

25. According to sliding filament model of muscle contraction, the structure that slides to shorten a sarcomere are
(1) Actin (2) Collagen
(3) Myosin (4) Creatine phosphate

26. Which of the following statement is **not** correct in respect to muscular contraction in smooth muscles?
(1) Latent period is long and contraction process is slow, relaxation is also slow
(2) Smooth muscles have comparatively short muscle twitch period i.e. about 1 to 3 seconds
(3) The Ca^{+2} ion are also obtained from the extracellular fluid
(4) Calmodulin functions like Ca^{++} receptor in binding with it

27. During muscle contraction according to the sliding filament mechanism, the part of sarcomere which increases in size/length is
(1) A-band (2) I-band
(3) O-band (4) H-zone

28. Sutures are the end-to-end fusions of flat cranial bones. Structurally, they belong to the category of
(1) Synovial joints (2) Fibrous joints
(3) Amphiarthrose joints (4) Cartilaginous joints

29. An autoimmune disorder affecting neuromuscular junctions and leading to fatigue, weakening and paralysis of muscles is
(1) Muscular dystrophy (2) Muscular tetany
(3) Myasthenia gravis (4) Poliomyelitis

30. Overactivity of xanthine oxidase enzyme will lead to a type of arthritis known as
(1) Osteoarthritis (2) Rheumatoid arthritis
(3) Gouty arthritis (4) Both (1) & (2)

31. Foramen transversarium is a pore present in the transverse processes of cervical vertebrae and is meant for the passage of vertebral artery. The cervical vertebra which lacks this foramen is
(1) Axis
(2) Atlas
(3) Seventh cervical vertebra
(4) Sixth cervical vertebra

32. Which of the following is **incorrect** match?
(1) Pivot joint : Between atlas and axis
(2) Saddle joint : Between carpal and metacarpal of thumb
(3) Hinge : Between first vertebra *i.e.*, atlas and occipital condyles
(4) Gliding : Between the carpals

33. Attached to the inner surface of the tympanic membrane is _____
(1) Head of malleus
(2) Handle of malleus
(3) Incus, serving as pivot point
(4) Stapes

34. The myosin heads in skeletal muscles bind to the exposed active sites on actins to form cross bridges. Active sites on actins become free when Ca^{2+} ions bind to a unit of _____, removing the inhibitory complex
(1) Troponin (2) Tropomyosin
(3) Calmodulin (4) Calsequestrin

35. If a small piece of bone breaks off fully from the bone but remains attached to the ligament, it is
(1) Comminuted fracture
(2) Evulsive fracture
(3) Compound fracture
(4) Green stick fracture

36. Which of the following ions play a key role in muscle contraction?
(1) Na^+, Ca^{++} (2) Na^+, K^+
(3) Ca^{++}, K^+ (4) Ca^{++}, Mg^{++}

37. Which of the following is correct vertebral formulae of human?
(1) $C_7T_{12}L_5S_{(4)}C_{(3)}$ (2) $C_8T_{12}L_5S_{(4)}C_{(5)}$
(3) $C_7T_{12}L_5S_{(5)}C_{(4)}$ (4) $C_7T_{12}L_5S_{(5)}C_{(5)}$

38. Type of joint present between two zygapophyses of adjacent vertebrae is
(1) Gliding joint (2) Cartilaginous joint
(3) Hinge joint (4) Fibrous joint

39. Which of the following curves of spinal cord are called as secondary curves?
(1) Cervical, thoracic (2) Thoracic, lumbar
(3) Thoracic, pelvic (4) Cervical, lumbar

40. The joint between atlas and axis is
(1) Gliding joint (2) Hinge joint
(3) Pivot joint (4) Saddle joint

41. Number of floating ribs in human are
(1) 2 (2) 4
(3) 12 (4) 24

42. Dicondylic skull is found in
(1) Birds, Amphibians (2) Amphibians, Fishes
(3) Amphibians, Mammals (4) Birds, Reptiles

43. Number of sacral bones in embryo are
(1) 4 (2) 5
(3) 1 (4) 26

44. The ion that must be present to initiate binding of the cross bridges in muscle fibre is
(1) Ca^{2+} (2) Na^{+}
(3) Fe^{2+} (4) Mn^{2+}

45. Obturator foramen is found in
(1) Pectoral girdle (2) Pelvic girdle
(3) Humerus bone (4) Femur bone

46. Name the type of joint between pubic bones in the pelvic girdles
(1) Fibrous joint (2) Cartilaginous joint
(3) Hinge joint (4) Pivot joint

47. Choose the **incorrect** statement w.r.t. smooth muscle
(1) They are involuntary, non-striated and innervated by autonomic nervous system
(2) Gap junction between fibres are present in multiunit smooth muscle
(3) The regulatory proteins for contraction are calmodulin and myosin light chain kinase
(4) Transverse tubules are absent in smooth muscle

48. Which of the following binds to the myosin head during its detachment from actin?
(1) Ca^{2+} (2) Mg^{2+}
(3) ATP (4) ADP

49. Thick myofilament, myosin consist of_____ polypeptide chains
(1) 2 (2) 4
(3) 6 (4) 8

50. Motor end plate is related to
(1) Sarcosome (2) Sarcoplasm
(3) Sacroplasmic reticulum (4) Sarcolemma

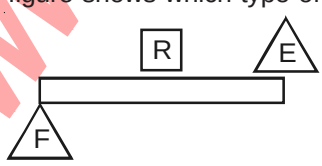
51. Which of the following is **incorrect** w.r.t. cardiac muscles?
(1) Autorhythmicity
(2) Long refractory period
(3) Considerable capacity for regeneration
(4) Gap junctions

52. Cori's cycle occurs between
(1) Liver and kidney (2) Kidney and muscles
(3) Liver and heart (4) Muscles and liver

53. Cori's cycle is associated with
(1) Lactic acid metabolism
(2) Fatty acid metabolism
(3) Protein metabolism
(4) Steroid metabolism

54. Which of the following is a synarthroses type of joint?
(1) Shoulder joint
(2) Gomphoses
(3) Joint in between carpals
(4) Joint between sternum and clavicle

55. Following figure shows which type of lever system?



(1) First class lever (2) Second class lever
(3) Third class lever (4) Zero class lever

56. Mark the mismatched pair
(1) Ellipsoid joint - Metacarpo - Phalangeal Joint
(2) Pivot joint - Radio - Ulnar joint
(3) Hinge joint - Elbow joint
(4) Saddle joint - Carpometacarpal joint of index finger

57. Number of unpaired bones in the cranium is
(1) 1 (2) 2
(3) 3 (4) 4

58. Which of the following is not the correct set of antagonistic muscle?
(1) Adductors and abductors
(2) Pronators and supinators
(3) Elevators and levators
(4) Sphincters and dilators

59. The inability of a muscle to maintain force of contraction after prolonged activity is called
(1) Muscle tone (2) Muscle tetanus
(3) Muscle fatigue (4) Muscle twitch

60. Even when muscle are at rest a certain amount of contraction/tautness usually remains. This is called
(1) Muscle treppe (2) Muscle twitch
(3) Muscle tetany (4) Muscle tone

61. The number of T-tubules per sarcomore in striated muscle are
(1) 2 (2) 4
(3) 8 (4) 16

62. The figure shows different types of centra of vertebrae. Identify them and relate them with the animals in which such centra are found.

(1) (a) – 9th vertebra of frog, (b) – Vertebra of rat, (c)– Vertebra of Salamander, (d) – 8th vertebra of frog
(2) (a) – 8th vertebra of frog, (b) – Typical vertebra of mammal, (c) – Typical vertebra of Salamander, (d) – 9th vertebra of frog
(3) (a) – Typical vertebra of fish, (b) – Typical vertebra of Salamander, (c) – 8th vertebra of frog, (d) – Typical vertebra of frog
(4) (a) – Typical vertebra of frog, (b) – Typical vertebra of mammal, (c) – 8th vertebra of frog, (d) – 9th vertebra of frog

63. The foraman magnum is present in inferior part of which cranial bone?
(1) Sphenoid bone (2) Ethmoid bone
(3) Temporal bone (4) Occipital bone

1. Visual for near objects accommodation involves
   (1) Increased tension on the lens ligaments
   (2) A decrease in the curvature of the lns
   (3) Relaxation of the sphincter muscle of the iris
   (4) Contraction of the ciliary muscle
2. Scala vestibuli is connected with scala tympani by
   (1) Fenestra rotundus (2) Fenestra ovalis
   (3) Helicotrema (4) Lamina spiralis
3. Which of the following is cholinergic and unmyelinated?
   (1) Pre-ganglionic parasympathetic fibres
   (2) Post-ganglionic parasympathetic fibres
   (3) Pre-ganglionic sympathetic nerves
   (4) Post-ganglionic sympathetic nerves
4. Each sympathetic ganglion is connected to the spinal nerve by
   (1) Gray ramus communicans
   (2) White ramus communicans
   (3) Ramus dorsalis
   (4) Ramus ventralis
5. Which is the neurotransmitter within the ganglia for sympathetic and parasympathetic nervous system?
   (1) Nor-adrenaline and acetylcholine respectively
   (2) Acetylcholine for both
   (3) Acetylcholine and adrenaline respectively
   (4) Adrenaline for both
6. Which of the following areas in cerebral cortex are responsible for complex functions like intersensory associations, memory and communication and makes maximum part of cortex?
   (1) Motor areas
   (2) Sensory areas
   (3) Somato-sensory areas
   (4) Association areas
7. In case of inhibitory chemical synapse or generation of inhibitory post synaptic potential (IPSP), which of the following channels are never open?
   (1) Na^+ channels (2) K^+ channel
   (3) Cl^- channel (4) Both (2) & (3)
8. Which of the following cranial nerve can protect us by warning about harmful chemicals in the air?
   (1) Olfactory (2) Trigeminal
   (3) Vagus (4) Seventh
9. Lack of green cone in an individual is known as
   (1) Protanopia (2) Deuteranopia
   (3) Tritanonopia (4) Chloranopia
10. An inhibitory post-synaptic potential
    (1) Depolarises the post-synaptic membrane by opening of Na^+ channels
    (2) Depolarises the post-synaptic membrane by opening of K^+ channels
    (3) Hyperpolarises the post-synaptic membrane by opening of Ca^{2+} channels
    (4) Hyperpolarises the post-synaptic membrane by opening of Cl^- channels
11. A fight or flight response in the body is controlled by the
    (1) Sympathetic division of the nervous system
    (2) Parasympathetic division of the nervous system
    (3) Release of ACh from post-ganglionic neuron
    (4) Somatic nervous system
12. Pacinian corpuscles which occur in the skin are
    (1) Free sensory nerve endings
    (2) Specialised cells at the end of the sensory nerve fibre
    (3) A type of gland
    (4) Encapsulated pressure and vibration receptors deep in the dermis
13. Which of the following is not involved in accommodation process for near objects?
    (1) Curvature of the lens increases
    (2) Size of the pupil is reduced
    (3) Radius of curvature of the lens decreases
    (4) Focal length of the lens is increased
14. Synaptic delay results from
    (1) An exhaustion in neurotransmitter
    (2) The time taken in releasing the neurotransmitter and stimulating the next neuron
    (3) Divergence of impulse
    (4) Repeated transmission of the impulse at the synapse
15. Where are the taste-buds for tasting chillies, black pepper and 'hot' sauces are present?
    (1) Tip of the tongue
    (2) Vallate papillae
    (3) Fungiform papillae
    (4) No taste buds for tasting 'chillies'
16. All the following statements are correct, but one is wrong. Which one is **wrong**?
    (1) The neurotransmitter within the ganglion is acetylcholine for both sympathetic and parasympathetic nerves
    (2) Pre-ganglionic sympathetic fibre directly supplies the medulla and is cholinergic
    (3) The post-ganglionic sympathetic fibre that terminates on sweat gland is adrenergic
    (4) The post-ganglionic parasympathetic fibre are cholinergic

17. Which of the following cells can sharpen the perception of contrast between light and dark patterns falling on the retina?
(1) Purkinje cells (2) Muller cells
(3) Amacrine cells (4) Cone cells

18. The oily secretion from _____ glands helps to keep the eyelids from adhering to each other
(1) Moll (2) Meibomian
(3) Zeis (4) Harderian

19. The membrane that gives us the ability to discriminate different pitches of sound is the
(1) Round window (2) Tympanic membrane
(3) Tectorial membrane (4) Basilar membrane

20. Which part of the ear is mainly related to sense of dynamic equilibrium?
(1) Utriculus (2) Sacculus
(3) Semicircular ducts (4) Cochlea

21. Cranial nerve having gasserian ganglia is
(1) Trochlear nerve (2) Trigeminal nerve
(3) Vagus nerve (4) Facial nerve

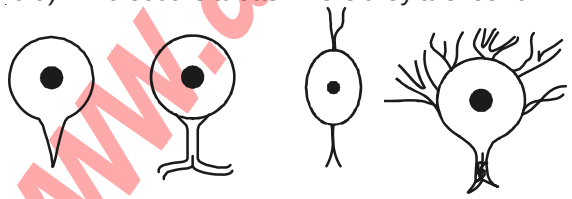
22. Ascending nerve tracts conduct sensory impulses towards brain through
(1) Dorsal funiculi (2) Lateral funiculi
(3) Ventral funiculi (4) Both (2) & (3)

23. If Bowman's gland is removed, the persons may suffer from
(1) Ageusia (2) Anosmia
(3) Agnosia (4) Alexia

24. Speed of nerve impulse can be increased by the following except one, mark the except one
(1) Increase in diameter of axon
(2) Increase in temperature
(3) Wrapping of insulation cover like myelin sheath
(4) Removing the insulation cover like myelin sheath

25. A nerve fibre can transmit impulse in response to threshold stimulus at about
(1) 10 impulse per second
(2) 100 impulse per second
(3) 1000 impulse per second
(4) 10000 impulse per second

26. Following figures show different types of neurons (a,b,c and d). Find out the areas where they are found.



(a) (b) (c) (d)

(1) a – Retina ; b – Olfactory epithelium ; c – CNS ; d– Ganglia of ANS
(2) a – Ganglia of ANS ; b – CNS ; c – Retina d– Schneiderian membrane
(3) a – Early embryo ; b – Dorsal root ganglion of spinal cord ; c – Retina ; d–CNS
(4) a – Taste bud ; b – Schneiderian membrane ; c – Retina ; d– CNS

27. Mark the correct sequence showing the flow of cerebrospinal fluid
(1) Diocoel → Paracoel → metacoel → Subarachnoid space
(2) Paracoel → Diocoel → Subarachnoid space → metacoel
(3) Diocoel → metacoel → foramen of Magendie → subarachnoid space
(4) Diocoel → metacoel → foramen of magnum → sub arachnoid space

28. Mark the correct match
(1) Ruffini corpuscles – Respond to cold
(2) Krause's corpuscles – Excited by heat
(3) Pacinian corpuscles – Sensitive to pressure
(4) Merkel's disc – Sensitive to pain

29. In which of the following period a stimulus, whatever may be its strength, will not excite the nerve fibre?
(1) Absolute refractory period
(2) Relative refractory period
(3) Normal refractory period
(4) Latent period

30. Hormones which interact with membrane-bound receptors normally, and do not enter the target cell, but generate second messengers which in turn regulate cellular metabolism are all, **except**
(1) Insulin (2) FSH
(3) Cortisol (4) Epinephrine

31. The atrial wall of our heart secretes a very important peptide hormone called atrial natriuretic factor (ANF). Which of the following is not a function of ANF?
(1) Dilation of the afferent arteriole to increase GFR
(2) Decrease in blood pressure
(3) Vasoconstriction
(4) Decrease in blood volume

32. Which of the following serves as a second messenger, slowing muscle contraction in response to acetylcholine?
(1) c-AMP (2) c-GMP
(3) Calcium (4) DG

33. Which of the following method is applied during origin of nervous system in invertebrates?
(1) Cell splitting and migration method
(2) Cell migration and invagination method
(3) Invagination process
(4) Both (1) & (2)

34. Which of the following lobe of brain is associated with decoding and interpretation of sound, language comprehension, smell, memory and emotion?
(1) Frontal lobe (2) Parietal lobe
(3) Temporal lobe (4) Occipital lobe

35. Which of the following disease is caused due to degeneration of GABA secreting neurons of corpus striatum and acetylcholine secreting neurons of other parts?
(1) Paralysis agitans
(2) Parkinson's disease
(3) Huntington's chorea
(4) Multiple sclerosis

36. Which of the following is **not** correctly matched?
(1) Ataxia — Lacks of muscle co-ordination
(2) Dyslexia — Inability of an individual to comprehend written language
(3) Wilson's disease — Hepatico-lenticular disease
(4) Alzheimer's disease — An inability to speak influent sentences although the person has no problem in understanding written or spoken words

37. Which of the following is not the characteristic of chemical synapse?
(1) Commonest type of synapse
(2) Requires neurotransmitter
(3) It cannot be regulated
(4) Does not allow the two way transmission of impulses

38. Which one of the following is **correct** w.r.t. travelling of sound in ear?
(1) External sound → Malleus → Stapes → Incus → Fenestra ovalis → Scala media → Scala vestibuli → Scala tympani → Fenestra rotunda → Middle ear → Out
(2) External sound → Tympanic membrane → Ear ossicles → Fenestra ovalis → Scala vestibuli → Helicotrema → Scala Tympani → Fenestra rotunda → Middle ear → Out
(3) External sound → Ear ossicles → Fenestra rotunda→ Scala vestibuli → Scala Tympani → Scala media → Fenestra rotunda → Middle ear → Out
(4) Both (1) & (3)

39. Ventral root of spinal cord is composed of
(1) Somatic motor and visceral sensory fibres
(2) Somatic sensory and visceral sensory fibres
(3) Somatic motor and visceral motor fibres
(4) Somatic sensory and visceral motor fibres

40. Which of the following is called as thoraco-lumbar outflow?
(1) Autonomic nervous system
(2) Sympathetic nervous system
(3) Parasympathetic nervous system
(4) Somatic neural system

41. Which of the following is **not** a part of knee jerk reflex?
(1) Afferent pathway (2) Muscle spindle
(3) Efferent pathway (4) Interneuron

42. During depolarisation there is
(1) Closure of voltage gated Na^+ and K^+ channels
(2) Opening of voltage gated Na^+ channel and voltage gated K^+ channel still closed
(3) Opening of voltage gated K^+ ion channel and closure of Na^+ channel
(4) Exit of K^+ ions

43. Which of the following is incorrect regarding Huntington's chorea?
(1) Loss of intrastriatal GABAergic system and cholinergic system of nigra striata
(2) Autosomal dominant mutation
(3) Loss of dopamine secretion
(4) Lack of huntingtin protein

44. Striated muscle fibres for eyeball movements are inserted into the sclera; nerve fibres of which cranial nerves control them to move the eyeball for looking at different directions?
(1) II^{nd}, IV^{th} and VI^{th} (2) III^{rd}, IV^{th} and VI^{th}
(3) III^{rd}, IV^{th} and VII^{th} (4) IV^{th}, VII^{th} and IX^{th}

45. The excess movement of K^+ ions from axoplasm to extracellular fluid leads to
(1) Depolarization
(2) Hyperpolarization
(3) Repolarization
(4) Threshold value for nerve impulse

46. Arbor vitae is found in
(1) Cerebrum (2) Medulla
(3) Cerebellum (4) Hypothalamus

47. Temperature regulatory centre is present in
(1) Cerebrum (2) Medulla
(3) Hypothalamus (4) Cerebellum

48. In ear, eustachian tube connects
(1) Middle ear with internal ear
(2) Middle ear with external ear
(3) Middle ear with pharynx
(4) Internal ear with pharynx

49. Which part of brain participate in expression of rage, aggression, pain, pleasure and the behaviour pattern related with sexual arousal?
(1) Cerebrum (2) Hypothalamus
(3) Medulla oblongata (4) Pons varoli

50. Middle ear is responsible for amplification of signal due to
(1) Presence of 4,000 ceruminous gland
(2) Vibrations of tympanic membrane
(3) Leverage system of ossicles
(4) Utriculus and sacculus

51. In case of non-mammals *i.e.* amphibians, reptiles, birds, the number of ear ossicle is/are
(1) 1 in amphibian, 2 in reptiles and 3 in birds
(2) 1 in amphibian and reptiles and 3 in birds
(3) 1 in amphibian, reptiles and birds
(4) 1 in amphibian and 2 in reptiles and birds

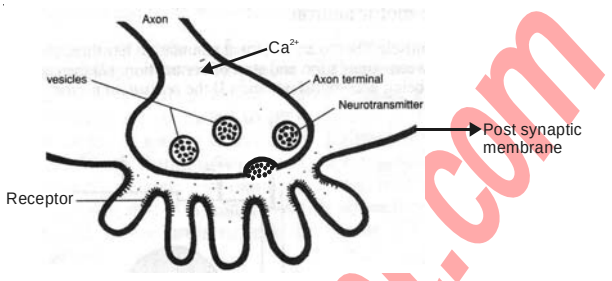
52. The glands which are present in between the bases of eyelashes are
(1) Glands of Moll (2) Glands of Zeis
(3) Meibomian gland (4) Ceruminous gland

53. Cerebrospinal fluid moves from paracoel to diocoel through
(1) Iter/aqueduct of sylvius
(2) Interventricular foramen/foramen of monro
(3) Obturator foramen
(4) Choroid plexus

54. The spinal cord extends down upto first lumbar vertebra where it tapers to end but meninges of the spinal cord continue upto coccygeal region. These meanings are known as
(1) Conus medullaris (2) Filum terminale
(3) Piamater (4) Duramater

55. Spinal cord conducts impulses to and from the brain. Which funiculus is involved in conducting motor impulses from brain to spinal cord?
(1) Dorsal grey horn
(2) Lateral and ventral funiculi
(3) Dorsal and ventral funiculi
(4) Dorsal and lateral funiculi

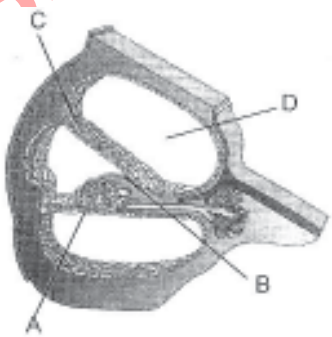
56. In the following diagram showing chemical conduction at synapse, if Ca^{2+} channels are blocked what will happen to the conduction?



(1) Release of neurotransmitter will be inhibited
(2) Binding of neurotransmitter will be blocked
(3) Both (1) and (2)
(4) Depolarization of presynaptic membrane would not occur

57. Which of the following is correct for the thalamus?
(1) It acts as relay centre
(2) It is the centre of crude sensation
(3) It has RAS
(4) All of the above

58. Given below is a diagrammatic representation of sectional view of cochlea



Read the following paragraph carefully
The eardrum vibrates in response to sound waves and these vibrations are transmitted through ear ossicles to oval window which are transferred to the fluid of cochlea, where they generate waves in lymphs. The waves in the lymph induce a ripple in the (i). The movement of the (ii) bend the hair cells, pressing them against the (iii). Choose the option which correctly fills the graph w.r.t. labelled structures in diagram.
(1) (i)D, (ii)B, (iii)A (2) (i)A, (ii)B, (iii)C
(3) (i)A, (ii)B, (iii)D (4) (i)A, (ii)A, (iii)B

[Chapter 10 : Chemical Coordination and Integration]

1. Which of the following disease is characterised by severe mental retardation, low intelligence quotient, abnormal skin, deaf, mutism and stunted growth in child?
(1) Nanism (2) Cretinism
(3) Grave's disease (4) Myxoedema

2. Tumor of parathyroid gland causes
(1) Parathyroid tetany
(2) Grave's disease
(3) Osteitis fibrosa cystica
(4) Hypocalcemic tetany

3. Individuals with type-I diabetes
(1) Lack β-cells in the islets of Langerhans
(2) Produce enough insulin but lack functional receptors on their cells
(3) Can control their diabetes with diet and exercise
(4) All of these are correct

4. Both adrenaline and cortisol are secreted in response to stress. Which of the following statement is also true for both of these hormones?
   (1) They act to increase blood glucose
   (2) They are secreted by the adrenal cortex
   (3) Their secretion is stimulated by adrenocorticotropin
   (4) They are secreted into the blood within seconds of the onset of stress

5. Which of the following hormone enters into nucleus and binds to receptors and stimulates the translation?
   (1) T_4 (2) T_3
   (3) Steroid hormone (4) All of these

6. Excess of which of the following hormone can result in diabetes mellitus condition?
   (1) Insulin (2) Prolactin
   (3) Growth hormone (4) Aldosterone

7. Which of the following is not transported through hypothalmo-hypophysial portal vein?
   (1) Somatostatin
   (2) Thyotrophin releasing hormone
   (3) Prolactin releasing hormone
   (4) Somatotropin

8. Pituitary secretes many hormones. Which one of the following is case of hypopituitarism?
   (1) Midget (2) Simmond's disease
   (3) Acromegaly (4) Both (1) & (2)

9. Glucocorticoids are involved in carbohydrate, lipid and protein metabolism. But are not involved in
   (1) Anti inflammatory function
   (2) Immunosuppressive function
   (3) Increase the WBC count
   (4) Increase the RBC count

10. Which of the following set shows antagonistic effect?
   (1) Prolactin and oxytocin
   (2) Oxytocin and prostaglandins
   (3) cAMP and cGMP
   (4) Thyroxine end GH

11. Which of the following endocrine gland secretes catecholamines?
   (1) Pituitary (2) Thyroid
   (3) Adrenal medulla (4) Pancreas

12. A boy has undeveloped and non-functional secondary sex organs like prostate, seminal vesicles and penis, lacks external sex characters such as beard, moustache and low pitch voice and does not produce sperms. These are the symptoms of which disease?
   (1) Sexual pseudoprecocity of boys
   (2) Sexual pseudoprecocity of girls
   (3) Eunuchoidism
   (4) Adrenal virilisin

13. Life saving corticoid hormones are secreted by
   (1) Pituitary (2) Pineal
   (3) Adrenal (4) Thyroid

14. Mark the correct statements w.r.t. thyroid gland
   A. T_3 is about 4 times as potent as T_4
   B. Endostyle of protochordates (*Herdmania*) is forerunner of thyroid gland of vertebrates
   C. Grave's disease occurs due to hypothyrodism
   D. Grave's disease is an example of autoimmune disorder
   (1) A & C (2) A, B & D
   (3) A, B, C & D (4) A & D

15. Find odd one out w.r.t. amount of secretion
   (1) Conn's disease (2) Cushing's disease
   (3) Plummer's disease (4) Simmond's disease

16. Which part of adrenal gland secretes cortisol?
   (1) Zona glomerulosa (2) Zona reticularis
   (3) Zona fasciaulata (4) Adrenal medulla

17. Mark the incorrect w.r.t. cortisol
   (1) Anti-insulin (2) Stress-hormone
   (3) Immuno-active (4) Anti-allergic

18. Cushing's syndrome is related to
   (1) Mineralocorticoids
   (2) Glucocorticoids
   (3) Somatomedins
   (4) Angiotensin converting enzyme (ACE)

19. Mark the **incorrect** statement w.r.t. insulin?
   (1) Secreted by β-cells of islets of Langerhans of pancreas
   (2) Lowers glucose level by promoting synthesis of fats from glucose by adipose tissue
   (3) Polypeptide hormone
   (4) Lowers glucose level by inhibiting uptake of amino-acids by liver and muscle cells

20. Somatostatin is secreted by
   (1) Phaeochromocytes
   (2) Hypothalamus
   (3) δ-cells of islets of langerhans
   (4) Both (2) & (3)

21. Hormones which increase alertness, pupilary dilation, piloerection, sweating is/are
   (1) Adrenaline
   (2) Secreted by Adrenal cortex
   (3) Nor-adrenaline
   (4) Both (1) & (3)

22. IP_3 and DG are secondary messenger involved in the action of
   (1) Acetylcholine (2) Thyroxine
   (3) Insulin (4) Nor–adrenaline

23. Find the incorrect match
(1) Huntington chorea – Degeneration GABA secreting neurons of corpus striatum
(2) Parkinson disease – Destruction of substantia nigra
(3) Osteitis fibrosa cystica – Hypoparathyroidism
(4) Sexual pseudoprecocity in boys – Excess of testosterone produced by tumour of testes and adrenals

24. Match the Column-I with Column-II

	Column-I		Column-II
a.	Exopthalmic goitre	(i)	Corpus luteum
b.	Thymus	(ii)	Kidney
c.	Inhibin	(iii)	Autoimmune disorder
d.	Calcitriol	(iv)	Hassall's corpuscles

(1) a(iii), b(ii), c(i), d(iv) (2) a(iv), b(iii), c(i), d(ii)
(3) a(iii), b(iv), c(i), d(ii) (4) a(iii), b(iv), c(ii), d(i)

25. Bronze-like pigmentation is characteristic of
(1) Collip's disease (2) Conn's disease
(3) Cushing's disease (4) Addison's disease

26. Phaeochromocytes are found in
(1) Parathyroid (2) Thyroid matrix
(3) Adrenal medulla (4) Pineal gland

27. Mark the **incorrect** match w.r.t. hormone source
(1) Secretin - duodenal mucosa
(2) Enterogastrone - stomach
(3) Pancreozymin - duodenal mucosa
(4) Gastrin - stomach

28. Herring bodies are found in
(1) Pancrease (2) Thymus
(3) Pituitary gland (4) Ovary

29. Following are the examples of secondary messengers **except**
(1) cAMP (2) DG
(3) Sodium (4) IP_3

30. Adrenalin shows the following activity **except**
(1) Dilation of arterioles of heart and skeletal muscles
(2) Increased consumption of O_2
(3) Glycogenolysis
(4) Constriction of pupil

31. Biological clock of body is
(1) Thyroid gland (2) Pancreas
(3) Pituitary gland (4) Pineal gland

32. In adult hyposecretion of thyroxine hormone causes
(1) Cretinism disease (2) Dwarfism
(3) Myxedema disease (4) Acromegaly

33. Find out **incorrect** statement
(1) Insulin stimulates glycogenesis
(2) Glucagon enhances release of glucose into the blood
(3) Prolonged hyperglycemia leads to a complex disorder called diabetes mellitus
(4) Insulin reduces glucose uptake by liver cells

34. Main child birth hormone is
(1) Progesterone (2) Oxytocin
(3) Relaxin (4) Prolactin

35. Which hormones play a very important role in the regulation of a 24 hour (diurnal) rhythm of our body?
(1) Thyroxine (2) Melatonin
(3) Adrenalin (4) Growth hormone

36. Find the **correct** match
(1) Melatonin – Tetany
(2) PTH – Dwarfism
(3) Growth hormone – Acromegaly
(4) Thyroxine – Gigantism

37. The condition of gynaecomastia in males can arise due to
(1) Disturbance of estrogen to androgen ratio
(2) Temporary increase in circulating estrogen in neonatal period and during puberty
(3) Decreased testosterone in later life
(4) All of these

38. The hormone which inhibits secretion of glucagon and insulin as well as decreases motility and absorption in the digestive tract is
(1) Glucocorticoid (2) Adrenaline
(3) Nor-adrenaline (4) Somatostatin

39. Addison's disease and Conn's syndrome are associated with abnormal secretion of
(1) Mineralocorticoids (2) Glucocorticoids
(3) Sexcorticoids (4) Endorphin

40. The hormone which is regularly abused by the milkmen to get more milk from their cows and buffaloes is
(1) Pitressin (2) Pitocin
(3) GnRH (4) Somatotropin

41. Which of the following hormone stimulate phospholipase activity in cell membrane of liver cell and cause formation of DAG and IP_3?
(1) Adrenaline (2) Noradrenaline
(3) Insulin (4) Parathormone

42. Which of the following is/are not a steroid hormone?
(1) Progesterone (2) Placental estradiol
(3) Relaxin (4) Cortisol

43. Match the following

Column I	Column II
a. Thyroxine	(i) Tryptophan
b. Melatonin	(ii) Protein
c. Insulin	(iii) Steroid
d. Estradiol	(iv) Tyrosine

(1) a(i), b(iii), c(ii), d(iv) (2) a(iv), b(i), c(ii), d(iii)
(3) a(iii), b(i), c(iv), d(ii) (4) a(ii), b(iv), c(i), d(iii)

44. Which of the following is available in drug stores and is being used to haster the recovery from jet lag?
(1) TSH (2) Collip's hormone
(3) Melatonin (4) Adrenaline

45. Disorder caused due to thyroid hormone deficiency includes
a. Cretinism b. Gull's disease
c. Graves disease d. Simple goitre
(1) b & d (2) b & c
(3) a, b, d (4) b, c, d

46. Hormone which increases the concentration of calcium ions in the blood plasma by mobilising more calcium from bones to the plasma. It is released from
(1) Thyroid gland (2) Parathyroid gland
(3) Adrenal gland (4) Pituitary gland

47. Which hormone lowers blood glucose level by stimulating transport of glucose from blood to muscle and adipose cells?
(1) GH (2) Glucocorticoids
(3) Insulin (4) Thyroxine

48. Which endocrine gland is also known as "the throne of immunity"?
(1) Pineal (2) Thyroid
(3) Parathyroid (4) Thymus

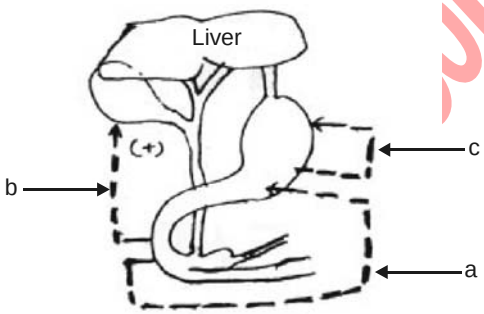
49. All the hormone of adrenal cortex is synthesised from
(1) Tyrosine (2) Glycoprotein
(3) Cholesterol (4) Tryptophan

50. Calcitonin is a thyroid gland secretion and its function is to
(1) Increase Ca^{2+} level in the blood
(2) Increase PO_4^- level in the blood
(3) Decrease Ca^{2+} level in the blood
(4) No effect on Ca^{2+} level of blood

51. Which cells of islet of Langerhans gets damaged when treated with alloxan or streptozocin?
(1) α-cell (2) β-cell
(3) δ-cell (4) F-cell

52. Which hormone produces anti-inflammatory reactions and suppresses the immune response?
(1) PTH (2) Thyroxine
(3) Cortisol (4) Adrenaline

53. In the diagram given below hormones released have been shown as broken lines (a,b,c). Identify them



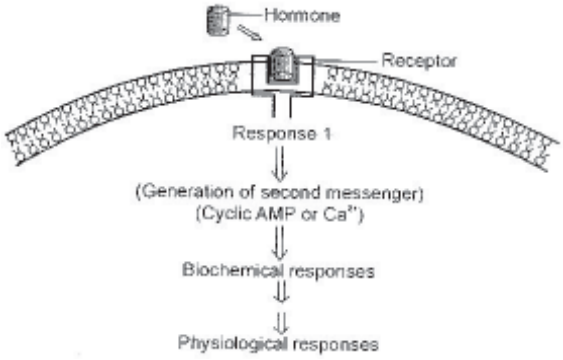
(1) a – Secretin ; b – Gastrin ; c – CCK
(2) a – Enterogasteron ; b – Gastrin ; c – CCK
(3) a – Enterogasteron ; b – CCK ; c – Gastrin
(4) a – Motilin ; b – Duocrinin ; c – GIP

54. Which of the following is called as neurohypophysis?
(1) Adrenal cortex (2) Anterior pituitary
(3) Posterior pituitary (4) Pineal body

55. Life saving corticoid hormones are secreted by
(1) Pituitary (2) Pineal
(3) Adrenal (4) Thyroid

56. The correct combination is
(i) α-cell : Glucagon
(ii) β-cell : Insulin
(iii) γ-cell : Somatostatin
(iv) δ-cell : Gastrin
(1) (i) and (ii) only (2) (i), (ii) and (iii) only
(3) (ii) and (iii) only (4) (i), (ii), (iii) and (iv)

57. Given below is a diagrammatic representation of the mechanism of hormone action



Which of the following hormone acts by the given mechanism ?
(1) Follicle stimulating hormone
(2) Estrogen
(3) Testosterone
(4) All of these

❑ ❑ ❑

ANSWERS

[PHYSICS]

Chapter 9 : Thermal Properties of Matter

1.	(1)	2.	(1)	3.	(2)	4.	(4)	5.	(4)	6.	(2)	7.	(3)
8.	(2)	9.	(4)	10.	(1)	11.	(3)	12.	(1)	13.	(4)	14.	(3)
15.	(1)	16.	(2)	17.	(2)	18.	(4)	19.	(1)	20.	(3)	21.	(4)
22.	(1)	23.	(3)	24.	(2)	25.	(3)	26.	(2)	27.	(3)	28.	(2)
29.	(1)	30.	(1)										

Chapter 10 : Thermodynamics

1.	(1)	2.	(1)	3.	(2)	4.	(1)	5.	(3)	6.	(1)	7.	(3)
8.	(2)	9.	(3)	10.	(1)	11.	(1)	12.	(2)	13.	(2)	14.	(1)
15.	(3)	16.	(3)	17.	(2)	18.	(3)	19.	(1)	20.	(3)	21.	(4)
22.	(3)	23.	(2)	24.	(3)	25.	(1)	26.	(2)	27.	(1)	28.	(3)
29.	(4)	30.	(2)	31.	(1)	32.	(2)	33.	(3)	34.	(4)	35.	(3)
36.	(1)	37.	(3)	38.	(2)	39.	(3)	40.	(4)	41.	(2)	42.	(1)
43.	(3)	44.	(4)	45.	(3)	46.	(1)						

Chapter 11 : Kinetic Theory

1.	(1)	2.	(3)	3.	(3)	4.	(2)	5.	(4)	6.	(2)	7.	(1)
8.	(4)	9.	(1)	10.	(3)	11.	(4)	12.	(1)	13.	(3)	14.	(3)
15.	(4)	16.	(2)	17.	(2)	18.	(1)	19.	(4)	20.	(1)	21.	(3)
22.	(4)												

Chapter 12 : Oscillation

1.	(2)	2.	(3)	3.	(4)	4.	(2)	5.	(1)	6.	(2)	7.	(3)
8.	(3)	9.	(1)	10.	(4)	11.	(1)	12.	(1)	13.	(4)	14.	(1)
15.	(2)	16.	(1)	17.	(2)	18.	(4)	19.	(3)	20.	(1)	21.	(4)
22.	(1)	23.	(2)	24.	(2)	25.	(1)	26.	(3)	27.	(2)	28.	(4)
29.	(2)	30.	(2)	31.	(3)	32.	(2)	33.	(4)	34.	(2)	35.	(3)
36.	(1)	37.	(3)	38.	(2)	39.	(2)	40.	(2)	41.	(4)	42.	(4)
43.	(3)	44.	(3)	45.	(1)	46.	(1)	47.	(3)	48.	(2)	49.	(1)
50.	(2)	51.	(3)	52.	(2)	53.	(3)	54.	(4)	55.	(4)	56.	(3)
57.	(2)	58.	(2)	59.	(3)	60.	(3)	61.	(3)				

Chapter 13 : Waves

1.	(2)	2.	(4)	3.	(3)	4.	(1)	5.	(3)	6.	(2)	7.	(2)
8.	(1)	9.	(1)	10.	(4)	11.	(1)	12.	(4)	13.	(1)	14.	(4)
15.	(3)	16.	(2)	17.	(2)	18.	(3)	19.	(2)	20.	(2)	21.	(2)
22.	(1)	23.	(1)	24.	(2)	25.	(3)	26.	(1)	27.	(3)	28.	(1)
29.	(3)	30.	(2)	31.	(1)	32.	(2)	33.	(3)	34.	(2)	35.	(3)
36.	(2)	37.	(1)	38.	(4)	39.	(1)	40.	(1)	41.	(1)	42.	(1)
43.	(2)	44.	(1)	45.	(1)	46.	(2)	47.	(2)	48.	(1)	49.	(3)
50.	(3)												

[CHEMISTRY]

Chapter 12 : Organic Chemistry

1.	(3)	2.	(3)	3.	(4)	4.	(2)	5.	(3)	6.	(4)	7.	(2)
8.	(2)	9.	(2)	10.	(2)	11.	(1)	12.	(3)	13.	(2)	14.	(2)
15.	(2)	16.	(1)	17.	(4)	18.	(4)	19.	(2)	20.	(3)	21.	(4)

22.	(4)	23.	(2)	24.	(2)	25.	(1)	26.	(1)	27.	(2)	28.	(4)
29.	(2)	30.	(3)	31.	(3)	32.	(4)	33.	(4)	34.	(1)	35.	(2)
36.	(3)	37.	(2)	38.	(1)	39.	(4)	40.	(2)	41.	(1)	42.	(2)
43.	(4)	44.	(2)	45.	(3)	46.	(2)	47.	(2)	48.	(4)	49.	(1)
50.	(2)	51.	(1)	52.	(2)	53.	(1)	54.	(4)	55.	(2)	56.	(3)

Chapter 13 : Hydrocarbons & Environmental Chemistry

1.	(2)	2.	(4)	3.	(3)	4.	(3)	5.	(4)	6.	(4)	7.	(1)
8.	(2)	9.	(1)	10.	(1)	11.	(3)	12.	(1)	13.	(4)	14.	(3)
15.	(1)	16.	(1)	17.	(3)	18.	(3)	19.	(4)	20.	(2)	21.	(4)
22.	(2)	23.	(3)	24.	(3)	25.	(1)	26.	(1)	27.	(4)	28.	(2)
29.	(3)	30.	(2)	31.	(1)	32.	(3)	33.	(2)	34.	(2)	35.	(4)
36.	(4)												

[BOTANY]

Chapter 9 : Mineral Nutrition

1.	(3)	2.	(2)	3.	(2)	4.	(4)	5.	(4)	6.	(1)	7.	(4)
8.	(3)	9.	(3)	10.	(1)	11.	(3)	12.	(2)	13.	(2)	14.	(2)
15.	(2)	16.	(4)	17.	(2)	18.	(3)	19.	(2)	20.	(1)	21.	(3)
22.	(1)	23.	(1)	24.	(4)	25.	(3)	26.	(4)	27.	(3)	28.	(4)
29.	(2)	30.	(2)	31.	(4)	32.	(3)	33.	(4)	34.	(4)	35.	(2)
36.	(3)	37.	(4)	38.	(2)								

Chapter 10 : Photosynthesis in Plants

1.	(1)	2.	(2)	3.	(3)	4.	(2)	5.	(2)	6.	(2)	7.	(3)
8.	(4)	9.	(2)	10.	(4)	11.	(3)	12.	(2)	13.	(2)	14.	(3)
15.	(1)	16.	(3)	17.	(4)	18.	(2)	19.	(3)	20.	(4)	21.	(1)
22.	(1)	23.	(4)	24.	(4)	25.	(1)	26.	(3)	27.	(1)	28.	(1)
29.	(4)	30.	(4)	31.	(2)	32.	(1)	33.	(2)	34.	(4)	35.	(3)
36.	(4)	37.	(1)	38.	(4)	39.	(4)	40.	(4)	41.	(2)	42.	(2)
43.	(4)	44.	(2)	45.	(1)	46.	(2)	47.	(1)	48.	(2)	49.	(3)
50.	(4)	51	(2)										

Chapter 11 : Respiration in Plants

1.	(3)	2.	(2)	3.	(3)	4.	(3)	5.	(3)	6.	(1)	7.	(4)
8.	(1)	9.	(1)	10.	(1)	11.	(2)	12.	(3)	13.	(3)	14.	(1)
15.	(1)	16.	(3)	17.	(3)	18.	(1)	19.	(2)	20.	(1)	21.	(4)
22.	(4)	23.	(4)	24.	(2)	25.	(2)	26.	(1)	27.	(1)	28.	(3)
29.	(4)	30.	(2)	31.	(1)	32.	(4)	33.	(2)	34.	(3)	35.	(2)
36.	(2)	37.	(1)	38.	(2)	39.	(1)	40.	(1)	41.	(1)	42.	(3)
43.	(1)	44.	(4)	45.	(4)	46.	(2)	47.	(4)	48.	(3)	49.	(4)

Chapter 12 : Plant Growth & Development

1.	(4)	2.	(1)	3.	(1)	4.	(1)	5.	(3)	6.	(3)	7.	(2)
8.	(3)	9.	(3)	10.	(1)	11.	(4)	12.	(2)	13.	(1)	14.	(4)
15.	(2)	16.	(1)	17.	(3)	18.	(3)	19.	(3)	20.	(4)	21.	(4)
22.	(1)	23.	(4)	24.	(2)	25.	(3)	26.	(2)	27.	(4)	28.	(4)
29.	(4)	30.	(1)										

[ZOOLOGY]

Chapter 6 : Body Fluids and Circulation

1.	(2)	2.	(3)	3.	(1)	4.	(3)	5.	(3)	6.	(3)	7.	(3)
8.	(2)	9.	(4)	10.	(2)	11.	(2)	12.	(4)	13.	(1)	14.	(2)
15.	(4)	16.	(2)	17.	(2)	18.	(2)	19.	(1)	20.	(1)	21.	(2)
22.	(3)	23.	(3)	24.	(2)	25.	(3)	26.	(1)	27.	(2)	28.	(3)
29.	(3)	30.	(3)	31.	(3)	32.	(2)	33.	(3)	34.	(1)	35.	(1)
36.	(2)												

Chapter 7 : Excretory Products and their Elimination

1.	(4)	2.	(2)	3.	(4)	4.	(2)	5.	(2)	6.	(3)	7.	(4)
8.	(3)	9.	(3)	10.	(4)	11.	(3)	12.	(3)	13.	(4)	14.	(2)
15.	(3)	16.	(2)	17.	(3)	18.	(2)	19.	(2)	20.	(2)	21.	(4)
22.	(4)	23.	(2)	24.	(4)	25.	(2)	26.	(2)	27.	(3)	28.	(4)
29.	(1)	30.	(2)	31.	(3)	32.	(2)	33.	(2)	34.	(3)	35.	(3)
36.	(2)	37.	(3)	38.	(3)	39.	(2)	40.	(4)	41.	(4)	42.	(1)
43.	(2)	44.	(3)	45.	(1)	46.	(4)	47.	(2)	48.	(3)	49.	(2)
50.	(1)	51.	(4)	52.	(4)	53.	(3)	54.	(2)	55.	(1)	56	(2)
57.	(3)	58.	(3)	59.	(1)								

Chapter 8 : Locomotion and Movement

1.	(2)	2.	(1)	3.	(4)	4.	(3)	5.	(3)	6.	(2)	7.	(1)
8.	(4)	9.	(3)	10.	(3)	11.	(2)	12.	(4)	13.	(4)	14.	(3)
15.	(4)	16.	(1)	17.	(4)	18.	(3)	19.	(1)	20.	(1)	21.	(4)
22.	(2)	23.	(2)	24.	(3)	25.	(1)	26.	(2)	27.	(3)	28.	(2)
29.	(3)	30.	(3)	31.	(3)	32.	(3)	33.	(2)	34.	(1)	35.	(2)
36.	(4)	37.	(3)	38.	(1)	39.	(4)	40.	(3)	41.	(2)	42.	(3)
43.	(2)	44.	(1)	45.	(2)	46.	(2)	47.	(2)	48.	(3)	49.	(3)
50.	(4)	51.	(3)	52.	(4)	53.	(1)	54.	(2)	55.	(2)	56	(4)
57.	(4)	58.	(3)	59.	(3)	60.	(4)	61.	(1)	62.	(2)	63.	(4)

Chapter 9 : Neural Control and Coordination

1.	(4)	2.	(3)	3.	(2)	4.	(1)	5.	(2)	6.	(4)	7.	(1)
8.	(2)	9.	(2)	10.	(4)	11.	(1)	12.	(4)	13.	(4)	14.	(2)
15.	(4)	16.	(3)	17.	(3)	18.	(2)	19.	(4)	20.	(3)	21.	(2)
22.	(1)	23.	(2)	24.	(4)	25.	(3)	26.	(3)	27.	(3)	28.	(3)
29.	(1)	30.	(3)	31.	(3)	32.	(2)	33.	(1)	34.	(3)	35.	(3)
36.	(4)	37.	(3)	38.	(2)	39.	(3)	40.	(2)	41.	(4)	42.	(2)
43.	(3)	44.	(2)	45.	(2)	46.	(3)	47.	(3)	48.	(3)	49.	(2)
50.	(3)	51.	(3)	52.	(1)	53.	(2)	54.	(2)	55.	(2)	56	(1)
57.	(4)	58.	(4)										

Chapter 10 : Chemical Coordination and Integration

1.	(2)	2.	(3)	3.	(1)	4.	(1)	5.	(3)	6.	(3)	7.	(4)
8.	(4)	9.	(3)	10.	(3)	11.	(3)	12.	(1)	13.	(3)	14.	(2)
15.	(4)	16.	(3)	17.	(3)	18.	(2)	19.	(4)	20.	(4)	21.	(4)
22.	(3)	23.	(3)	24.	(3)	25.	(4)	26.	(3)	27.	(2)	28.	(3)
29.	(3)	30.	(4)	31.	(4)	32.	(3)	33.	(4)	34.	(2)	35.	(2)
36.	(3)	37.	(4)	38.	(4)	39.	(1)	40.	(2)	41.	(3)	42.	(3)
43.	(2)	44.	(3)	45.	(3)	46.	(2)	47.	(3)	48.	(4)	49.	(3)
50.	(3)	51.	(2)	52.	(3)	53.	(3)	54.	(3)	55.	(3)	56	(1)
57.	(1)												

❑ ❑ ❑

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Practice Question Bank for NEET - 2013

Booklet -4

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CONTENTS

2012-13

PHYSICS

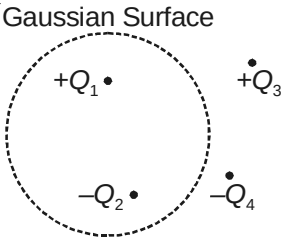
[Chapter-14 : Electric Charges and Field]

1. On each of the three corners of an equilateral triangle of side D three equal charges Q are placed. The coulombic force experienced by one charge due to the other two charges is

(1) Zero (2) $\frac{\sqrt{2}Q^2}{4\pi\varepsilon_0 D^2}$

(3) $\frac{\sqrt{3}Q^2}{4\pi\varepsilon_0 D^2}$ (4) $\frac{2Q^2}{4\pi\varepsilon_0 D^2}$

2. If we apply Gauss' Law $\oint \vec{E}\cdot\vec{dS} = \frac{Q_{net}}{\varepsilon_0}$ for a spherical Gaussian surface shown below, then the $\vec{E}$ in the expression is due to



(1) All the charges collectively
(2) All positive charges only
(3) All negative charges only
(4) Net charges inside the Gaussian surface

3. Two short electric dipoles at a certain distance R apply a force F on each other. If the separation is doubled, then the force of interaction between the dipoles, will become approximately

(1) $\frac{F}{2}$ (2) $\frac{F}{4}$

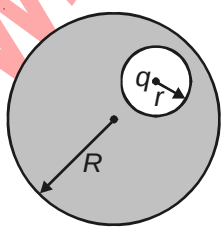
(3) $\frac{F}{8}$ (4) $\frac{F}{16}$

4. Two equal point charges are kept a distance R apart. A third charged particle kept on the perpendicular bisector at a distance r from the centre will experience maximum electrostatic force when

(1) r = ±R (2) $r = \pm\frac{R}{\sqrt{2}}$

(3) $r = \pm\frac{R}{2\sqrt{2}}$ (4) $r = \pm R\sqrt{2}$

5. A metal sphere of radius R contains a spherical cavity of radius r (r < R). A point charge q is kept at the centre of the cavity. The electric field inside the cavity is



(1) Zero
(2) Spherically symmetrical
(3) Constant
(4) Directed towards the centre of the metal sphere

6. A particle of mass M and charge Q is at rest in a uniform electric field E and then released. The kinetic energy acquired by the particle after moving a distance x is

(1) MQ^2Ex (2) MQE^2x
(3) $MQEx^2$ (4) QEx

7. The electric field in a region is radially outward with magnitude E = Ar, where A is constant and r is distance from origin. The charge inside a sphere of radius r at the origin is

(1) $\varepsilon_0 Ar^3$ (2) $4\pi\varepsilon_0 Ar^2$
(3) $2\pi\varepsilon_0 Ar^3$ (4) $4\pi\varepsilon_0 Ar^3$

8. A charge Q is given a displacement $\vec{s} = x\hat{i} + y\hat{j} + z\hat{k}$ in an electric field $\vec{E} = \hat{i}E_x + \hat{j}E_y + \hat{k}E_z$. The work done is

(1) $Q\sqrt{(xE_x)^2 + (yE_y)^2 + (zE_z)^2}$

(2) $Q(E_x + E_y + E_z)\sqrt{x^2 + y^2 + z^2}$

(3) $\sqrt{(xE_x)^2 + (yE_y)^2 + (zE_z)^2}$

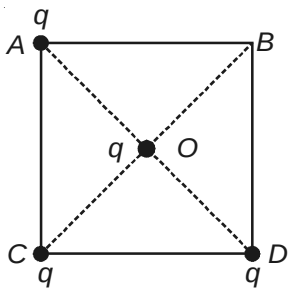
(4) $Q(xE_x + yE_y + zE_z)$

9. A cube of side D has charge Q at each of its eight vertices. The electric field at the centre of the cube is

(1) $\frac{8Q}{4\pi\varepsilon_0\left(\frac{D}{2}\right)^2}$ (2) $\frac{8Q}{4\pi\varepsilon_0(D\sqrt{2})^2}$

(3) $\frac{8Q}{4\pi\varepsilon_0\left(\frac{D}{\sqrt{2}}\right)^2}$ (4) Zero

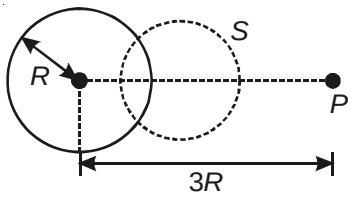
10. Four point charges each of magnitude q are kept as shown. ABCD is a square of side $a\sqrt{2}$. The electrostatic force on the charge at the centre O is



(1) $\frac{kq^2}{a^2}$ (2) $\frac{kq^2}{2a^2}$

(3) $\frac{\sqrt{2}kq^2}{2a^2}$ (4) Zero

11. A negative point charge – Q is kept at point P near a neutral conducting sphere as shown. The electric flux linked with the gaussian surface S (shown dotted) is ϕ, then one can conclude that



(1) $\phi = 0$

(2) $\phi < 0$

(3) $\phi > 0$

(4) $\phi > 0$, if sphere is solid and $\phi < 0$ if the sphere is hollow

12. A point charge moving with velocity $\vec{v} = (3 \text{ m/s})\,\hat{i}$ is released in a uniform electric field $\vec{E} = (a\hat{i} + b\hat{j})$. The subsequent trajectory of the particle will be

(1) A parabola

(2) An ellipse

(3) A rectangular hyperbola

(4) A straight line

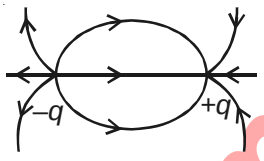
13. An electric dipole experiences a torque 'x' when kept in a uniform electric field with angle $\theta = 60^\circ$ between electric field and dipole moment. What is the potential energy of the dipole?

(1) – x (2) $\frac{x}{2}$

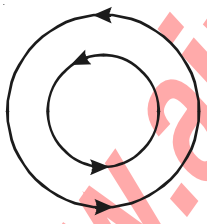
(3) $-\frac{x}{\sqrt{3}}$ (4) 2x

14. Which of the following pattern of electrostatic field lines is possible?

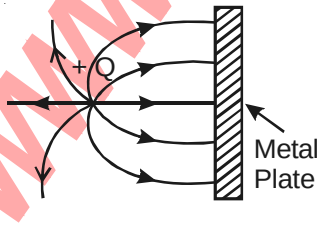
(1)



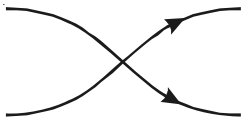
(2)



(3)



(4)

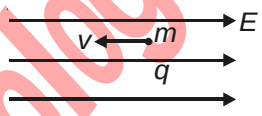


15. When an electric dipole is perpendicular to a uniform electric field, the torque acting on it is W. If the dipole is released from this position, the K.E. acquired by the dipole till it reaches in the position of stable equilibrium is

(1) $\frac{W}{2}$ (2) W

(3) 1.5 W (4) 2 W

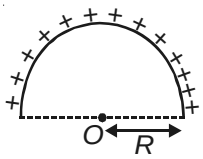
16. A positively charged particle is projected with speed v in a uniform electric field E as shown. After what time the particle will have same K.E. as initial?



(1) $\frac{2mv}{qE}$ (2) $\frac{mv}{qE}$

(3) $\frac{mv}{2qE}$ (4) $\frac{mv}{4qE}$

17. What is the value of electric field at the centre of curvature O of the semicircular ring as shown in figure?The total charge is Q, which is uniformly distributed



(1) $\frac{Q}{2\pi\varepsilon_0 R}$ (2) $\frac{Q}{2\pi^2\varepsilon_0 R}$

(3) $\frac{Q}{2\pi^2\varepsilon_0 R^2}$ (4) $\frac{Q}{4\pi\varepsilon_0 R^2}$

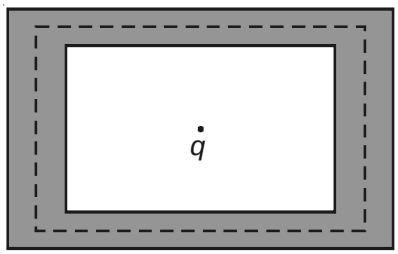
18. At the centre of a neutral square frame made of copper, there is a point charge q as shown. The electric flux linked with the surface of frame is

(1) $\frac{q}{6\,\varepsilon_0}$

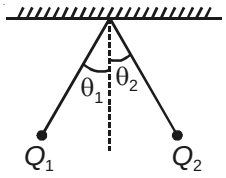
(2) $\frac{q}{2\,\varepsilon_0}$

(3) $\frac{q}{\varepsilon_0}$

(4) Zero



19. Two identical simple pendulums have different charges Q_1 and Q_2 on their bobs. When they are suspended from the same point, their strings make angle θ_1 and θ_2 from the vertical as shown, hence $(Q_1 > Q_2)$

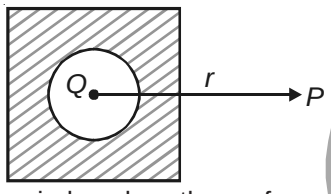


(1) $\theta_1 > \theta_2$ (2) $\theta_1 < \theta_2$
(3) $\theta_1 = \theta_2$ (4) $Q_1\theta_1 = Q_2\theta_2$

20. If the electric flux entering and leaving a closed surface are ϕ_1 and ϕ_2 respectively then the electric charge enclosed by the volume of the surface is

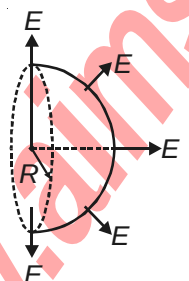
(1) $(\phi_1 + \phi_2)\varepsilon_0$ (2) $(\phi_2 - \phi_1)\varepsilon_0$
(3) $\frac{(\phi_1+\phi_2)}{\varepsilon_0}$ (4) $\frac{(\phi_2-\phi_1)}{\varepsilon_0}$

21. A point charge +Q is placed at the centre of a spherical cavity inside a metal block. Now choose the correct statement



(1) Charge induced on the surface of the cavity is –Q
(2) Charge induced on the outer surface of the block is +Q
(3) Electric field intensity at the outside point P is $\frac{Q}{4\pi\varepsilon_0 r^2}$
(4) All of these

22. A hemispherical surface is kept in a radial electric field $\vec{E}$ normal to curved surface as shown. Electric flux linked with the curved surface will be



(1) $4\pi R^2E$ (2) πR^2E
(3) $\frac{\pi R^2 E}{2}$ (4) $E2\pi R^2$

23. A charge Q is placed at the origin. Electric flux through the first quadrant of the x-y plane is

(1) $\frac{Q}{4\varepsilon_0}$ (2) $\frac{Q}{2\varepsilon_0}$
(3) $\frac{Q}{\varepsilon_0}$ (4) Zero

24. A positive charge Q is placed in front of a conducting solid cube at a distance d from its centre. Magnitude of electric field at the centre of the cube due to charges appearing on its surface is

(1) $\frac{Q}{4\pi\varepsilon_0 d^2}$ (2) $\frac{2Q}{4\pi\varepsilon_0 d^2}$
(3) Zero (4) Indeterminate

25. A positive point charge q is placed in between two negative charges of unit magnitude each along a straight line. The system of these three charges will be in equilibrium if q equals

(1) 1 C (2) 0.5 C
(3) 0.25 C (4) 0.2 C

26. A short electric dipole is placed pointing towards x-axis at origin O. A point P is at a large distance R from O such that OP makes an angle $\frac{\pi}{3}$ with the x-axis. If electric field at P makes an angle β with x-axis, then β is

(1) $\frac{\pi}{3}$ (2) $\frac{\pi}{3} + \tan^{-1}\left(\frac{\sqrt{3}}{2}\right)$
(3) $\tan^{-1}\left(\frac{\sqrt{3}}{2}\right)$ (4) $\frac{3\pi}{2}$

27. In a region uniform electric field $\vec{E}$ exists along +x axis. If work done by electric field in moving a charge 0.2 C through a distance 2 m along a line making 60° with +x axis is 4 joule, then the magnitude of E is

(1) $\sqrt{3}$ N/C (2) 4 N/C
(3) 5 N/C (4) 20 N/C

28. Electric field strength at an internal point of a uniformly charged non-conducting solid sphere of radius R at a distance x(x < R) from the centre is proportional to

(1) x (2) $\frac{1}{x}$
(3) x^2 (4) Independent of x

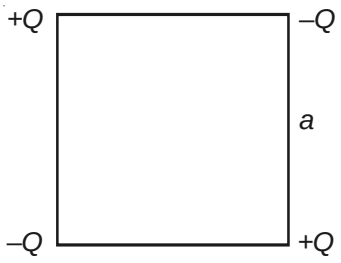
29. A free point charge Q of mass m is kept at the mid-point of two stationary point charges distant 2l and having charge Q each. If the free charge Q is slightly displaced along the line joining stationary charges then the angular frequency of resulting SHM will be

$\left(K = \frac{1}{4\pi\varepsilon_0}\right)$

(1) $\sqrt{\frac{KQ^2}{ml^3}}$ (2) $\sqrt{\frac{KQ^2}{2ml^3}}$

(3) $\sqrt{\frac{KQ^2}{4ml^3}}$ (4) $\sqrt{\frac{4KQ^2}{ml^3}}$

30. Work done by electric field in placing four charges at the corners of the square of side a is $\left(K = \frac{1}{4\pi\varepsilon_0}\right)$



(1) $\frac{\left(4-\sqrt{2}\right)KQ^2}{a}$ (2) $\left(4+\sqrt{2}\right)\frac{KQ^2}{a}$

(3) $\frac{\left(4-\sqrt{2}\right)KQ^2}{\sqrt{2}a}$ (4) $\frac{\left(4+\sqrt{2}\right)KQ^2}{\sqrt{2}a}$

31. A short electric dipole of moment p and moment of inertia I is kept in a uniform electric field E in stable equilibrium position. If the dipole is given a very small angular deflection from stable position, then it

(1) Undergoes circular motion

(2) Undergoes SHM with time period $2\pi\sqrt{\frac{I}{pE}}$

(3) Undergoes SHM with time period $2\pi\sqrt{\frac{pE}{I}}$

(4) Doesn't undergo SHM

32. The electric field in a region is $\vec{E} = (2\hat{i} + 4\hat{j} + 3\hat{k})$ V/m. The electric flux (in Vm) through the surface $x^2 + y^2 = 4$ is

(1) Zero (2) 8π

(3) 12π (4) 16π

33. If two concentric conducting shells have radii r_1 and r_2 ($r_1 > r_2$) and outer shell is given a charge +q, then magnitude of charge that will appear on outer surface of inner shell will be

(1) Zero (2) $-\frac{qr_1}{r_2}$

(3) $-\frac{qr_2}{r_1}$ (4) –q

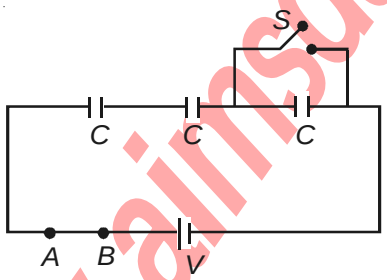
[Chapter-15 : Electrostatics Potential and Capacitance]

1. A charged spherical liquid drop having potential V breaks into 8 identical droplets. The potential at each droplet will be (Assuming charge gets equally divided among droplets)

(1) V (2) $\frac{V}{2}$

(3) $\frac{V}{4}$ (4) $\frac{V}{8}$

2. Initially switch S is open. When it is closed?



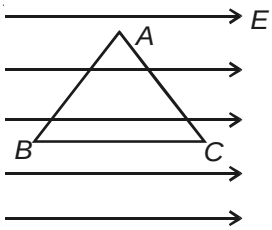
(1) Charge $\frac{CV}{3}$ flows from B to A

(2) There is no flow of charge

(3) Charge $\frac{CV}{6}$ flows from A to B

(4) Charge $\frac{CV}{6}$ flows from B to A

3. ABC is an equilateral triangle and a uniform electric field $\vec{E}$ exists in its plane. A charge q is taken from A to C directly and work done is W_1. Then it is taken from A to C via B and work done is W_2, then



(1) $W_1 = W_2$ (2) $W_1 > W_2$

(3) $W_1 < W_2$ (4) $W_2 = 2W_1$

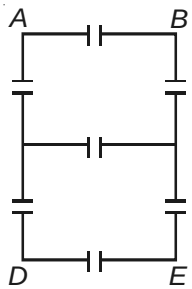
4. In given arrangement each capacitor has capacitance C. The equivalent capacitance between A and D is

(1) C

(2) $\frac{C}{2}$

(3) $\frac{C}{4}$

(4) $\frac{3C}{4}$



5. Two charges +q each are placed at the two vertices of an equilateral triangle. The charge that must be placed at the third vertex to have total energy of configuration zero, will be

(1) $\frac{-q}{2}$ (2) $\frac{+q}{2}$

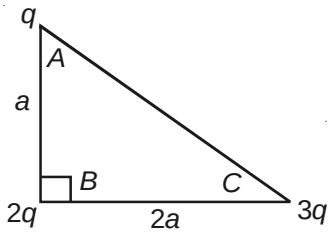
(3) – 2q (4) + 2q

6. A charge q is kept at origin, another identical charge is shifted from (3a, 0) to (a, 0). The work done in doing so, is

(1) $\frac{kq^2}{a}$ (2) $\frac{kq^2}{3a}$

(3) $\frac{2kq^2}{3a}$ (4) Zero

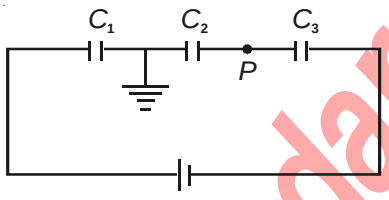
7. In the given arrangement, the energy required to interchange the position of charges at A and C, will be



(1) Zero (2) $\frac{2kq^2}{a}$

(3) $\frac{3kq^2}{a\sqrt{5}}$ (4) $\frac{kq^2}{a\sqrt{5}}$

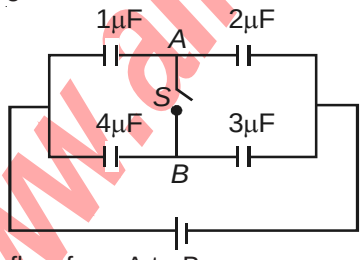
8. In the given circuit, if $C_1 : C_2 : C_3 :: 2 : 3 : 5$, then the potential at P is



(1) 6 V (2) 10 V

(3) – 10 V (4) – 16 V

9. In the given circuit diagram, when switch S is closed the charges



(1) Will flow from A to B

(2) Will flow from B to A

(3) Will not flow

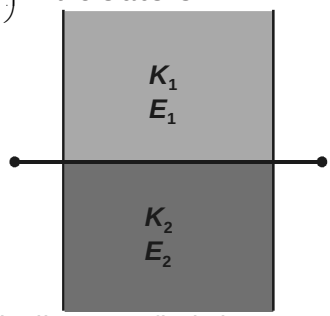
(4) May flow from A to B or B to A, depends on the potential difference of battery

10. Four identical metal plates each of area A are arranged at equal separation d as shown. Equivalent capacitance between A and B will be

(1) $\frac{2A\varepsilon_0}{3d}$ (2) $\frac{A\varepsilon_0}{2d}$

(3) $\frac{3A\varepsilon_0}{2d}$ (4) $\frac{5A\varepsilon_0}{2d}$

11. The space between the plates of a charged parallel plate capacitor is shared by two different slabs of same dimensions as shown in the figure. The ratio of electric field $\left(\frac{E_1}{E_2}\right)$ in the slabs is



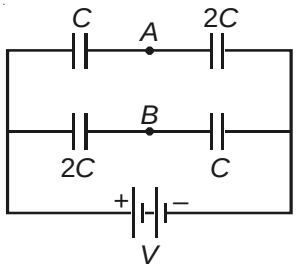
(1) $\frac{K_1}{K_2}$

(2) $\frac{K_2}{K_1}$

(3) 1

(4) $\left(\frac{K_1}{K_2}\right)^2$

12. In the given circuit diagram, find the potential difference between the two points, A and B $(V_A - V_B)$



(1) $-\frac{V}{3}$ (2) $\frac{V}{3}$

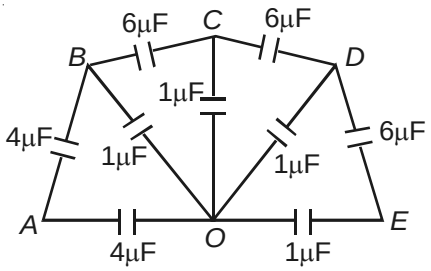
(3) $\frac{V}{9}$ (4) $-\frac{V}{9}$

13. Two identical capacitors are separately charged with batteries of potential difference V_1 and V_2 $(V_1 > V_2)$. Batteries are disconnected and the oppositely charged plates of capacitors are joined together. The common potential will be

(1) $\frac{V_1+V_2}{2}$ (2) $\frac{V_1-V_2}{2}$

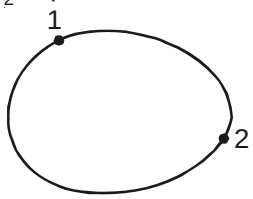
(3) $\frac{V_1}{2}$ (4) $\frac{V_2}{2}$

14. In given circuit, if a battery of potential difference of 12 V is connected across O and E, then the potential difference between O and D will be



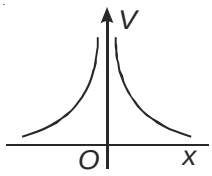
(1) 4 V (2) 8 V
(3) 12 V (4) 2 V

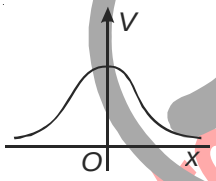
15. An egg shaped conductor shown in the diagram is given some charge. The charge densities σ_1, σ_2 and potentials V_1, V_2 at points '1' and '2' are related as

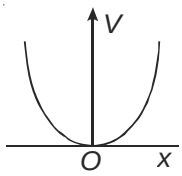


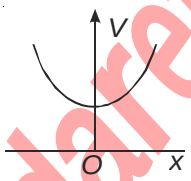
(1) $\sigma_1 = \sigma_2$, $V_1 = V_2$ (2) $\sigma_1 > \sigma_2$, $V_1 > V_2$
(3) $\sigma_1 < \sigma_2$, $V_1 = V_2$ (4) $\sigma_1 < \sigma_2$, $V_1 < V_2$

16. A point charge is kept at origin. The electric potential V on x-axis varies with x-coordinate as

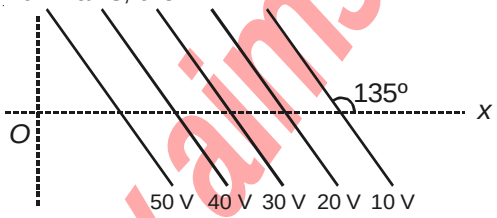
(1) 

(2) 

(3) 

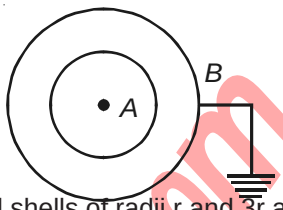
(4) 

17. In the following diagram equipotential surfaces are shown. The direction of the electric makes an angle θ with x-axis, then



(1) θ = 30° (2) θ = 45°
(3) θ = 90° (4) θ = 135°

18. Two concentric shells A and B are shown in the diagram. A is given 20 μC of charge and B is earthed. The charge appearing on B is

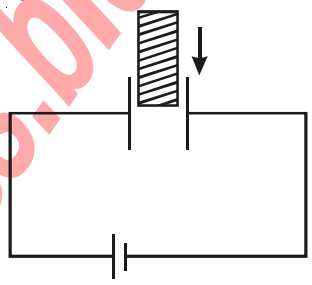


(1) – 10 μC
(2) – 20 μC
(3) 10 μC
(4) Zero

19. Two conducting spherical shells of radii r and 3r are kept at large separation. Both the shells contain equal charges. The electrostatic force between the shells is F. If the two shells are connected by a thin wire, the force between the shells become F', then the ratio $\frac{F'}{F}$ is

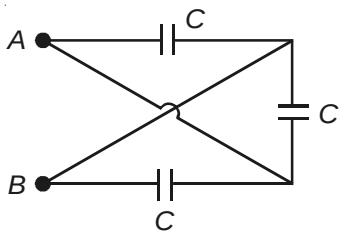
(1) 1 : 1 (2) 1 : 3
(3) 3 : 4 (4) 3 : 1

20. The diagram shows a capacitor connected with a battery. When a dielectric slab is moved inside the space between the plates of the capacitor, which of the following is incorrect?



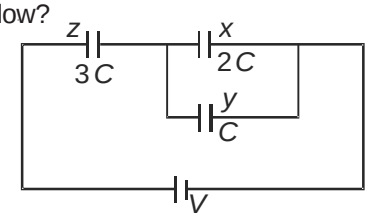
(1) Charge on the capacitor will increase
(2) Capacitance of the capacitor will increase
(3) Energy stored in the capacitor will increase
(4) Potential of the capacitor will increase

21. What is the equivalent capacitance between the points A and B?



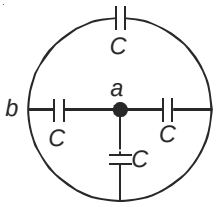
(1) 3 C (2) $\frac{2C}{3}$
(3) $\frac{C}{3}$ (4) C

22. What is the charge on the capacitor y in the network shown below?



(1) $\frac{1}{2}$ CV (2) CV
(3) $\frac{2}{3}$ CV (4) $\frac{3}{2}$ CV

23. The equivalent capacitance between the points a and b is



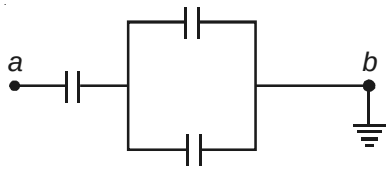
(1) 3 C

(2) $\frac{3C}{4}$

(3) $\frac{4C}{3}$

(4) C

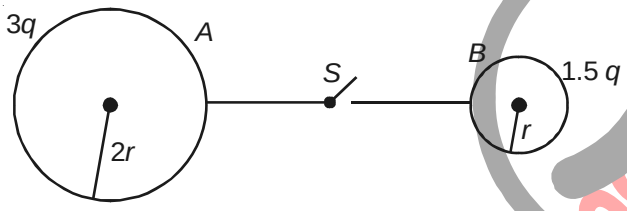
24. Three identical capacitors each with breakdown voltage of 12 V are arranged as shown, the maximum potential of the point 'a' can be



(1) 24 V (2) 18 V

(3) 12 V (4) 36 V

25. The two metallic spherical shells A and B are arranged at very large distance as shown below. When the switch S is closed, the amount of charge that will flow through the switch will be



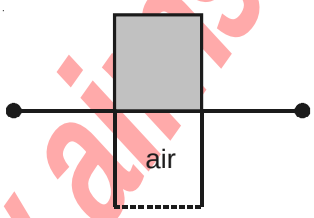
(1) 2 q

(2) 1.5 q

(3) 0.5 q

(4) Zero

26. An air filled capacitor has capacitance C. When a dielectric medium of dielectric constant K is filled in half space between the plates as shown, the capacitance becomes 3C. The value of K is



(1) 2 (2) 3

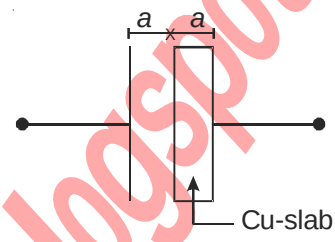
(3) 5 (4) 6

27. The plates of a parallel plate capacitor of capacitance C are circular in shape of radius R each. If a circular hole of radius $\frac{R}{2}$ is made in one plate, then the capacitance of the capacitor will become

(1) $\frac{4}{3}$C (2) C

(3) $\frac{3}{4}$C (4) $\frac{1}{2}$C

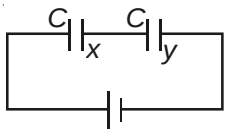
28. The capacitance of a parallel plate capacitor is C when the entire space between the plates has air. If a copper slab is put as shown in figure, which touches one plate, the capacitance becomes C' then the ratio $\frac{C'}{C}$ is



(1) 4 (2) 2

(3) 1 (4) 0.5

29. Two identical parallel plate capacitors are connected across a cell as shown below. If the separation between the plates of capacitor x is increased then charge on the capacitor y will



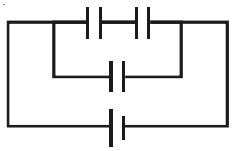
(1) Increase

(2) Decrease

(3) Remain the same

(4) Depend on the emf of the cell

30. The breakdown voltage of each of the capacitors is 24 V. The maximum emf of the battery so that the capacitors remain safe is



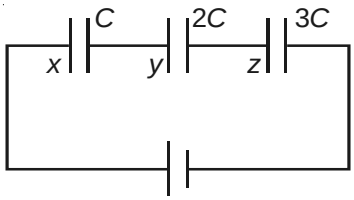
(1) 48 V

(2) 36 V

(3) 24 V

(4) 12 V

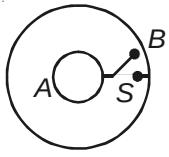
31. What is the ratio of the charge stored on the capacitors x, y and z in the diagram shown below?



(1) 1 : 2 : 3 (2) 3 : 2 : 1

(3) 6 : 3 : 2 (4) 1 : 1 : 1

32. The conducting shells A and B kept concentrically have charge q and 3q as shown. If the switch S is closed, the new values of the charges on A and B respectively will be



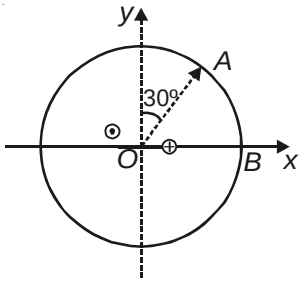
(1) 2q, 2q

(2) 3q, q

(3) 0, 4q

(4) 4q, 0

33. At the centre of a conducting shell short electric dipole is kept as shown. The ratio of potential at point A and B on the shell is



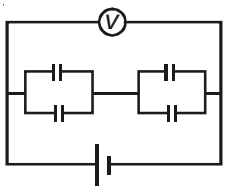
(1) 0.5

(2) 2

(3) $\frac{1}{\sqrt{2}}$

(4) 1

34. Four capacitors each of 100 μF are connected as shown in the following circuit :



A DC voltmeter reads 50 volts. The charge on each plate of the capacitors is

(1) 1.25 mC (2) 2.5 mC

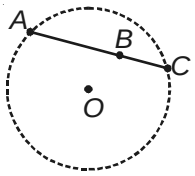
(3) 5.0 mC (4) 7.5 mC

35. A α-particle; proton and electron accelerated through the same potential difference. The ratio of their kinetic energy is

(1) 1 : 1 : 4 (2) 1 : 1836 : 7344

(3) 4 : 1 : 1 (4) 2 : 1 : 1

36. Figure shows a spherical equipotential surface work done by the electric field in moving a charge Q from A to B is W_1 and from B to C is W_2 then



(1) $W_1 > W_2$ (2) $W_1 - W_2 = 0$

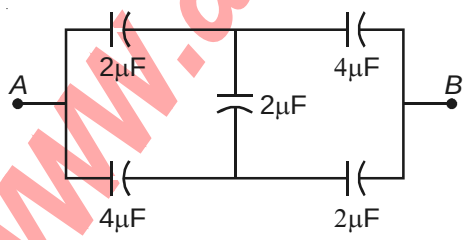
(3) $W_1 < W_2$ (4) $W_1 + W_2 = 0$

37. Charges 2Q, –Q and –Q are kept at the three vertices of an equilateral triangle. If E and V denote the electric field and potential respectively, then at the centroid

(1) E = 0, V = 0 (2) E ≠ 0, V = 0

(3) E = 0, V ≠ 0 (4) E ≠ 0, V ≠ 0

38. In the network shown below, equivalent capacitance between points A and B is



(1) 7 μF (2) 5 μF

(3) $\frac{14}{5}$ μF (4) $\frac{10}{7}$ μF

39. A parallel plate capacitor of capacitance C is charged to potential V after which the battery is disconnected. Now if an additional charge +Q is sprayed on the positive plate of the capacitor then the new potential difference between the capacitor plates will be

(1) V (2) $V + \frac{Q}{2C}$

(3) $V + \frac{Q}{C}$ (4) $\frac{Q}{C}$

40. Two capacitors each having capacitances 4 μF and breakdown voltages 20 V are joined in series. The capacitance and breakdown voltage of the combination are respectively

(1) 2 μF and 25 V (2) 2 μF and 10 V

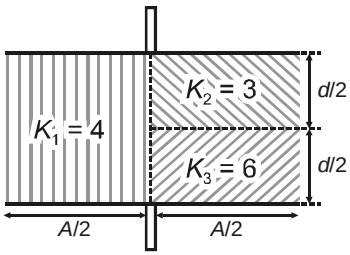
(3) 2 μF and 20 V (4) 2 μF and 40 V

41. A charge +Q is given to the outer conducting sphere of radius R_2 and the inner conducting concentric sphere of radius R_1 ($R_1 < R_2$) is grounded. Charge on the inner sphere will be

(1) –Q (2) $\frac{-QR_2}{R_1}$

(3) $\frac{-QR_1}{R_2}$ (4) Zero

42. A parallel plate air capacitor has capacitance C. Now, it is filled with three dielectrices as shown below



The equivalent capacitance of the new capacitor is

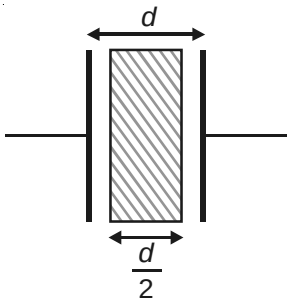
(1) 6C

(2) 4C

(3) $\frac{18C}{11}$

(4) $\frac{36C}{13}$

43. A metal slab of thickness $\frac{d}{2}$ is inserted between the plates of an air parallel plate capacitor of plate area A and plate separation d. Capacitance of the capacitor is



(1) $\frac{\varepsilon_0 A}{d}$ (2) $\frac{2\varepsilon_0 A}{d}$

(3) $\frac{\varepsilon_0 A}{2d}$ (4) Zero

44. Two concentric sphere have radii R_1 and R_2 ($R_1 < R_2$). If inner sphere is grounded then capacitance of the system is

(1) $\frac{4\pi\varepsilon_0 R_1^2}{(R_2 - R_1)}$ (2) $\frac{4\pi\varepsilon_0 R_2^2}{(R_2 - R_1)}$

(3) $\frac{4\pi\varepsilon_0 R_1 R_2}{(R_2 - R_1)}$ (4) $4\pi\varepsilon_0 R_2$

45. A capacitor of capacitance C is completely charged to potential V and then the battery is disconnected. Now this capacitor is joined to another uncharged capacitor of capacitance 2C. New potential difference across the capacitor of capacitance C is

(1) V (2) $\frac{V}{2}$

(3) $\frac{V}{3}$ (4) $\frac{V}{4}$

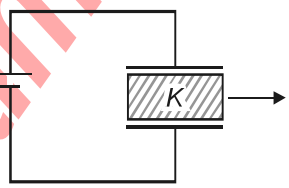
46. After charging completely the capacitor shown, the dielectric slab is pulled out while the battery remains connected. Charge flown through the battery during dielectric pulling is (C - capacitance of the capacitor without dielectric)

(1) CV(K – 1)

(2) CV

(3) CKV

(4) Zero



47. A capacitor of capacity 100 μF is being charged at a constant rate of 10 μC/s. Time taken to charge the capacitor upto 5 V will be (in second)

(1) 50 (2) 100

(3) 150 (4) 200

48. Two capacitors C_1 = 2μF and C_2 = 4μF are connected in parallel to a supply of 12 V and charged completely. Now the battery is removed and a dielectric slab of constant K = 2 is filled completely into the gap between plates of capacitor C_1. New potential drop across the capacitors will be

(1) 9 V (2) 18 V

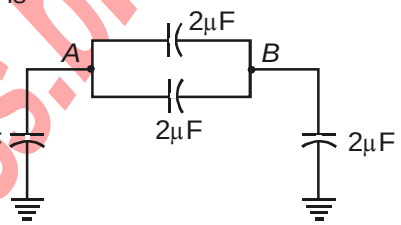
(3) 12 V (4) 24 V

49. Two identical capacitors of capacitance 4μF are charged to potential 20 V and 40 V respectively. After disconnecting from voltage source the two capacitors are joined such that plates of similar polarity are connected together. Decrease in electrostatic energy due to joining is

(1) 200 μJ (2) 400 μJ

(3) 500 μJ (4) 800 μJ

50. Equivalent capacitance of the circuit shown between A and B is



(1) 4 μF (2) 5 μF

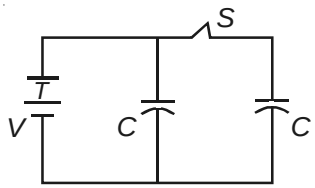
(3) 6 μF (4) $\frac{4}{5}$ μF

51. Identical charges –Q each are placed at 8 corners of a cube of side b. Electrostatic potential energy of a charge +Q placed at the centre of the cube will be

(1) $\frac{-4\sqrt{3}Q^2}{\pi\varepsilon_0 b}$ (2) $\frac{-8\sqrt{3}Q^2}{\pi\varepsilon_0 b}$

(3) $\frac{-4Q^2}{\sqrt{3}\pi\varepsilon_0 b}$ (4) $\frac{-8\sqrt{3}Q^2}{2\pi\varepsilon_0 b}$

52. In the circuit shown below, after charging both the identical capacitor, switch S is opened. Now both the capacitors are filled with a dielectric of constant K = 3. Ratio of total energy of capacitors before and after insertion of the dielectric is



(1) $\frac{2}{5}$ (2) $\frac{5}{2}$

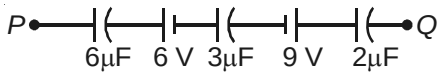
(3) $\frac{3}{5}$ (4) $\frac{5}{3}$

53. Two infinitely large conducting plates charged to $+Q_1$ and $+Q_2$ ($Q_1 > Q_2$) are brought closer to form a parallel plate capacitor of capacitance C. Potential difference between the two plates is

(1) $\frac{Q_1 - Q_2}{2C}$ (2) $\frac{Q_1 - Q_2}{C}$

(3) $\frac{Q_1 - Q_2}{4C}$ (4) $\frac{2(Q_1 - Q_2)}{C}$

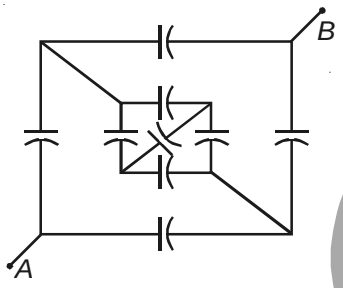
54. In the circuit shown below, electric potential of point P is greater than potential of point Q by 3 volt. Potential difference across the 3μF capacitor is



(1) 1 V (2) 2 V

(3) 3 V (4) 6 V

55. In the circuit shown below, capacitance of each capacitor is C. The effective capacitance between points A and B is



(1) $\frac{C}{2}$ (2) C

(3) 2C (4) 4C

56. A large hollow conducting sphere of radius R has a small opening at the top. Very small liquid drops each of radius r and charged to potential V fall into the sphere one by one. Potential of the sphere becomes V′ after N drops fall into it. If V′ = V then N equals

(1) $\left(\frac{R}{r}\right)^2$ (2) $\left(\frac{R}{r}\right)^3$

(3) $\left(\frac{r}{R}\right)$ (4) $\left(\frac{R}{r}\right)$

57. Choose the correct statement regarding electrostatic field E and potential V of electric dipole

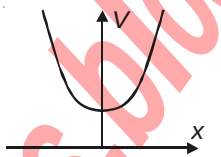
(1) If V = 0 then E must be zero

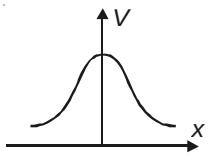
(2) If E = 0 then V must be zero

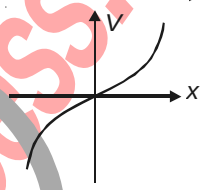
(3) If V = 0 then E must be non-zero

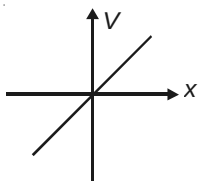
(4) If V = 0 then E must be constant

58. Two identical positive point charges Q are placed on the x-axis at x = –a and x = +a. Variation of electric potential V along the x-axis between x = –a to x = +a is

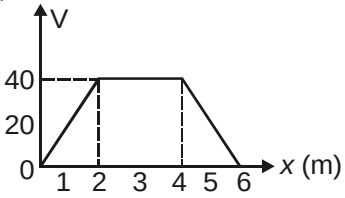
(1) 

(2) 

(3) 

(4) 

59. Variation of electric potential V as a function of position x(in metre) is shown below. The electric field at x = 5 m is



(1) 20 N/C towards +x axis

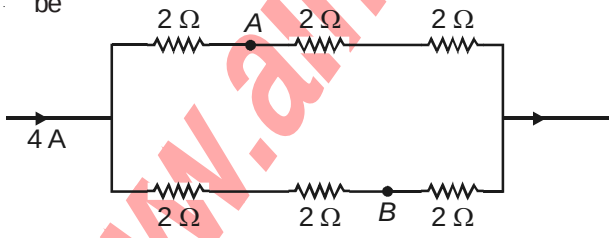
(2) 20 N/C towards –x axis

(3) 10 N/C towards +x axis

(4) 10 N/C towards –x axis

[Chapter-16 : Current Electricity]

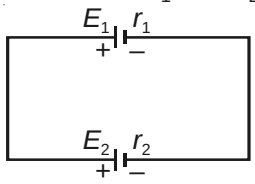
1. A current of 4 A flows in a system of conductors shown in figure. The potential difference $V_A - V_B$ will be



(1) –4 volt (2) 4 volt

(3) –2 volt (4) 2 volt

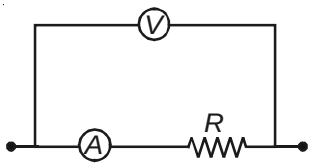
2. In given circuit, $E_2 > E_1$ and $r_1 > r_2$. If V_1 and V_2 are terminal voltages across E_1 and E_2 respectively then



(1) $V_1 = V_2$ (2) $V_1 > V_2$

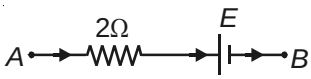
(3) $V_2 > V_1$ (4) $\frac{V_1}{V_2} = \frac{E_1}{E_2}$

3. An ammeter and a voltmeter are connected as shown in the given circuit. If voltmeter reads 12 V and ammeter reads 3 A, value of R should be



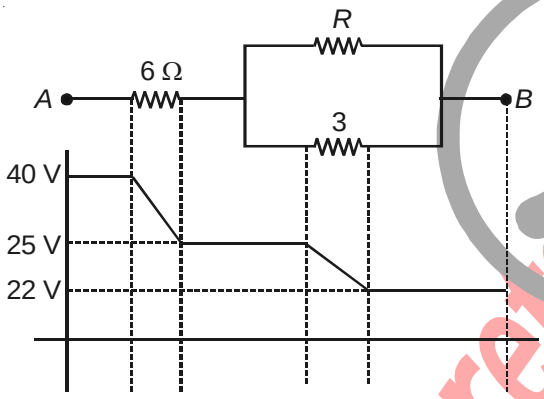
(1) Equal to 4 Ω
(2) Less than 4 Ω
(3) More than 4 Ω
(4) More than or less than 4 Ω depending upon the direction of current

4. The rate of 5 joule/second when a current of 1 ampere passes through it in the indicated direction. If the cell has no internal resistance, its emf (E) is



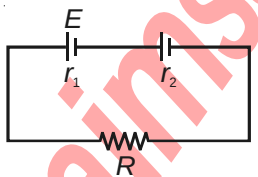
(1) 2 V (2) 3 V
(3) 5 V (4) $\sqrt{10}$ V

5. For the given circuit, potential variation is shown in the graph. The value of R is



(1) 1 Ω (2) 2 Ω
(3) 3 Ω (4) 6 Ω

6. In the given circuit, one cell has emf E as shown. If terminal voltage across both the cells are equal, the emf of other cell is

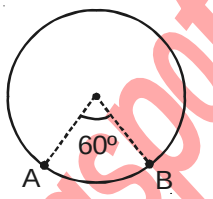


(1) $\frac{Er_1}{r_2}$ (2) $\frac{E(R+2r_2)}{(R+2r_1)}$
(3) $\frac{E(R+2r_1)}{(R+2r_2)}$ (4) $\frac{E(R+2r_1)}{(R+r_2)}$

7. A cell of e.m.f. E is connected across a resistance r. The potential difference between the terminals of the cell is found to be V. The internal resistance of the cell must be

(1) $\frac{2(E-V)V}{r}$ (2) $\frac{(E-V)r}{V}$
(3) $\frac{2(E-V)r}{E}$ (4) (E – V)r

8. A uniform wire of resistance R is looped as circle as shown. The equivalent resistance between A and B will be



(1) R (2) $\frac{R}{2}$
(3) $\frac{3R}{16}$ (4) $\frac{5R}{36}$

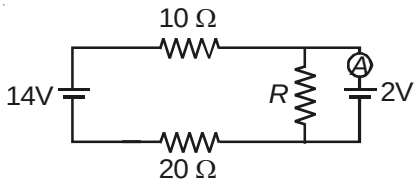
9. A current flows in a wire of circular cross-section with the free electrons travelling with a drift velocity v. If an equal current flows in a wire of the same material but of twice the radius, the new mean drift speed is

(1) $\frac{v}{4}$ (2) 4v
(3) v (4) 2v

10. In Joule's heating, if potential difference across a conductor having fixed dimension and a material of specific resistance ρ, remains constant then heat produced in the conductor is directly proportional to

(1) ρ^2 (2) ρ
(3) $\frac{1}{\sqrt{\rho}}$ (4) $\frac{1}{\rho}$

11. In the given circuit if ideal ammeter reads zero, potential difference across 10 Ω wire will be

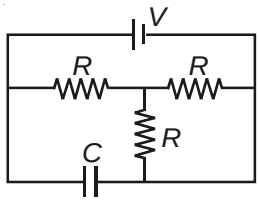


(1) 2 V (2) 4 V
(3) 8 V (4) 10 V

12. If two bulbs of wattage 40 W and 60 W respectively each rated at 110 V are connected in series with the supply of 220 V, which bulb will fuse?

(1) 40 W bulb (2) 60 W bulb
(3) Both the bulbs (4) No bulb will fuse

13. The charge on the capacitor at steady state, in given circuit will be



(1) CV (2) $\frac{CV}{3}$

(3) $\frac{2CV}{3}$ (4) $\frac{CV}{2}$

14. The emf e of a Cu–Fe thermocouple varies with the temperature θ of the hot junction (Cold junction at 0°C) as

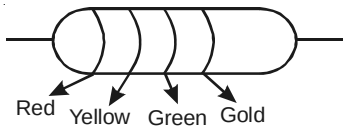
$$e(\mu V) = 14(\mu V/°C)\theta - 0.02\left(\mu V/°C^2\right)\theta^2$$

The neutral temperature is

(1) 175°C (2) 350°C

(3) 700°C (4) 87.5°C

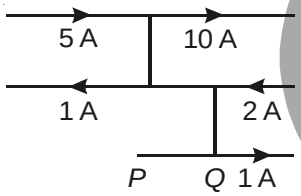
15. A carbon resistor has coloured rings as shown in figure. What is its resistance?



(1) $24 \times 10^5\ \Omega \pm 5\%$ (2) $35 \times 10^6\ \Omega \pm 5\%$

(3) $13 \times 10^4\ \Omega \pm 10\%$ (4) $36 \times 10^5\ \Omega \pm 10\%$

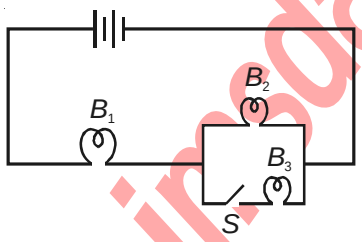
16. In the situation shown in figure, the current in arm PQ is



(1) 5 A from P to Q (2) 3 A from Q to P

(3) 5 A from Q to P (4) 3 A from P to Q

17. In the situation shown, B_1, B_2 and B_3 are identical bulbs. Which of the following change in their brightness will be noticed when switch S is closed?



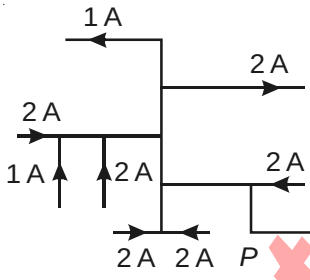
(1) B_1 remains the same, B_2 decreases

(2) B_1 increases, B_2 decreases

(3) B_1 decreases, B_2 increases

(4) B_1 decreases, B_2 decreases

18. What are the magnitude and direction of current i in the arm PQ of the portion of circuit shown below?



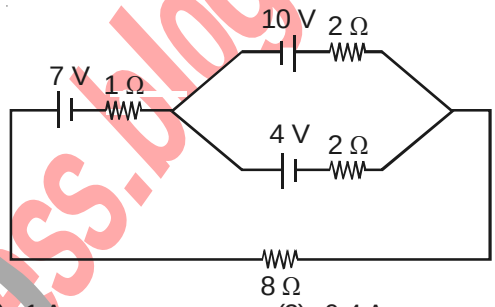
(1) 4 A (P to Q)

(2) 8 A (P to Q)

(3) 2 A (Q to P)

(4) 4 A (Q to P)

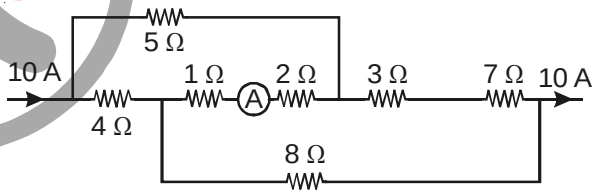
19. In the situation shown, find the current through 8 Ω resistance



(1) 1 A (2) 0.4 A

(3) 1.3 A (4) 0.3 A

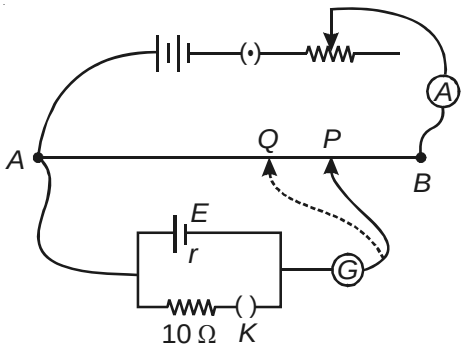
20. In the given circuit, the reading of the ammeter (resistance of ammeter = 0.01 Ω) is



(1) 10 A (2) 0.1 A

(3) Zero (4) Nearly 0.6 A

21. In the potentiometer experiment shown below, AB is potentiometer wire. When key K is closed, null point is obtained at Q (AQ = 100 cm) but when K is open, null point shifts to P (QP = 20 cm). The internal resistance r of the cell of emf E is

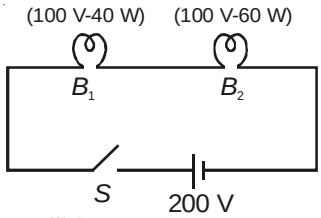


(1) 1.2 Ω (2) 2.0 Ω

(3) 0.6 Ω (4) 2.5 Ω

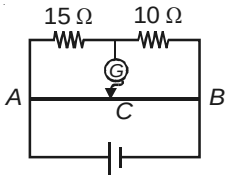
22. The potential difference across a circuit element is 50 V and the steady current through it is 5 A. Then the rate of
(1) Heat production in it may be less than or equal to 250 W
(2) Heat production in it may be greater than or equal to 250 W
(3) Power consumption in it must be 250 W
(4) Heat production must be less than 250 W

23. In the circuit shown, when switch S is closed, then



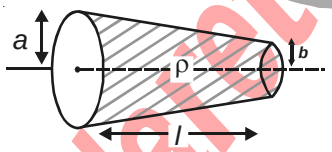
(1) Bulb B_1 will fuse
(2) Bulb B_2 will fuse
(3) Both B_1 and B_2 will fuse
(4) Neither B_1 nor B_2 will fuse

24. Wheatstone bridge AB is 100 cm long. What should be the length AC for which deflection in galvanometer is zero?



(1) 40 cm (2) 50 cm
(3) 60 cm (4) 70 cm

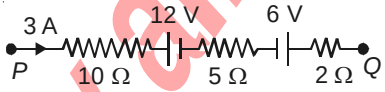
25. A conductor is in the shape of cylinder of non-uniform cross-section area. If constant current is flowing through it, then drift speed along the length



(1) Increase
(2) Decrease
(3) First increase then decrease
(4) Remain same

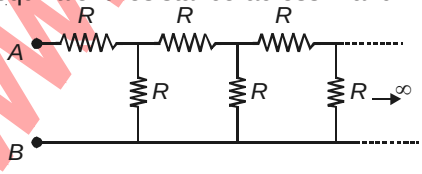
26. If length of conductor increases by x% by stretching then resistance increases by (x is small)
(1) 2x % (2) x %
(3) 4x % (4) 1.5x %

27. The potential difference across P & Q terminals of the circuit in volt is



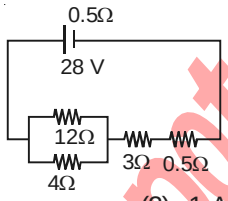
(1) 57 (2) 67
(3) 75 (4) 76

28. The equivalent resistance across A and B terminal is



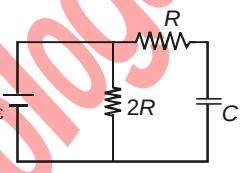
(1) $\left(\frac{\sqrt{3}+1}{2}\right)R$ (2) $\left(\frac{\sqrt{3}-1}{2}\right)R$
(3) $\left(\frac{\sqrt{5}+1}{2}\right)R$ (4) $\left(\frac{\sqrt{5}-1}{2}\right)R$

29. The current in 12 Ω resistance is



(1) 4 A (2) 1 A
(3) 3 A (4) 2 A

30. The time constant in the given circuit is

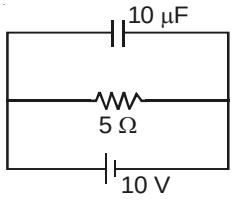


(1) $\tau = RC$ (2) $\tau = 2RC$
(3) $\tau = 3RC$ (4) $\tau = \frac{3RC}{2}$

31. Two electric bulbs have tungsten filaments of same length. One of them 60 watt and other 100 watt. Then
(1) 100 watt bulb has thicker filament
(2) 60 watt bulb has thicker filament
(3) Both filaments are of same thickness
(4) Both filament are of same resistance

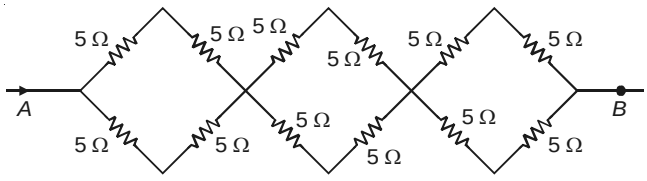
32. A wire has resistance of 12 Ω. If is bent in the form of an equilateral triangle, the effective resistance between any two corner's of the triangle is
(1) $\frac{9}{4}$ Ω (2) 12 Ω
(3) 6 Ω (4) $\frac{8}{3}$ Ω

33. If the internal resistance of the cell shown in the following diagram is 5 Ω, then charge stored on the capacitor will be



(1) 100 μC
(2) 50 μC
(3) 25 μC
(4) 12.5 μC

34. In the network of resistor shown in the figure, the equivalent resistance between A & B



(1) 15 Ω (2) 30 Ω
(3) 45 Ω (4) 60 Ω

CHEMISTRY

[Chapter-14 : Solid State]

1. In normal spinel structure there is closed packed array of O^{--} ions. The trivalent cations are present in

   (1) 75% of octahedral voids

   (2) 50% of octahedral voids

   (3) 12.5% of tetrahedral voids

   (4) 25% of octahedral voids

2. A crystalline compound AB adopts sodium chloride type structure with edge length of the unit cell as 745 pm and formula mass 74.5 g. The density of the crystalline compound is nearly

   (1) 0.16 g cm^{-3} (2) 12.0 g cm^{-3}

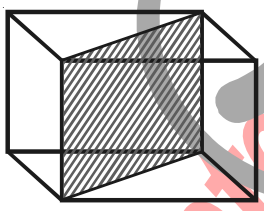
   (3) 19.9 g cm^{-3} (4) 1.20 g cm^{-3}

3. The ionic radii of K^+ and Cl^- ions are 133 and 136 pm respectively. The distance between K^+ and Cl^- in KCl is

   (1) 269 pm (2) 13.5 pm

   (3) 136 pm (4) 300 pm

4. How many such diagonals can be present in a cubic unit cell?

   (1) 2

   (2) 4

   (3) 8

   (4) 6

5. Atoms of element x form hcp lattice and those of element y occupy two third of tetrahedral voids and one thrid of octahedral voids. The formula of the compound formed by the elements x and y will be

   (1) xy (2) x_3y_4

   (3) x_2y_3 (4) x_3y_5

6. Ionic solid having molecular formula XY_2O_4, oxide ions forms C.C.P X atoms are present in octahedral void whereas Y atoms are equally distributed between octahedral and tetrahedral voids, percentage of tetrahedral voids left are

   (1) 25% (2) 87.5%

   (3) 75% (4) 12.5%

7. A solid is made up of 3 type of atoms of X, Y and Z. X atoms occupies alternate corner of the cube, Y atoms occupies alternate face centre of the cube, Z atoms occupies alternate edge centre of the cube. The formula of the compound is

   (1) $X\ Y_3\ Z_6$ (2) $X\ Y_2\ Z_2$

   (3) $X\ Y_3\ Z_3$ (4) X Y Z

8. In a solid compound x atoms are present at the corner y atoms are present at the body centre. Coordination number of x and y are respectively

   (1) 8, 8 (2) 8, 6

   (3) 6, 8 (4) 6, 6

9. What is true about the f.c.c. unit cell?

   (1) Each corner atom is surrounded by 12 face centre atom

   (2) Each face centre atoms is surrounded by four corner atom, 4 face centre atom above the plane and four face centre atom below the plane

   (3) Distance between next nearest neighbour is "a"

   (4) All of these

10. An ionic solid MCl is dopped with 10^{-3}mol of MCl_2, then the number of cationic vacancies per mole is

    (1) 10^{-3} (2) 2×10^{-3}

    (3) 6.022×10^{20} (4) $2 \times 6.02 \times 10^{20}$

11. Solid MX have rock salt structure if its molecular mass is "a" then the number of unit cell in 1 g of it is [N – Avogadro's number]

    (1) $\frac{N}{a}$ (2) $\frac{4 \times N}{a}$

    (3) $\frac{N}{4}$ (4) $\frac{N}{4 \times a}$

12. What is true about the semiconductor?

    (1) They behaves like a insulator in pure state

    (2) Conductivity of semiconductor can be increase by increasing temperature

    (3) In semiconductor the gap between valency bond and conduction bond is finite

    (4) All of these

13. FeO have rock salt structure if all the atoms along one of the body diagonal plane are removed then the number of Fe^{+2} and O^{-2} ions per unit cell are respectively

    (1) 1, 1 (2) $\frac{5}{2}, \frac{5}{2}$

    (3) 4, 4 (4) $\frac{4}{3}, \frac{3}{2}$

14. Frenkel defect in crystal is observed when

    (1) An ion leaves its normal site and occupies an interstitial site

    (2) Unequal number of cations and anions are missing from the lattice

    (3) Density of the crystal is increased

    (4) Equal number of cations and anions are missing from the lattice

15. In an ionic solid X atoms are present at the corner and face centre Y atoms are present at the edge centre and body centre. The formula of compound is
(1) XY_4 (2) X_2Y
(3) X_3Y_4 (4) XY

16. Pure Ge is doped with Al. Which type of semiconductor will form?
(1) n-type (2) p-type
(3) n, p-type (4) Intrinsic

17. Which of the following is an example of spinel structure?
(1) CsCl (2) $MgAl_2O_4$
(3) Fe_3O_4 (4) Fe_2O_3

18. In a compound AB, ionic radii of A^+ and B^- are 88 pm and 200 pm respectively then coordination number of A^+ will be?
(1) 4 (2) 8
(3) 6 (4) 12

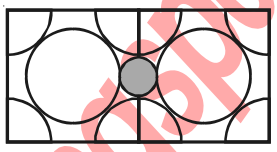
19. Which of the following is an example of antifluorite structure?
(1) Na_2O (2) CaF_2
(3) H_2O (4) Fe_2O_3

20. Co-ordination number of Na^+ and O^{--} ion in Na_2O are respectively
(1) 4, 8 (2) 8, 4
(3) 6, 6 (4) 8, 12

21. No of effective atom in H.C.P. unit cell is
(1) 4 (2) 6
(3) 8 (4) 12

22. Which of the following is/are example of two dimensional lattice?
(1) Square (2) Rectangle
(3) Rhombus (4) All of these

23. As shown in the diagram a metal M crystallizes in a f.c.c. manner if the edge length is 4 Å then the radii of the atom that could just fit into the voids is



(1) 4 Å (2) 2 Å
(3) 0.586 Å (4) 1.172 Å

24. In a crystal $a = b \neq c$, $\alpha = \beta = 90°$, $\gamma = 120°$. It is
(1) Cubic (2) Monoclinic
(3) Tetragonal (4) Hexagonal

25. Most unsymmetrical crystal system is
(1) Hexagonal (2) Triclinic
(3) Cubic (4) Orthorhombic

26. Co-ordination number Mg^{2+}, Al^{3+} in mineral spinel ($MgAl_2O_4$) are respectively
(1) 3 and 4 (2) 4 and 3
(3) 4 and 6 (4) 6 and 4

[Chapter-15 : Solution]

1. When solid HgI_2 is added to aqueous solution of KI then
(1) Vapour pressure is raised
(2) Vapour pressure is lowered
(3) Osmotic pressure increased
(4) Boiling point is raised

2. An aqueous solution of certain non-volatile non-electrolyte solute (molar mass = 150 g mol^{-1}) boils at 373.26 K (K_b for H_2O = 0.52) at 1 atm pressure. The mass % of solution is
(1) 7.5% (2) 14%
(3) 25% (4) 20%

3. Henry law constants for four gases are given below at 293 K. Which is more soluble in water at that temperature?
(1) A (K_H = 34.86 K bar)
(2) B (K_H = 69.16 K bar)
(3) C (K_H = 144.97 K bar)
(4) D (K_H = 88.84 K bar)

4. At 300 K, the two solutions of glucose A and B with respective concentration of 0.01 M and 0.001 M are separated by semipermeable membrane. How much external pressure need to be applied and on which solution so as to prevent osmosis?
(1) 0.2463 atm pressure is applied on solution B
(2) 0.2214 atm pressure is applied on solution A
(3) 0.0246 atm pressure is applied on solution B
(4) 0.0217 atm pressure is applied on solution A

5. Mole fraction of the component A in vapour phase is x_1 and mol fraction of component A in liquid mixture is x_2. (If P_A° = vapour pressure of pure A; P_B° = vapour pressure of pure B), then total vapour pressure of the liquid mixture is
(1) $\frac{P_A^\circ x_2}{x_1}$ (2) $\frac{P_A^\circ x_1}{x_2}$
(3) $\frac{P_B^\circ x_1}{x_2}$ (4) $\frac{P_B^\circ x_2}{x_1}$

6. The mole fraction of solute in 2.5 m aqueous solution is
(1) 0.043 (2) 0.43
(3) 55.5 (4) 0.55

7. Water and perchloric acid (boiling point 383 K) form constant boiling mixture at 71.6% of perchloric acid. The boiling point of the solution is
(1) > 373 K but < 383 K (2) = 373 K
(3) > 383 K (4) < 737 K

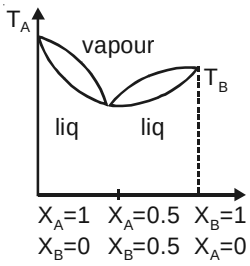
8. The values of observed and theoretical molecular masses of certain electrolyte XY are 65.4 and 114.45 respectively. The electrolyte XY in the solution is dissociated to the extent of
(1) 75% (2) 80%
(3) 50% (4) 90%

9. K_f for dioxane is 4.9, the depression in freezing point of 0.001 m solution of a solute x in dioxane is
(1) 0.49°C (2) 4.9°C
(3) 4.9×10^{-2}°C (4) 0.0049°C

10. 25 g of ethylene glycol is added in the 100 g of H_2O. How much ice will separate if solution is cooled to –10°C (k_f = 1.86)?
(1) 25 (2) 50
(3) 75 (4) 17

11. Which will form maximum boiling azeotrope?
(1) Benzene + Toluene (2) Hexane + Heptane
(3) $H_2O + H_2SO_4$ (4) $H_2O + C_2H_5OH$

12. Which curve represents minimum boiling azeotrope?

(1)


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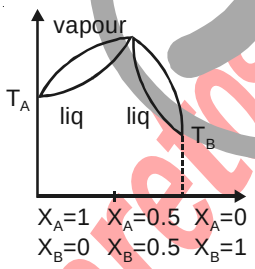
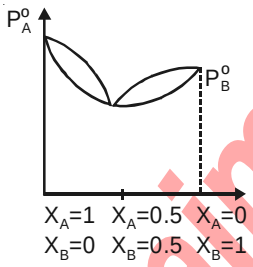


(3)


(4) Both (1) & (3)

13. Which solids will have maximum boiling points?
(1) Atomic solid (2) Covalent solid
(3) Molecular solid (4) Metallic solid

14. Which of the following is independent from the temperature?
(1) Molality
(2) Normality
(3) Percentage by $\frac{\text{Weight}}{\text{Volume}}$
(4) Molarity

15. Which of the following is colligative property?
(1) Osmotic pressure (2) Boiling point
(3) Freezing point (4) All of these

16. Which of the following is correct statement about azeotropic solutions?
(1) Neither of the component can be purified by fractional distillation
(2) Only one component can be purified
(3) Both the component can be purified above their boiling point
(4) Both the component can be purified below their boiling point

17. Which of the following will show negative deviation from Raoults law?
(1) Hexane + Heptane (2) $H_2O + H_2SO_4$
(3) $H_2O + C_2H_5OH$ (4) $H_2O + CH_3OH$

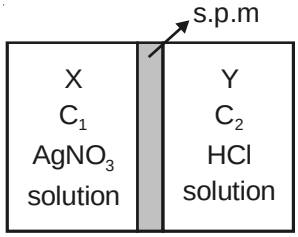
18. Van't Hoff factor i, for 0.5 M $AlCl_3$ solution if it is 40% dissociate
(1) 0.40 (2) 1.20
(3) 2.2 (4) 4

19. Phenol associates in toluene forms dimer. To what degree phenol associates if its Van't hoff factor is 0.54?
(1) 0.92 (2) 0.52
(3) 0.54 (4) 0.46

20. Which of the following aqueous solution has highest freezing point?
(1) 0.01 M Na_2SO_4 (2) 0.1 M K_2SO_4
(3) 0.25 M $FeCl_3$ (4) 0.2 M Na_3PO_4

21. 1.23 g of $Ca(NO_3)_2$ is added in 10 g of water, if elevation in boiling point is 0.975 C. Its percent ionisation will be (K_b = 0.512)
(1) 25% (2) 50%
(3) 77% (4) 33.33%

22. As shown in the diagram if $C_1 < C_2$ then white ppt of AgCl will form in



(1) X compartment (2) Y compartment
(3) Both (1) & (2) (4) No ppt. will be formed

23. 12.2 g of benzoic Acid in 100 g Benzene has ΔT_f, 2.60 if it forms dimer in the solution then its degree of association will be $k_f = 5.12$

(1) 1 (2) 0.5

(3) 0.25 (4) 0.4

24. A solution contains 58.5 g NaCl in 54 g of H_2O if relative lowering in V.P. is 0.4 then % ionisation of NaCl is

(1) 40% (2) 50%

(3) 60% (4) 100%

25. An aq V solution contains two salts MX and MX_2 if MX is 80% ionised and MX_2 is 50% ionised then Van't Hoff factor of solution will be

(1) 1.3 (2) 3.3

(3) 3.8 (4) 5.0

26. On mixing 20 ml of acetone with 20 ml of chloroform the total volume of solution is

(1) < 40 ml (2) > 40 ml

(3) = 40 ml (4) Unpredictable

27. Which of the following aqueous solutions has highest freezing point?

(1) 0.1 M KCl (2) 0.1 M $BaCl_2$

(3) 0.1 M $AlCl_3$ (4) 0.1 M Na_2SO_4

28. Two substance A and B forming ideal solutions have $P_A^\circ : P_B^\circ = 1 : 2$ and mole fractions in liquid phase as $X_A : X_B = 1 : 2$, then mole fraction of 'A' in vapour phase will be

(1) 0.33 (2) 0.25

(3) 0.52 (4) 0.2

29. Which of the following is not a characteristic of interstitial compounds?

(1) They have high melting point higher than those of pure metals

(2) They are very hard

(3) They retain metallic conductivity

(4) They are chemically active

30. A solution of W gram of urea in 500 g water is cooled to –0.5°C. The amount of ice separated is 128 g. Then value of ω will be ($K_{f(H_2O)} = 1.86$)

(1) 8 g (2) 6 g

(3) 5 g (4) 3 g

[Chapter-16 : Electrochemistry]

1. A current of 9.65 A is passed for 3 hours between nickel electrodes in 0.5 L of a 2 M solution of $Ni(NO_3)_2$. The molarity of the solution after electrolysis would be (atomic mass of Ni = 58)

(1) 0.46 M (2) 0.625 M

(3) 0.92 M (4) 1.25 M

2. Equivalent conductance of $BaCl_2$, H_2SO_4 and HCl are x_1, x_2 and x_3 S cm^2 $equiv^{-1}$ at infinite dilution. If specific conductance of saturated $BaSO_4$ solution is y S cm^{-1}, then K_{sp} of $BaSO_4$ is

(1) $\frac{10^3 y}{2(x_1 + x_2 - 2x_3)}$ (2) $\frac{10^6 y^3}{(x_1 + x_2 - 2x_3)^2}$

(3) $\frac{10^6 y^2}{(2x_1 + 2x_2 - 2x_3)^2}$ (4) $\frac{x_1 + x_2 - 2x_3}{10^6 y^2}$

3. Given standard electrode potentials

$Fe^{2+} + 2e^- \rightarrow Fe$; $E^o = -0.44$ V

$Fe^{3+} + 3e^- \rightarrow Fe$; $E^o = -0.036$ V

The standard electrode potential (E^o) for

$Fe^{3+} + e^- \rightarrow Fe^{2+}$ is

(1) – 0.476 V (2) – 0.404 V

(3) 0.404 V (4) + 0.772 V

4. Given: $E^o_{Fe^{+2}/Fe}$ = a volt, $E^o_{Fe^{+3}/Fe}$ = b volt

What is the value of $E^o_{Fe^{+3}/Fe^{+2}}$?

(1) b – a (2) b + a

(3) 2a + 3b (4) 3b – 2a

5. If hydrogen electrodes dipped in two solution of pH = 3 and pH = 6 are connected by a salt bridge, the e.m.f of the resulting cell is

(1) 0.177 V (2) 0.3 V

(3) 0.052 V (4) 0.104 V

6. A molten solution contains Fe^{2+}, Ag^+, Bi^{3+} and Pb^{2+} ions in same concentration. The value of redox potential are-Ag^+/Ag = 0.8 V, Fe^{2+}/Fe = –0.44 V, Bi^{3+}/Bi = +0.21, Pb^{2+}/Pb = –0.13 V. If sufficient voltage is applied to deposit metal then sequence of deposition will be

(1) Ag, Bi, Pb, Fe (2) Fe, Pb, Bi, Ag

(3) Bi, Pb, Ag, Fe (4) Pb, Ag, Bi, Fe

7. Given electrode potential are

$Fe^{3+} + e \rightarrow Fe^{2+}$; $E^\circ = 0.771$ V, $I_2 + 2e \rightarrow 2I^-$; $E^\circ = 0.536$ V, E^o_{cell} for the cell reaction

$2Fe^{3+} + 2I^- \rightarrow 2Fe^{2+} + I_2$ is

(1) $2 \times 0.771 - 0.536 = 1.006$ V

(2) $0.771 - 0.5 \times 0.536 = 0.503$ V

(3) $0.771 - 0.536 = 0.235$ V

(4) $0.536 - 0.771 = -0.235$ V

8. A student made the following observation in the lab
   a. Clean copper metal did not react with molar $Pb(NO_3)_2$ solution
   b. Clean lead metal dissolved in a 1 molar $AgNO_3$ solution and crystals of Ag metal appeared
   c. Clean silver metal did not react with 1 molar $Cu(NO_3)_2$ solution.

   The order of decreasing reducing character of the three metals is
   (1) Cu, Pb, Ag (2) Cu, Ag, Pb
   (3) Pb, Cu, Ag (4) Pb, Ag, Cu

9. Following are some facts about electrolytic conduction
   I. Λ_m decreases with dilution due to increase in interionic attraction between ions
   II. For weak electrolytes, there is rapid increase in degree of ionisation with dilution hence interionic attraction decreases and Λ_m increases rapidly
   III. Λ_m^∞ of KCl can be obtained by extra polation to $\sqrt{C} = 0$. Then the correct statements are
   (1) I, II, III (2) I, III
   (3) III (4) II, III

10. $Al^{3+} + 3e^- \rightarrow Al(s)$; $E^o = -1.66$ V
    $Cu^{2+} + 2e^- \rightarrow Cu(s)$; $E^o = +0.34$ V
    What voltage is produced under standard conditions to give a spontaneous reactions by combination of these two half cells?
    (1) 1.32 V (2) – 1.32 V
    (3) 2.00 V (4) – 2.00 V

11. $pt\,|H_2\ (P_1\ atm)|H^+(C_1)\|H^+(C_2)|H_2(P_2\ atm)|\,pt$
    The cell reaction is always spontaneous if
    (1) $P_1 > P_2$ & $C_1 > C_2$ (2) $P_1 < P_2$ & $C_1 > C_2$
    (3) $P_1 > P_2$ & $C_2 > C_1$ (4) $P_1 < P_2$ & $C_2 > C_1$

12. Two galvanic cells were set up, one with 2M $ZnSO_4$ and 2M $CuSO_4$, the other with 4M $ZnSO_4$ and 4M $CuSO_4$. The emf's are E_1 and E_2 respectively. Then
    (1) $E_1 = 2E_2$ (2) $E_2 = 2E_1$
    (3) $E_2 = 4E_1$ (4) $E_1 = E_2$

13. If the standard electrode potential of Cu^{2+}/Cu electrode is 0.34 V, what is the electrode potential of 0.1 M concentration of Cu^{2+}?
    (1) 3.99 V (2) 0.3105 V
    (3) 0.222 V (4) 0.176 V

14. Specific conductance of 0.1 M nitric acid is 3.6×10^{-2} $ohm^{-1}cm^{-1}$. The molar conductance of the solution is
    (1) 360 ohm^{-1} cm^2 (2) 630 ohm^{-1} cm^2
    (3) 100 ohm^{-1} cm^2 (4) 3600 ohm^{-1} cm^2

15. The resistance of 0.1 N solution of a salt is found to be 1.5×10^3 ohms. The equivalent conductance of the solution is (cell constant = 1.10 cm^{-1})
    (1) 4.6 (2) 5.6
    (3) 7.3 (4) 6.6

16. A current of strength 1.5 amp was passed through $CuSO_4$ solution for 3 minutes 21 seconds. The amount of copper deposited is [At. wt. of Cu=63.5]
    (1) 0.3175 g (2) 0.0635 g
    (3) 0.099 g (4) 6.35 g

17. A certain current liberates 1.0 g of hydrogen in 4 hrs. The amount of copper deposited from a solution of copper sulphate by the same current flowing for the same time would be nearly [At. wt. of Cu = 63.5]
    (1) 63.6 g (2) 127.2 g
    (3) 31.75 g (4) 12.72 g

18. From the solution of an electrolyte, two mole of electron will deposit at cathode
    (1) 31.75 g of Cu (2) 12 g of Mg
    (3) 23 g of Na (4) 18 g of Al

19. A current of 9.65 ampere flowing for 10 minutes deposits 3.0 g of the metal which is trivalent. The atomic mass of the metal is
    (1) 30 (2) 150
    (3) 90 (4) 289.5

20. On electrolysis, which of the following doesn't give out oxygen?
    (1) Acidic water using Pt-electrodes
    (2) Fused KOH using Pt-electrodes
    (3) Dilute H_2SO_4 using Pt-electrolytes
    (4) Dilute H_2SO_4 using Cu-electrodes

21. Iron can be protected by coating with zinc or tin. If coating is broken
    (1) Iron will corrode faster if coated with zinc
    (2) Iron will corrode faster if coated with tin
    (3) Iron will corrode faster in both cases
    (4) Iron will not undergo any corrosion in both cases

22. The given concentration cell
    $Pt\,|Cl_2\,|Cl^-_{C_1}\,\|\,Cl^-_{C_2}\,|Cl_2\,|Pt$
    The cell is spontaneous when
    (1) $C_2 > C_1$ (2) $C_1 = C_2$
    (3) $C_1 > C_2$ (4) Data insufficient

23. The number of faradays needed to reduce 8 g-equivalent of Zn^{2+} to Zn metal will be
    (1) 2 (2) 4
    (3) 1 (4) 8

24. In which one of the following, one Faraday of electricity will liberate $\frac{1}{2}$ g-atom of the metal?
    (1) $CrCl_3$ (2) $CoCl_3$
    (3) $ZnSO_4$ (4) NaCl

25. If three faradays of electricity is passed through the solutions of $AgNO_3$, $ZnSO_4$ and $CrCl_3$, the molar ratio of the cations deposited at the cathodes will be

(1) 1 : 1 : 1 (2) 1 : 2 : 3

(3) 3 : 2 : 1 (4) 6 : 3 : 2

26. At what pH of HCl solution will hydrogen gas electrode show electrode potential of –0.118 V?

(1) 2 (2) 1

(3) 3 (4) 4

27. The maximum possible electrical work that can be obtained from the following cell under the standard conditions at 25ºC, Zn | Zn^{2+} (aq) || Ni^{2+} (aq) | Ni will be [given, $E^{o}_{Zn^{2+}/Zn} = -0.76$ V, $E^{o}_{Ni^{2+}/Ni} = -0.25$ V]

(1) 98.43 kJ (2) 27.92 kJ

(3) 81.45 kJ (4) 96.5 kJ

28. The molar conductivity of acetic acid solution at infinite dilution is 390.7 $ohm^{-1}\ cm^2\ mol^{-1}$. What will be the molar conductivity of 0.01 M acetic acid solution? (given that the dissociation constant of acetic acid is 1.8×10^{-5})

(1) 6.17 $ohm^{-1}\ cm^2$ (2) 16.57 $ohm^{-1}\ cm^2$

(3) 20.33 $ohm^{-1}\ cm^2$ (4) 39.07 $ohm^{-1}\ cm^2$

29. The electrical resistance of a column of 0.05 M NaOH solution of diameter 1 cm and length 50 cm is 5.55×10^3 ohm. Its resistivity will be

(1) 0.01148 S cm^{-1} (2) 87.135 ohm × cm

(3) 229.6 S $cm^2\ mol^{-1}$ (4) 0.0018 ohm × cm

30. How many grams of chlorine can be produced by the electrolysis of molten NaCl with a current of 1.00 A for 15 min?

(1) 0.331 g (2) 0.662 g

(3) 0.151 g (4) 0.355 g

31. In electrochemical reaction

$$2Fe^{+3} + Zn \rightleftharpoons Zn^{+2} + 2Fe^{+2}$$

Increasing concentration of Fe^{+2} will

(1) Increase cell emf (2) Increase current flow

(3) Decrease cell emf (4) Alters pH of solution

32. Electrochemical equivalent of a divalent metal is 3×10^{-4}. The approximate atomic mass of the metal is

(1) 107.8 (2) 63.6

(3) 57.9 (4) 55.8

33. $Zn\,|\,Zn^{2+}_{(C_1)}\,||\,Zn^{2+}_{(C_2)}\,|\,Zn\,(s)$. The ΔG is –ve if

(1) $C_1 = C_2$ (2) $C_1 > C_2$

(3) $C_2 > C_1$ (4) $C_1 > 2C_2$

34. Select correct statement.

(1) If salt bridge is removed, potential falls to zero

(2) KCl cannot be used as electrolyte in salt bridge in case of silver electrode

(3) Cell reaction is spontaneous if emf is positive

(4) All of these

35. Which of the following solutions will have highest value of molar conductance of CH_3COOH?

(1) 1 M CH_3COOH (2) 0.5 M CH_3COOH

(3) 0.3 M CH_3COOH (4) 0.1 M CH_3COOH

36. The measured potential for

$$Mg^{2+} + 2e^- \rightleftharpoons Mg\ (s)$$

does not depend upon

(1) Raising the temperature

(2) Increasing the concentration of Mg^{2+} ion

(3) Making the magnesium plate bigger

(4) Decreasing the concentration of Mg^{2+} ion

37. The time required to coat a metal surface of 80 cm^2 with 5×10^{-3} cm thick layer of silver (density 1.05 g cm^{-3}) with the passing of 3 A current through silver nitrate solution is

(1) 115 s (2) 125 s

(3) 135 s (4) 145 s

38. If a spoon of silver metal is placed in a solution of ferrous sulphate

(1) Ag will oxidise

(2) Iron will precipitate

(3) Ag and Fe will precipitate

(4) No reaction will take place

39. The ionic conductance of Al^{3+} and SO_4^{2-} ions at infinite dilution are x and y $ohm^{-1}\ cm^2\ mol^{-1}$ respectively. If Kohlrausch's law is valid, then molar conductance of aluminium sulphate at infinite dilution will be

(1) 3x + 2y (2) 3y + 2x

(3) 2x + 2y (4) 3x + 3y

40. If emf of following reaction is x_1 volt

$8Al + 3Fe_3O_4 \longrightarrow 4Al_2O_3 + 9Fe$, $E^o = x_1$ volt

then, what will be the ΔG^o of following reaction?

$$Al + \frac{3}{8}Fe_3O_4 \longrightarrow \frac{1}{2}Al_2O_3 + \frac{9}{8}Fe$$

(1) $-3x_1$ F (2) $3x_1$ F

(3) $-\frac{3}{8}x_1$ F (4) $-24x_1$ F

41. Two moles of electrons were transferred from anode to cathode in an experiment on electrolysis of water. The total volume of H_2 and O_2 (dry) at STP produced will be

(1) 33.6 L (2) 11.2 L

(3) 22.4 L (4) 44.8 L

42. The standard reduction potential E^o for OCl^-/Cl^- and $Cl^- / \frac{1}{2}Cl_2$ respectively are 0.90 V and – 1.24 V. The E^o of $OCl^- / \frac{1}{2}Cl_2$ will be

(1) 2.14 V (2) 0.56 V

(3) – 0.17 V (4) 0.34 V

43. The two aqueous solutions; A $[Cu(NO_3)_2]$ and B [NaCl] were electrolysed using platinum electrodes. The pH of the resulting solutions will

(1) Increase in both

(2) Decrease in both

(3) Increase in A and decrease in B

(4) Decrease in A and increase in B

44. The electrolysis of aqueous solution of $CuBr_2$ using platinum electrode would lead to the evolving deposition of

(1) O_2 gas at anode

(2) Cu at cathode

(3) H_2 gas at cathode

(4) Br_2 gas at anode and O_2 gas at cathode

45. Find the minimum potential difference needed to reduce Al_2O_3 at 500°C. The free energy change for the decomposition reaction: $\frac{2}{3}Al_2O_3 \longrightarrow \frac{4}{3}Al + O_2$ is ΔG = 960 kJ

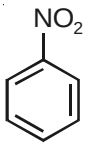
(1) – 3.623 V (2) – 2.487 V

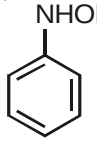
(3) – 4.356 V (4) – 0.248 V

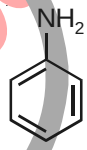
46. The standard reduction potential of Ag^+/Ag electrode at 298 K is 0.799 V. Find the potential of the Ag^+/Ag electrode in a saturated solution of AgI. (K_{sp} of AgI = 2.5×10^{-17})

(1) 0.309 V (2) 0.151 V

(3) 0.569 V (4) 0.432 V

47..  is reduced by 4 Faradays of charge. The species formed would be

(1)  (2) 

(3)  (4) 

[Chapter-17 : Chemical Kinetics]

1. In the first order reaction the concentration of reactant decreases from 2 M to 0.50 M in 20 minutes. The value of specific rate constant is

(1) 69.32 min^{-1} (2) 6.932 min^{-1}

(3) 0.6932 min^{-1} (4) 0.06932 min^{-1}

2. The rate of gaseous reaction is given by the expression $K[A]^2[B]^3$. The volume of reaction vessel is suddenly reduced to one half of the initial volume. The reaction rate relative to the original rate will be

(1) $\frac{1}{24}$ (2) $\frac{1}{32}$

(3) 32 (4) 24

3. The first order decomposition of H_2O_2 are written as

$$H_2O_{2(l)} \rightarrow H_2O_{(l)} + \frac{1}{2}O_2 \quad : \quad \text{rate} = K.[H_2O_2]$$

$$2H_2O_{2(l)} \rightarrow 2H_2O_{(l)} + O_2 \quad : \quad \text{rate} = K'[H_2O_2]$$

Which of the following relationship is true?

(1) K = K′ (2) K > K′

(3) K > 2K′ (4) 2K = K′

4. The inversion of cane sugar proceeds with half life of 600 minutes at pH = 5 for any concentration of sugar. However if pH = 6, the half life changes to 60 minutes. The rate law expression for sugar inversion can be written as

(1) $r = K[sugar]^2[H^+]^0$ (2) $r = K[sugar]^1[H^+]^0$

(3) $r = K[sugar]^1[H^+]^1$ (4) $r = K[sugar]^0[H^+]^1$

5. A gaseous reaction,

$$A_{2(g)} \longrightarrow B_{(g)} + \frac{1}{2}C_{(g)}$$

shows increase in pressure from 200 mm to 250 mm in 10 minutes. The rate of disappearance of A_2 is

(1) 10 mm min^{-1} (2) 20 mm min^{-1}

(3) 50 mm min^{-1} (4) 100 mm min^{-1}

6. For which of the following reactions K_{310}/K_{300} would be maximum?

(1) A + B → C; E_a = 50 kJ

(2) X + Y → Z; E_a = 40 kJ

(3) P + Q → R; E_a = 60 kJ

(4) E + F → G; E_a = 100 kJ

7. For decomposition of $N_2O_{5(g)}$ dissolved in CCl_4

$$2N_2O_{5(g)} \rightarrow 4NO_{2(g)} + O_{2(g)}$$

The following data at 300 K is given

Concentration of Reactant	Rate of Decomposition
0.170 M	0.050 M hr^{-1}
0.340 M	0.100 M hr^{-1}
0.680 M	0.200 M hr^{-1}

The rate equation for the reaction is

(1) rate = $K[N_2O_5]^2$ (2) rate = $K[N_2O_5]$

(3) rate = $K[N_2O_5]^3$ (4) rate = $K[N_2O_5]^0$

8. The half life period of the first order reaction $PCl_5 \rightarrow PCl_3 + Cl_2$ is 10 min. The time in which the concentration of PCl_5 would be reduced to 10% of the original concentration will be

(1) 26 minutes (2) 33 minutes

(3) 71 minutes (4) 90 minutes

9. For a zero order reaction, the plot of concentration Vs time is linear with

(1) +ve slope and zero intercept

(2) –ve slope and zero intercept

(3) +ve slop and non zero intercept

(4) –ve slop and non zero intercept

10. The rate constant of forward and backward reactions for certain hypothetical reaction are 1.1×10^{-2} and 1.5×10^{-3} respectively. The equilibrium constant for the reaction is

(1) 7.33 (2) 0.733

(3) 73.3 (4) 733

11. The rate of disappearance of $AB_3(g)$ in the reaction

$2AB_3(g) \underset{K_2}{\overset{K_1}{\rightleftharpoons}} A_2(g) + 3B_2(g)$ would be

(1) $2K_1[AB_3]^2 - 2K_2[A_2][B_2]^3$

(2) $2K_1[AB_3] - K_2[A_2][B_2]^3$

(3) $K_1[AB_3]^2 - 2K_2[A_2][B_2]^3$

(4) $K_1[AB_3] - K_2[A_2][B_2]^3$

12. For any hypothetical reaction

$2A + 3B + C \rightarrow$ Products

Experiment	[A]M	[B]M	[C]M	Rate in M sec^{-1}
1	0.5	0.5	0.5	6×10^{-4}
2	1.5	0.5	0.5	1.8×10^{-3}
3	0.5	2.0	0.5	1.2×10^{-3}
4	1.5	0.5	1.5	1.8×10^{-3}

Order of the reaction is

(1) 3 (2) 4

(3) 2 (4) 1.5

13. For the decomposition of N_2O_5 at 200°C,

$$N_2O_5(g) \rightarrow N_2O_4(g) + \frac{1}{2}O_2(g),$$

If the initial pressure is 114 mm and after 25 minutes of the reaction, total pressure of the gaseous mixture is 133 mm, the average rate of reaction in atm. min^{-1} will be

(1) 0.001 atm min^{-1} (2) 0.002 atm min^{-1}

(3) 0.003 atm min^{-1} (4) 0.004 atm min^{-1}

14. A chemical reaction $2A \rightarrow 4B + C$ in gas phase occurs in a closed vessel. The concentration of B is found to be increased by 5×10^{-3} mol L^{-1} in 10 seconds. The rate of disappearance of A will be

(1) 5×10^{-4} mol L^{-1} s^{-1}

(2) 10^{-3} mol L^{-1} s^{-1}

(3) 2.5×10^{-4} mol L^{-1} s^{-1}

(4) 1.25×10^{-4} mol L^{-1} s^{-1}

15. The rate law for a reaction is found to be

rate = $K[NO_2^-][I^-][H^+]^2$

How would the rate of reaction change when, concentration of each of NO_2^-, I^- and H^+ are tripled?

(1) 27 times (2) 39 times

(3) 8 times (4) 81 times

16. The rate of a gaseous reaction is halved when the volume of the vessel is doubled. The order of the reaction is

(1) 1 (2) 2

(3) 3 (4) Zero

17. The decomposition of NH_3 on platinum surface follows zero order kinetics with rate constant $k=2.5\times10^{-4}Ms^{-1}$. The rate of production of N_2 is

(1) 1.25×10^{-4} Ms^{-1} (2) 3.75×10^{-4} Ms^{-1}

(3) 2.5×10^{-4} Ms^{-1} (4) 15×10^{-4} Ms^{-1}

18. The rates of a reaction starting with initial concentrations of 2×10^{-3} M and 1×10^{-3} M are equal to 2.40×10^{-4} Ms^{-1} and 0.60×10^{-4} Ms^{-1} respectively. The order of the reaction with respect to the reactant is

(1) 1 (2) 2

(3) 3 (4) 1.5

19. A first order reaction is 40% complete in 50 minutes. In what time will the reaction be 80% complete?

(1) 105.2 min (2) 97.4 min

(3) 157.5 min (4) 50 min

20. The half-life period of a first order reaction is 60 minutes. What percentage of the reactant will be left behind after 120 minutes?
(1) 25% (2) 50%
(3) 75% (4) 100%

21. The three-fourth of a first order reaction is completed in 32 minutes. What is the half-life period of the reaction?
(1) 8 min (2) 16 min
(3) 4 min (4) 64 min

22. In a reaction, 5 g ethylacetate is hydrolysed per litre in the presence of dil. HCl in 300 minutes. If the reaction is of first order and the initial concentration of ethyl acetate is 20 g/L, calculate the rate constant of the reaction [log 2 = 0.301, log 3 = 0.477]
(1) 3.2×10^{-4} min^{-1} (2) 1.6×10^{-4} min^{-1}
(3) 9.6×10^{-4} min^{-1} (4) 4.3×10^{-2} min^{-1}

23. For a reaction, the energy of activation is zero. What is the value of rate constant at 300 K, if $K = 1.6 \times 10^6$ s^{-1} at 280 K?
(1) 3.2×10^6 s^{-1} (2) 1.6×10^6 s^{-1}
(3) 4.8×10^6 s^{-1} (4) 6.4×10^6 s^{-1}

24. For a first order reaction, time taken for half-life of the reaction to complete is t_1, whereas that for 3/4th of the reaction to complete is t_2. How are t_1 and t_2 related to each other?
(1) $t_2 = 2t_1$ (2) $2t_2 = t_1$
(3) $t_2 \times t_1 = 1$ (4) $t_2 = t_1$

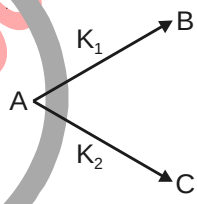
25. Two first order reactions proceed at the same rate at 25ºC, when started with same initial concentrations. The temperature coefficient of the first reaction is 2 while that of the second reaction is 3. What will be the ratio of the rates of the second reaction to the first at 55ºC?
(1) $\frac{27}{8}$ (2) $\frac{9}{8}$
(3) $\frac{81}{8}$ (4) 1 : 1

26. For a zero order reaction, starting with initial concentration Co, how long will it take for the reaction to go to completion?
(1) $\frac{Co}{2K}$ (2) Infinite
(3) $\frac{Co}{K}$ (4) Co

27. Which of the following reactions ends in finite time?
(1) Zero order (2) 1st order
(3) 2nd order (4) 3rd order

28. The half-life of a reaction is halved as the initial concentration of the reactant is doubled. The order of the reaction is
(1) 0.5 (2) 1
(3) 2 (4) 0

29. A substance undergoes first order decomposition as follows



$K_1 : K_2 = 3 : 5$
Then % distribution of B and C are
(1) 37.5% B and 62.5% C
(2) 30% B and 70% C
(3) 40% B and 60% C
(4) 20% B and 80% C

[Chapter-18 : Surface Chemistry]

1. In colloidal sulphur, molecules are held together by
(1) Hydrogen bonding
(2) Strong attraction forces
(3) van der Waal's forces
(4) Strong electrical forces

2. Which one of the following electrolytes brings about the coagulation of a gold sol quickest and in least concentration?
(1) NaCl (2) $AlPO_4$
(3) $MgSO_4$ (4) Na_2SO_4

3. Lyophilic sols have _____ between disperse phase and dispersion medium
(1) Strong attractive interaction
(2) Little attraction interaction
(3) Repulsive interaction
(4) Hydrogen bonding

4. Surface tension of a lyophilic sol is generally _____ than that of the medium
(1) Equal (2) Less
(3) More (4) Twice

5. Flocculation value is expressed in terms of
(1) Millimoles of electrolyte per litre of solution
(2) Moles of electrolyte per litre of solution
(3) Grams of electrolyte per litre of solution
(4) Millimoles of electrolyte per millilitre of solution

6. Butter is a colloid containing
(1) Fat dispersed in water
(2) Fat dispersed in oil
(3) Water dispersed in fat
(4) Water dispersed in starch

7. Bredig's arc method used for the preparation of metallic sols involves
   (1) Dispersion
   (2) Condensation
   (3) Dispersion as well as condensation
   (4) Neither dispersion nor condensation
8. Zeolites are good shape selective catalyst due to their
   (1) Honey comb like structure
   (2) Two dimensional structure
   (3) Close packed structure
   (4) Orthorhombic structure
9. Excess KI solution is added to silver nitrate solution to prepare a silver iodide sol. The maximum precipitating power for this sol is possessed by
   (1) K_2SO_4 (2) $CaCl_2$
   (3) Na_3PO_4 (4) $Al_2(SO_4)_3$
10. Which of the following compound can form micelles?
   (1) R—COOH (2) RCOOR'
   (3) $(RCO)_2O$ (4) RCOONa
11. The correct expression for Freundlich adsorption isotherm is,
   (1) $\frac{m}{x} = KP^{1/n}$ (2) $\frac{x}{m} = KP^{1/n}$
   (3) $\frac{x}{m} = \frac{K}{P^{1/n}}$ (4) $xm = KP^{1/n}$
12. Methods used for the preparation of colloidal solutions are
   (1) Peptisation
   (2) Hydrolysis
   (3) Double decomposition
   (4) All of these
13. The correct decreasing order of the volumes of gases H_2, CH_4, CO_2 and NH_3 adsorbed by 1 g of charcoal at 288 K are in the order
   (1) $H_2 > CH_4 > CO_2 > NH_3$
   (2) $CH_4 > CO_2 > NH_3 > H_2$
   (3) $CO_2 > NH_3 > H_2 > CH_4$
   (4) $NH_3 > CO_2 > CH_4 > H_2$
14. Which of the following is correct?
   (1) Chemical adsorption decreases with increases of temperature
   (2) Chemical adsorption increases with increase of temperature
   (3) Chemical adsorption first increases and then decreases with increase of temperature
   (4) Chemical adsorption first decreases and then increases with increase of temperature
15. The potential difference between fixed charged layer and the diffused Layer having opposite charge is called
   (1) Zeta potential (2) Beta potential
   (3) Alpha potential (4) Gamma potential
16. Colloidal solution of gold in water is called
   (1) Aqua dag (2) Argyrol
   (3) Purple of cassius (4) Oil dag
17. For adsorption
   (1) ΔH is (–) ve (2) ΔS is (–)ve
   (3) ΔG is (–) ve (4) All of these
18. Which of the following colloidal dispersions is a true hydrophobic colloid?
   (1) Gelatin (2) Sulphur
   (3) Starch (4) Gum
19. Micelles are
   (1) Surfactant molecules (2) Non-polar molecules
   (3) Polar molecules (4) None of these
20. Collodion is a colloidal sol of
   (1) Cellulose nitrate in ethanol
   (2) Cellulose nitrate in benzene
   (3) Cellulose nitrate in water
   (4) None of these

BOTANY

[Chapter 13 : Reproduction in Organisms]

1. Match the following

	Column-I		Column-II
a.	*Gladiolus*	(i)	Bulb
b.	Sweet potato	(ii)	Bulbils
c.	*Agave*	(iii)	Radical buds
d.	*Narcissus*	(iv)	Corm

   (1) a(i), b(ii), c(iii), d(iv) (2) a(iv), b(iii), c(ii), d(i)
   (3) a(iii), b(i), c(ii), d(iv) (4) a(i), b(iii), c(iv), d(ii)
2. What is **incorrect** for zygote?
   (1) Vital link between organisms of two generations
   (2) Sexually reproducing organisms begin life as zygote
   (3) Its development does not depend on type of life-cycle of organisms
   (4) May be formed either outside or inside the body of organism
3. When diploid embryosac develops directly from diploid megaspore mother cell and the unreduced egg of this embryosac develops into embryo. This phenomenon is called
   (1) Apospory
   (2) Diplospory
   (3) Non-recurrent agamospermy
   (4) Apogamy

4. The ploidy level of hypophysis is
(1) 2 *n* (2) *n*
(3) 3 *n* (4) 6 *n*

5. In which of the following group generally syngamy does not occur inside the body?
(1) Bryophytes (2) Pteridophytes
(3) Algae (4) Gymnosperms

6. Which of the following is **incorrectly** matched w.r.t chromosome number in meiocyte?
(1) *Ophioglossum* – 630
(2) Onion – 16
(3) *Zea mays* – 20
(4) *Pisum sativum* – 14

7. Choose **correct** match
(1) Nucule – Male sex organs
(2) Gemmae – Female sex organ
(3) Bulbils – Vegetative propagules
(4) Turions – Non-perennating buds

8. How many new plants are formed from single gemma in *Marchantia*?
(1) One (2) Two
(3) Three (4) Four

9. When syngamy occurs inside the body of the organism, the process is called internal fertilization. It is observed in
(1) *Spirogyra* (2) *Ulothrix*
(3) *Chlamydomonas* (4) *Ectocarpus*

10. Asexual reproduction is different from sexual reproduction in
(1) Involvement of single parent
(2) Absence of mitosis
(3) Having slower method of multiplication
(4) Introduction of variation in population

11. The most vital event of amphimixis is the
(1) Fusion of gametes
(2) Meiosis for the formation of gametes
(3) Development of (+) and (–) strains on gametes
(4) Production of large number of male gametes

12. The end of juvenile phase in angiospermic plant is marked by
(1) Formation of flower
(2) Formation of fruit without seed
(3) Abscission of all leaves in autumn
(4) Initiation of axillary bud

13. During the budding in yeast
(1) Nucleus divides equally and cytoplasm unequally
(2) Nucleus divides unequally and cytoplasm equally
(3) Nucleus and cytoplasm both divide unequally
(4) Nucleus and cytoplasm both divide equally

14. All given statements are **correct** w.r.t. asexual reproduction, **except**
(1) Zoospores in *Chlamydomonas* are anteriorly biflagellated
(2) Gametes may or may not be involved during asexual reproduction
(3) Sterigmata represents the ultimate branch of conidiophore bearing conidia in *Penicillium*
(4) Asexual reproduction is common among single celled organisms

15. *Chara* is a thallophyte that exceptionally has multicelled sex organs. The male sex organ is
(1) Nucule and present above ♀ sex organ
(2) Nucule and present below ♀ sex organ
(3) Globule and present above ♀ sex organ
(4) Globule and present below ♀ sex organ

16. Which of the following is not a feature of artificial/ natural methods of vegetative reproduction?
(1) They are commonly practiced in plants having reduced power of sexual reproduction
(2) Superior varieties with poor root system can be propagated
(3) Yield of progeny is not uniform
(4) Dispersal is nearly absent

17. Read the following statement for sexual reproduction
a. Sexual reproduction occurs in all living organisms
b. Only sexual reproduction occurs in organisms with simple organization
c. Sexual reproduction results in offsprings that are not identical to the parants or amongst themselves
d. Formation of diploid zygote is universal in all sexually reproducing organisms
Select the **correct** statements
(1) a & b (2) b & c
(3) c & d (4) b & d

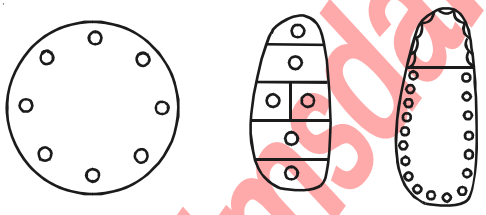
18. Which of the following is **incorrectly** matched?

a.	Syngamy	(i)	*Selaginella* species
b.	Tube cells	(ii)	Globule
c.	Shield cells	(iii)	Amphimixis
d.	Resting buds	(iv)	Nucule

(1) a(iii), b(ii), c(iv), d(i) (2) a(iii), b(i), c(iv), d(ii)
(3) a(i), b(iii), c(iv), d(ii) (4) a(iii), b(iv), c(ii), d(i)

19. The number of chromosomes in meiocyte of rice and apple are respectively
(1) 12, 34 (2) 24, 34
(3) 17, 12 (4) 10, 20

1. During microsporogenesis, in meiosis-I, karyokinesis is followed by cytokinesis, and in meiosis-II again karyokinesis is followed by cytokinesis. This type of cytokinesis which is taking place in two steps will lead to the formation of which of the following type of tetrad?
   (1) Isobilateral (2) Tetrahedral
   (3) Linear (4) Decussate
2. In which of the following pollination does not occur before opening of flowers?
   (1) *Pisum sativum* (2) *Triticum aestivum*
   (3) *Oryza sativa* (4) *Mirabilis*
3. Which of the following is **correct**?
   (1) When pollen tube enters the ovule through integuments called as porogamy
   (2) Hypohydrophily is observed in *Zostera*
   (3) Epihydrophily is observed in *Ceratophyllum*
   (4) Ornithophily is common in the members of family gramineae
4. When zygote divides by transverse division giving rise to, two unequal sized cells. The cell which is smaller is towards the _____
   (1) Chalazal region
   (2) Synergid region
   (3) Micropylar region
   (4) Integuments region
5. What would be the ploidy of PEN when hexaploid flowering plant is cross pollinated by pollen grains of tetraploid plant?
   (1) 10n (2) 5n
   (3) 8n (4) 7n
6. Select the **correct** order of endosperm types



   (1) Cellular, helobial, free nuclear
   (2) Free nuclear, cellular, helobial
   (3) Helobial, Free nuclear, cellular
   (4) Free nuclear, helobial, cellular
7. In a typical ovule the number of sporangia is
   (1) Generally 2
   (2) 4 or 2 or 1
   (3) Always 1
   (4) Generally 4
8. The female gamete in embryosac
   (1) Are 3 in number *i.e.* one egg and 2 polar nuclei
   (2) Has polarised cytoplasm
   (3) Has filiform apparatus
   (4) Is situated towards chalazal end in *Oenothera* type of embryosac
9. Select the **correct** statement w.r.t. mature male gametophyte of dicot plants
   (1) Only 2 male gametes are produced from tube cell
   (2) Generative cell gives rise to pollen tube
   (3) Antheridia is absent
   (4) Smallest cell is tube cell
10. Major difference between campylotropus and amphitropus type of ovule lies in
    (1) Non-bending of body and relative position of micropyle and funicle
    (2) Bending and non-bending of embryosac
    (3) Position of functional megaspore
    (4) Presence or absence of raphe
11. If the number of stamens in a flower of mustard is 6 and the number of microspore mother cells in each pollen sac is 100, then total number of male gametes produced per flower are
    (1) 1600 (2) 3200
    (3) 19200 (4) 2400
12. Select **incorrect** statement regarding structural and physiological characteristic of tapetum in anther
    (1) Secretes sporopollenin which make pollen grains sticky
    (2) Secretes pollenkitt which help in entomophily
    (3) Secretes proteins which are involved in pollen pistil interaction
    (4) Secretes some growth hormones and enzyme
13. Which of the following is **not** a post pollination development?
    (1) Swelling of tube cell and formation of pollen tube
    (2) Secretion of pectinase and other hydrolytic enzymes by pollen tube
    (3) Division of pollen cell into tube cell and generative cell
    (4) Formation of callose plugs in pollen tube
14. Select the **correct** statement w.r.t. *Zostera*
    (1) Shortest pollen grains
    (2) Longest pollen grains
    (3) Exine is well developed
    (4) Stigma is short
15. Select **correct** statement w.r.t. Geitonogamy
    (1) Requires pollinating agency like air etc
    (2) Produces variability in nature
    (3) May produce mosaic endosperm
    (4) Involves self sterility

16. Presence of a physical barrier between male and female organs to prevent self-pollination is called

(1) Cleistogamy (2) Herkogamy

(3) Dichogamy (4) Pseudocopulation

17. How many meiosis divisions are required to produce 200 male gametes and 200 female gametes respectively (w.r.t. higher plants) ?

(1) 50 and 100 (2) 25 and 200

(3) 50 and 200 (4) 50 and 300

18. Most common ovule among angiosperms is

(1) Resupinate ovule (2) 360° ovule

(3) Transverse ovule (4) Atropous ovule

19. Triple fusion is also called as

(1) Trophomixis

(2) Pseudo fertilization

(3) Generative fertilization

(4) More than one option is correct

20. X-bodies are two darkly stained bodies present in cytoplasm of

(1) Synergid cell before entry of pollen tube

(2) Degenerated synergid cell after entry of pollen tube

(3) Embryo sac before entry of pollen tube

(4) Pollen grain before germination

21. Which type of polyembryony is exhibited most commonly by *Citrus*?

(1) Cleavage polyembryony

(2) Simple polyembryony

(3) Mixed polyembryony

(4) Adventive polyembryony

22. A typical dicot embryo consists of

(1) Scutellum and epiblast

(2) Two cotyledons and tigellum

(3) Two cotyledons and epiblast

(4) Radicle and coleorrhiza

23. Presence of more than one embryo in a seed is called _____ when these develops from single proembryo.

(1) Cleavage polyembryony

(2) Simple polyembryony

(3) Adventive polyembryony

(4) Mixed polyembryony

24. Number of chromosomes in ♂ gamete of rice and maize are

(1) 12, 6 (2) 12, 10

(3) 19, 4 (4) 24, 20

25. Which is **not** a post-fertilization change?

(1) Integument → Seed coat

(2) Ovule → Seed

(3) Carpel → Megasporophyll

(4) Ovary → Fruit

26. How many male gametes/sperms will be produced from 10 pollen mother cells after microsporogenesis and microgametogenesis?

(1) 20 (2) 40

(3) 80 (4) 160

27. During pre-pollination development of pollen grain which one of the following events is absent?

(1) Size of pollen grain increases

(2) Migration of nucleus near pollen wall occurs

(3) Protoplast undergoes unequal mitosis

(4) Division of generative cell is inevitable in most of the flowering plants

28. Which of the following statement best describes an ovule?

(1) Integumented dehiscent megasporangium

(2) Integumented indehiscent microsporangia

(3) Integumented indehiscent megasporangium

(4) Non-integumented indehiscent megasporangium

29. Pollen grains represent

(1) The sporophytic generation

(2) The gametophytic generation

(3) The product of mitosis

(4) The future sporophyte

30. Megaspore mother cell in an ovule

(1) Is generally a hypodermal cell of nucellus near micropyle

(2) Is generally a epidermal cell of nucellus near chalaza

(3) Is generally a subhypodermal cell of nucellus near chalaza

(4) Is generally an epidermal cell of nucellus near micropyle

31. Pollen tube in angiosperms

(1) Is produced by exine

(2) Carries motile male gametes

(3) Is a sperm carrier

(4) Is produced by generative cell

32. Select the **incorrect** match
(1) Double fertilisation – Nawaschin
(2) Monocot embryo – 6-10 celled suspensor
(3) Central cell – Largest cell of embryo sac
(4) Antipodals – Absent in *Oenothera* type.

33. Anemophilous flowers do not show
(1) Nectarless and odourless flowers
(2) Pollen kitt and inserted sticky stigma
(3) Unwettable perianth and light pollen grains
(4) Large number of pollen grains and single ovule

34. In Orchidaceae, Podostemonaceae and Trapaceae
(1) Endosperm is triploid and starchy
(2) Double endosperm is found
(3) Endosperm have surface irregularity
(4) Endosperm is absent

35. Find out ploidy of endosperm when both male and female plants are hexaploid
(1) 9x (2) 15x
(3) 10x (4) 6x

36. Resemblance of flower of *Ophrys* (orchid) to female *Colpa* wasp, to attract pollinating agent is a phenomena called
(1) Co-evolution (2) Mimicry
(3) Pseudocopulation (4) Cross-pollination

37. Which group of the plant usually shows external fertilization?
(1) Algae (2) Bryophytes
(3) Pteridophytes (4) Both (1) & (2)

38. Which layer of anther wall is not derived from archaesporium?
(1) Middle layer (2) Tapetum layer
(3) Epidermis (4) Endothecium

39. Which one of the following is fore runner of male gamete?
(1) Ovule
(2) Middle layer
(3) Microspore mother cell
(4) Embryosac

40. The ovule of grasses derive its nutrition through
(1) Endothelium (2) Scutellum
(3) Placenta (4) Aleurone layer

41. In adventitive embryony, extra embryo develops directly from the cells of
(1) Nucellus (2) Integument
(3) Both (1) & (2) (4) Egg cell

42. Find out **incorrect** match
(1) Porogamy – Pollen tube enters through micropyle
(2) Basigamy – Pollen tube enters through funicle
(3) Mesogamy – Pollen tube enters through integument
(4) Acrogamy – Embryosac come out to micropyle to receive pollen tube

43. Extra embryos develop in *Citrus* seeds are
(1) Genetically identical among themselves as well as to mother plant
(2) Genetically identical among themselves but unidentical to mother plant
(3) Genetically non-identical among themselves as well as to mother plant
(4) Genetically identical to mother plant only

44. Which of the following is **not** the function of tapetum?
(1) Induce growth in ovary wall
(2) Regulate pollen germination and growth of pollen tube
(3) Pollen kit formation
(4) Secretion of callase

45. Night blooming flowers are generally pollinated by
(1) Honey bees (2) Butterfly
(3) Beetles (4) Moths

46. The unit of third whorl of floral appendages in most of the angiospermic plants is
(1) Petal (2) Microsporophyll
(3) Carpel (4) Tepal

47. Find the number of meiotic divisions occuring in anthers for the production of pollen grains required to fetilise female gametophytes developed from 1000 megaspore mother cells
(1) 100 (2) 25
(3) 250 (4) 1000

48. Find the **incorrect** statement w.r.t. tetrads of microspores
(1) Tetrahedral type of tetrads are formed in dicots
(2) Isobilateral type of tetrads are produced by successive type of cytokinesis

(3) Isobilateral type of tetrads are most common

(4) All types of tetrads are observed in *Aristolochia elegans*

49. Find the **correct** statement w.r.t. pollen grains

(1) Development of pollen grains start outside the microsporangium

(2) Pollen grains of wheat and rice maintain their viability for months

(3) Longest filamentous pollen grains are found in *Zostera*

(4) *Mirabilis* has smallest pollen grains

50. Pollen kitt is a yellow coloured, sticky layer present outside the pollen grains, which serves the purpose of

(1) Protection against UV rays

(2) Insect attractant

(3) Pollen germination

(4) More than one option is correct

51. In angiosperms pollen grains are shed at 2-celled stage in over

(1) 20% families (2) 40% families

(3) 60% families (4) 80% families

52. Ektexine is differentiated into 3 layers. The **correct** sequence of these layers from outer side to inner side is

(1) Foot layer → Baculum → Tectum

(2) Baculum → Tectum → Foot layer

(3) Tectum → Baculum → Foot layer

(4) Tectum → Foot layer → Baculum

53. Integumented indehiscent megasporangium of phanerogams is

(1) Nucellus (2) Stamen

(3) Carpel (4) Ovule

54. The ovule is attached to placenta by means of

(1) Chalaza (2) Funiculus

(3) Hilum (4) Integument

55. The *Polygonum* type embryo sac is

(1) 8-celled and 7-nucleated

(2) 4-nucleated and 4-celled

(3) 7-celled and 8-nucleated

(4) 7-celled and 5-nucleated

56. The only diploid structure in embryo sac is

(1) Nucellus (2) Integument

(3) Synergid cell (4) Secondary nucleus

57. In amphitropous ovule

(1) Body of ovule and embryo sac are curved

(2) Funiculus is coiled around the ovule

(3) Funicle, chalaza and micropyle lie in the same vertical line

(4) Body of ovule is straight

58. Chasmogamous bisexual flowers

(1) Are closed

(2) Show autogamy only

(3) May show cross pollination

(4) Are always homogamous

59. Embryo in most of the angiosperms develops at

(1) Chalazal end of ovule

(2) Centre of embryo sac

(3) Micropylar end of embryo sac

(4) Chalazal end of embryo sac

60. Primary endosperm cell (PEC) develops

(1) From any cell of embryo sac

(2) From central cell after triple fusion or pseudofertilisation

(3) Zygote after triple fusion

(4) From secondary nucleus after generative fertilisation

61. Bagging prevents contamination in

(1) Emasculated and unisexual flowers

(2) Emasculated flowers only

(3) Unisexual flowers only

(4) Non-emasculated flowers only

62. Gynoecium matures in comparison to androecium first in all, **except**

(1) *Ficus* (2) *Aristolochia*

(3) Sunflower (4) *Magnolia*

63. Find the **incorrect** statement w.r.t. pollination

(1) Anemophilous flowers produce enormous amount of pollens when compared to the number of ovules available for pollination

(2) Pollination by water is more common amongst abiotic pollinators

(3) Pollination by water is counted to about 30 genera, mostly monocotyledons

(4) Stigma is rough and sticky in entomophilous flowers

64. During megagametogenesis in most of the angiosperms

(1) Functional megaspore divides 4 times by mitosis

(2) Each nuclear division followed by wall formation

(3) Three cells arranged at chalazal pole, called egg apparatus

(4) Megaspore divides by free nuclear divisions

65. Choose **incorrect** statement regarding hybrid varieties

(1) Hybrid seeds have to be produced every year

(2) Production of hybrid seeds is costly

(3) They are made into apomictics to prevent segregation of characters

(4) Cultivation of hybrids has decreased productivity

66. Which one is **incorrect**?

(1) The smallest and lightest seed is that of *Orchis maculata*

(2) Legumes and cereals seeds are orthodox seeds

(3) Seed viability can be tested by 0.1% solution of TTC

(4) In dicots endospermic seeds are more common

67. Double fertilization involves

(1) 2 vegetative fertilization

(2) 2 syngamy

(3) 1 syngamy and one triple fusion

(4) 2 syngamy and one triple fusion

68. A tetraploid female plant is crossed with diploid male plant. What will be the ploidy of endosperm?

(1) 3n (2) 4n

(3) 5n (4) 6n

69. How many cells degenerate after fertilization in *Polygonum* type of embryo sac?

(1) 4 (2) 5

(3) 6 (4) 3

70. Pollen tube enters the embryo sac through _____ and releases its contents in _____.

(1) Degenerated synergid, synergid

(2) Degenerated synergid, antipodal cell

(3) Egg, synergid

(4) Synergid, zygote

71. Pollinium is a character of

(1) Mango and Orchid

(2) *Calotropis* and China rose

(3) Litchi and Mango

(4) Orchid and *Calotropis*

72. Mark the **correct** statement w.r.t. anther wall

(1) Tapetum is the outermost layer

(2) Exothecium is the innermost layer in *Arceuthobium*

(3) Cells of endothecium are nutritive in function

(4) Tapetal cells show increase in DNA contents by restitution nucleus formation, endomitosis and polyteny

73. During the development of isobilateral microspore tetrad

(1) Cytokinesis occurs after each karyokinesis of meiosis

(2) Meiosis is not required

(3) Karyokinesis is not required

(4) Cytokinesis occurs after complete meiotic division

74. Each male gametophyte produces two male gametes, those are

(1) Non-motile, amoeboid and unequal in size

(2) Motile, amoeboid and equal in size

(3) Non-motile, amoeboid and equal in size

(4) Motile, amoeboid and unequal in size

75. In which of the following families polysiphonous pollen grains have been reported?

(1) Cucurbitaceae and Malvaceae

(2) Cruciferae and Malvaceae

(3) Leguminosae and Solanaceae

(4) Liliaceae and Asteraceae

76. How many meiosis and mitosis divisions are required respectively to produce 32 male gametes in *Brassica*?

(1) 4, 32 (2) 4, 16

(3) 8, 32 (4) 8, 16

77. Agamospermy is/are related with

(1) Development of seed without meiosis

(2) Development of seed through diplospory

(3) Development of seed without fertilization

(4) All of the above

78. Choose **incorrect** statement w.r.t. synergids in female gametophytes of angiosperms

(1) Its cytoplasm is highly polarised

(2) One of them degenerates before the pollen tube enters the embryo sac

(3) The wall around the synergids is thick and complete

(4) Filiform apparatus is useful for absorption and transportation of nutrients

79. The most vital event of amphimixis is the

(1) Fusion of gametes

(2) Meiosis for the formation of gametes

(3) Development of (+) and (–) strains on gametes

(4) Production of large number of male gametes

80. Read the following statements w.r.t. Double fertilization
(i) It is the characteristic feature of both angiosperms and gymnosperms
(ii) It was confirmed by Guignard in *Lilium* and *Fritillaria*
(iii) Five nuclei and 3 gametes are involved in this process
Select **correct** one
(1) Only (i) is correct
(2) Only (ii) is correct
(3) Both (i) & (ii) are correct
(4) Both (ii) & (iii) are correct

81. Select the **incorrect** statement for pollination
(1) Wind pollinated flowers often have a single ovule in each ovary
(2) Pollination by water is quite rare and is limited to about 30 genera, mostly dicotyledons
(3) Some larger animals like lemurs, arboreal rodents and lizards have also been reported as pollinators in some species
(4) Cheiropterophily generally observed in flowers of tropical regions

[Chapter 15 : Principles of Inheritance and Variation]

1. All 4 types of blood groups are possible in children when
(1) Mother has blood group O and father has blood group AB
(2) Mother has blood group A and father has blood group AB
(3) Mother has blood group AB and father has blood group B
(4) Mother has blood group A and father has blood group B

2. Trisomy of 21st human chromosome is present in a human female. If the female is married with a normal male then what proportion of progeny is likely to be affected by this abnormality
(1) 50% (2) 25%
(3) 75% (4) 100%

3. Select **incorrect** statement
(1) A pureline is the progeny of a single plant obtained due to continuous self-fertilization
(2) Inbred lines are obtained in cross-fertilizing individuals due to fertilization among closely related lines
(3) A genotype cannot exhibit different phenotypes under different environmental conditions
(4) Hereditary characters have been found in chloroplast and mitochondria too

4. The number of phenotypes and types of gametes in a trihybrid cross AaBbCc × AaBbCc will be
(1) 8 and 64 (2) 8 and 8
(3) 8 and 27 (4) 27 and 27

5. In tetrahybrid (TtRrGgAa) selfing, the possibility of plant with genotype TTRrggAa in next generation would be
(1) $\frac{1}{256}$ (2) $\frac{9}{256}$
(3) $\frac{4}{256}$ (4) $\frac{2}{64}$

6. Crossing over is absent in
(1) Male *Drosophila* and *Bombax mori*
(2) Female *Drosophila* and *Bombax mori*
(3) Male *Drosophila* and female *Bombax mori*
(4) Female *Drosophila* and male *Bombax mori*

7. Blockage of phenylalanine hydroxylase leads to the appearance of disease phenylketonuria as well as
(1) Albinism
(2) Sickle cell anaemia
(3) Lesch nyhan's syndrome
(4) Tay-sach's disease

8. Choose **correct** match
(1) Patau's syndrome - Non-disjunctions
(2) Hypoploidy - Klinefelter's syndrome
(3) Auto-allopolyploidy - *Raphanobrassica*
(4) Familial's Down's syndrome - Trisomy of 21st chromosome

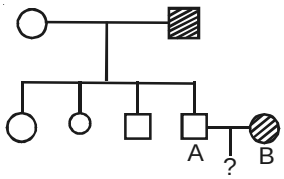
9. How many types of zygotic combinations are possible between a cross Aa BB Cc Dd × AA bb Cc DD?
(1) 32 (2) 128
(3) 64 (4) 16

10. What would be the phenotypic ratio in F_2 generation in a dihybrid cross if both the genes show lethality in homozygous dominant state?
(1) 2 : 2 : 2 : 2 (2) 4 : 2 : 2 : 1
(3) 6 : 3 : 2 : 1 (4) 9 : 3 : 3 : 1

11. The recombination frequency between the gene L and M is 7%, M and N is 12% and N and P is 15%. The distance between the gene M and P is
(1) 15 cM (2) 12 cM
(3) 19 cM (4) 3 cM

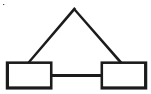
12. In the pedigree given below, a genetic disease caused by an autosomal gene (recessive) has been shown.

You would counsel the couple marked A and B that the probability that each of their children will have the disease is



(1) 0% (2) 25%

(3) 75% (4) 50%

13. In pedigree analysis the symbol  represents

(1) Consanguineous marriage

(2) Sex unspecified

(3) Monozygotic twin

(4) Dizygotic twin

14. Chromosome theory of linkage was given by

(1) Boveri and Sutton

(2) Bateson and Punnett

(3) Morgan and Castle

(4) Wilson and Stevens

15. If interference is complete the frequency of observed double crossover will be

(1) Equal to expected frequency

(2) Greater than expected frequency

(3) Lesser than expected frequency

(4) Zero

16. Which of the following chromosomal mutation can be beneficial and provide the basis for adaptive evolution?

(1) Duplication (2) Inversion

(3) Deletion/Deficiency (4) Translocation

17. F_2 phenotypic ratio by crossing AaBb would be _____ when first trait is completely dominant and second trait is incompletely dominant.

(1) 3 : 6 : 3 : 1 : 2 : 1 (2) 9 : 3 : 3 : 1

(3) $(1 : 2 : 1)^2$ (4) 9 : 3 : 1 : 2 : 1

18. How many types of gametes will be produced by a trihybrid individual, where last two genes are completely linked?

(1) Eight (2) Four

(3) Six (4) Two

19. *Drosophila* was utilized as experimental material by Morgan for his investigation, as

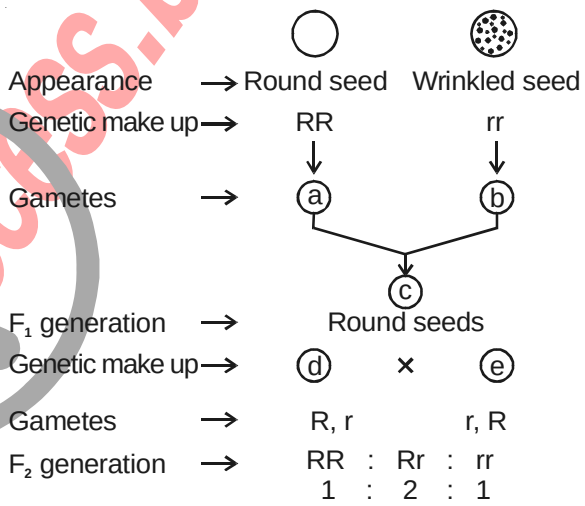
(1) It has very large size so that all the characters as easily observable without microscope

(2) Single mating produces a large number of offsprings

(3) Female flies can be easily distinguishable from male flies due to their small size

(4) New generation can be raised within two months

20. Given below is the diagram of a monohybrid cross between round and wrinkled seeded pea plants where the round allele (R) is dominant over wrinkled allele (r). From the given diagram label a, b, c, d and e.



(1) a = R, b = r, c = RR, d = rr, e = RR

(2) a = R, b = r, c = Rr, d = rr, e = RR

(3) a = r, b = R, c = rr, d = Rr, e = RR

(4) a = R, b = r, c = Rr, d = Rr, e = Rr

21. The crossover frequency between the genes X and Z is 4%, Z and Y is 10%, X and Y is 6%. Find the sequence of genes on chromosome.

(1) Z – X – Y (2) Y – Z – X

(3) X – Y – Z (4) Z – Y – X

22. A carrier female having gene for colourblindness and haemophilia on same X chromosome marries a colourblind man. What percentage of children will suffer from both traits?

(1) 100% (2) 50%

(3) 75% (4) 25%

23. Aneuploids develop due to

(1) Illegitimate crossing over

(2) Multiplication of same set of chromosome

(3) Exchange of chromosome segments between sister chromatids

(4) Non-disjunction of chromosomes

24. Which of the following represents the effect of UV rays?

(1) C → U (2) T → 5BrU

(3) T = T (dimer) (4) A → G

25. What is the probability of finding progenies having genotype AAbb in a cross involving AaBb × Aabb?

(1) $\frac{1}{2}$ (2) $\frac{3}{4}$

(3) $\frac{1}{4}$ (4) $\frac{1}{8}$

26. If a heterozygous AaBb for red flower and tallness is selfed, then calculate the number of red flowered plants among 1000 plants produced

(1) 750 (2) 500

(3) 900 (4) 250

27. In what proportion the genotype AABB, AABb, AaBB and AaBb are produced in a typical dihybrid F_2 generation?

(1) 1 : 1 : 1 : 1 (2) 1 : 2 : 3 : 4

(3) 1 : 2 : 2 : 4 (4) 9 : 3 : 3 : 1

28. How many types of gamete will be produced by genotype AaBbCcDDEE where all the genes are situated on different chromosomes?

(1) 8 (2) 16

(3) 4 (4) 32

29. The expressed phenotype in F_1 is combination of two phenotypes and their alleles in

(1) Incomplete dominance

(2) Codominance

(3) Double recessive epistasis

(4) Polygenic inheritance

30. Female heterozygous for phenylketonuria and for TSD marries a man which is also heterozygous for both traits. Find the probability of progeny to be suffering from both disorders

(1) 50% (2) 12.5%

(3) 6.25% (4) 0%

31. Person exhibiting sickle cell trait shows which of the following conditions?

(1) Hb^AHb^A

(2) Hb^SHb^S

(3) Hb^AHb^S

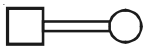
(4) More than one is correct

32. Choose the **incorrect** option

(1)  – Death

(2)  – Still birth

(3)  – Proposita

(4)  – Consanguineous marriage

33. How many total genotypes and phenotypes will be produced in a dihybrid test cross in case of independent assortment?

(1) 2 (2) 13

(3) 27 (4) 8

34. If in a dihybrid cross, 2000 individuals are produced in F_2 generation, approximately how many will be phenotypically different from parents (P-generation)?

(1) 1250 (2) 1000

(3) 1500 (4) 750

35. What respective ratio of purple flowered and white flowered individuals is expected when plants with the given genotypes are crossed in *Lathyrus odoratus*? [CcPp × ccPp]

(1) 5 : 3 (2) 2 : 6

(3) 6 : 2 (4) 3 : 5

36. Mendel's work was not taken seriously by contemporary scientists. Among the various reasons cited below, which one is **incorrect**?

(1) Non-duplication of results on Hawkweed

(2) Occupation of biological world with Darwin's theory of natural selection

(3) Non discovery of chromosome, mitosis and meiosis at that time

(4) His selection of garden pea which possessed limited number of varieties and produced limited number of seeds

37. Out of the following parental combinations, which one will produce 16 types of gametes, 16 phenotypes and 16 genotypes?

(1) TtRrWWAa × TtRrwwaa

(2) TtRrWWAA × TTRRwwaa

(3) TtRrWwAa × ttrrwwaa

(4) TtRrWwAa × TtRrWwAa

38. When a heterozygous *Cucurbita pepo* (Summer Squash) plant with disc-shaped fruit is crossed with homozygous plant with long-shaped fruit, three types of plants with disc-shaped, spherical and long fruits are produced in the ratio of _____ respectively.

(1) 9 : 6 : 1 (2) 1 : 2 : 1

(3) 2 : 1 : 1 (4) 1 : 1 : 2

39. Nitrous acid changes cytosine into _____ and adenine into _____.

(1) Xanthine, Uracil

(2) Hypoxanthine, Xanthine

(3) Guanine, Thymine

(4) Uracil, Hypoxanthine

40. What would be the blood groups of children if both parents have AB blood group?

(1) B or AB (2) O

(3) A, AB or B (4) A or AB

41. Normal parents have three normal daughters and one colour blind son. The possible reason is/are

(1) It is sex-linked inheritance

(2) Daughter is heterozygous for colour blindness

(3) Mother is carrier

(4) More than one option is correct

42. Which one of the following characters of garden pea studied by Mendel was a dominant feature?

(1) Yellow pod colour

(2) Terminal flower position

(3) Green seed colour

(4) Green pod colour

43. A pure sinistral female snail is crossed with a pure dextral male. The phenotypic ratio in F_2 is

(1) 1 Dextral : 3 Sinistral

(2) 1 Dextral : 2 Sinistral

(3) All dextral

(4) All sinistral

44. Nutritionally mutant strain of pink bread mould is called

(1) Prototroph (2) Auxotroph

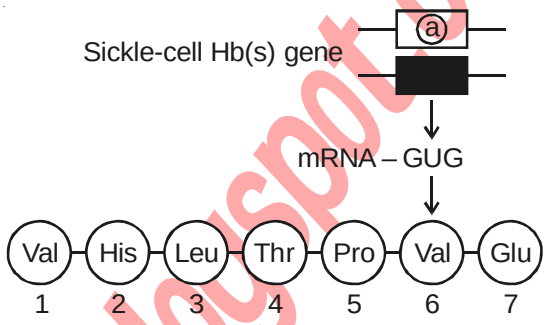
(3) Osmotroph (4) Phagotroph

45. During cross between Agouti (AABB) and Albino (aabb) mouse, the ratio of F_2 progenies with genotypes, *i.e.*, aabb, AaBB and AaBb will be

(1) 1 : 2 : 2 (2) 1 : 2 : 4

(3) 1 : 1 : 2 (4) 1 : 4 : 2

46. Following is the micrograph of red blood cells and amino acid composition of the relevant portion of β-peptide of haemoglobin from an individual with sickle-cell anaemia



The triplet nucleotides, *i.e.*, (a) of template is

(1) GTG (2) GUG

(3) GAG (4) CAC

47. Which of the following type of gamete will not be produced normally by genotype AaBbCc?

(1) AbC (2) ABc

(3) aBC (4) aBb

48. What would be the genotypic basis of ascospores arrangement in the ascus of *Neurospora crassa* if crossing over occurs at 2-stranded stage?

(1) 4Ab : 4aB

(2) 4AB : 4aB

(3) 2AB : 2Ab : 2aB : 2ab

(4) 2AB : 4Ab : 2ab

49. In a forest, if the maximum height of teak tree is 60 feet and minimum height is 32 feet. The average height of teak with aaBB genotype will be

(1) 55 feet (2) 52 feet

(3) 46 feet (4) 36 feet

50. A cross is made between AABbcc and aaBbCC typed individuals. What proportion of the offsprings will be of genotype, *i.e.*, aaBBCc?

(1) 25% (2) 12.5%

(3) 6.25% (4) Zero

51. For which of the following chromosome constitution, the sterile male is produced in *Drosophila*?

(1) AA + XY (2) AAA + XXX

(3) AA + XX (4) AA + XO

52. If a trait is controlled by 2 polygenes, then phenotypic classes will show the ratio of _____

(1) 1 : 4 : 6 : 4 : 1 (2) 9 : 3 : 3 : 1

(3) 4 : 4 (4) 6 : 3 : 2 : 1

53. If the genotype is AaBbCc. What will be percentage of gamete having two recessive alleles?

(1) 37.5% (2) 12.5%

(3) 6.25% (4) 27.5%

54. Number of grains in ear of wheat is due to

(1) Somatogenic variation

(2) Discontinuous variation

(3) Continuous variation

(4) Phenotypic plasticity

55. In a dominant epistatic gene interaction in *Cucurbita pepo*, calculate the number of phenotype and genotype in a cross AaBb × aabb

(1) 4 genotypes, 3 phenotypes

(2) 3 genotypes, 2 phenotypes

(3) 4 phenotypes, 4 genotypes

(4) 2 phenotypes, 2 genotypes

56. Read the following statements carefully and choose the **correct** option

(a) Phenotype is the external manifestation of gene product

(b) Individuals with similar phenotypes may not belong to same genotype

(c) Individuals with different phenotypes usually have similar genotypes

(d) Phenotype is not influenced by environment

(e) Phenotype remains same throughout the life of an individual

(1) b, c, & d are correct

(2) a, b & e are correct

(3) c & d are correct

(4) a & b are correct

57. Probability of heterozygous individual for all the traits produced by a cross between AaBbCC × AaBbcc is

(1) $\frac{1}{4}$ (2) $\frac{1}{8}$

(3) $\frac{1}{2}$ (4) $\frac{1}{16}$

58. Choose the **odd** one out w.r.t. the number of type of gametes formed in the given below genotypes

(1) AaBbCc (2) TtRrUuVv

(3) YyWwXxZZ (4) LlIiZZRRFf

59. Mice having yellow body colour is crossed with brown colour one. What percentage of progeny show lethality?

(1) 25% (2) 75%

(3) 0% (4) 100%

60. A heterozygous plant with red flower and tall height was crossed with recessive plant having white flower and dwarf height. What will be the percentage of plants having dwarf height?

(1) 25% (2) 75%

(3) 50% (4) 12.5%

61. What will be the number of individuals homozygous for first character and heterozygous for second character in a dihybrid cross?

(1) $\frac{4}{16}$ (2) $\frac{6}{16}$

(3) $\frac{3}{16}$ (4) $\frac{4}{64}$

62. A diploid organism is heterozygous for 5 loci. The types of gametes produced will be

(1) 16 (2) 8

(3) 32 (4) 5

63. Mendel selected _____ true breeding pea plant varieties which were similar except for _____ character(s) with contrasting traits.

(1) 7, one (2) 14, two

(3) 7, two (4) 14, one

64. Why was Mendel successful in his experiments performed on pea plant?

(1) He selected only pure breeding varieties of *Pisum sativum*

(2) He took only those traits for his studies which showed linkage

(3) Characters chosen by him were not distinctive contrasting traits

(4) He studied the inheritance of a character for only one generation

65. If mulatto man marries an albino woman (aabbcc), how many different type of phenotypes are obtained?

(1) 4 (2) 3

(3) 2 (4) 5

66. Which one of the following is not the characteristic feature of multiple allele?

(1) Individual will always have more than 2 alleles of the group

(2) A chromosome contains only one allele of the group

(3) Gametes carry single allele

(4) All multiple alleles occur on same gene locus of homologous chromosomes

67. A heterozygous purple coloured *Lathyrus odoratus* flower (CcPp) is crossed with double recessive homozygous white colour flower. What is the phenotypic ratio of purple and white flowers obtained in progeny?

(1) 9 : 7

(2) 9 : 3 : 3 : 1

(3) 1 : 3

(4) 9 : 3 : 4

68. In a Mendelian dihybrid cross, if one trait shows incomplete dominance and other trait shows homozygous dominant lethality then what will be the phenotypic ratio of progenies obtained in F_2 generation?

(1) 9 : 3 : 3 : 1

(2) 2 : 4 : 2 : 1 : 2 : 1

(3) 3 : 1

(4) 1 : 2 : 1 : 2 : 4 : 2 : 1 : 2 : 1

69. Trihybrid genotypic test cross ratio will be

(1) 1 : 1 : 1 : 1 : 1 : 1 : 1 : 1

(2) 1 : 1 : 1 : 1

(3) 1 : 1

(4) 1 : 2 : 1

70. How many type of gametes can be formed from AaBbCcDdEEZz genotype?

(1) 2^2 (2) 2^5

(3) 2^4 (4) 3^2

71. When a pea plant with intermediate sized starch grain in seed is crossed with other plant having small sized starch grain in seed, the total number of seeds obtained in progeny is 630. What is **correct** for this progeny?

(1) 330 (large size), 330 (small size)

(2) 330 (small size), 330 (medium size)

(3) 315 (intermediate size), 315 (small size)

(4) 158 (large size), 158 (small size), 314 (intermediate size)

72. Symbol utilized in pedigree analysis for unspecified sex is

(1)  (2) 

(3)  (4) 

73. The gene interaction where both dominant and recessive alleles express together and equally is

(1) Dominance

(2) Pseudodominance

(3) Incomplete dominance

(4) Co-dominance

74. Proportion of plants with purple coloured petals in sweet pea produced from Ccpp × ccPp would be

(1) $\frac{1}{4}$ (2) $\frac{3}{4}$

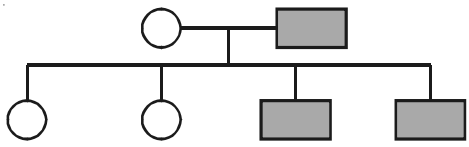
(3) $\frac{2}{4}$ (4) $\frac{3}{8}$

75. Find out the sequence of genes on chromosome if recombination frequency between genes A and B, C and D, B and C, A and C are 12%, 5%, 3% and 15% respectively

(1) ACBD (2) CBAD

(3) ABCD (4) DCAB

76. Find a correct statement w.r.t. given pedigree



(1) This can explain inheritance of hypertrichosis

(2) It may represent inheritance of an trait autosomal recessive

(3) Autosomal dominant trait shows such an inheritance

(4) All of these can be explained

77. Percentage of garden pea seeds with round shape having intermediate starch grain size will be _____, if the cross is made between BB and Bb parents.

(1) 100% (2) 50%

(3) 25% (4) 0%

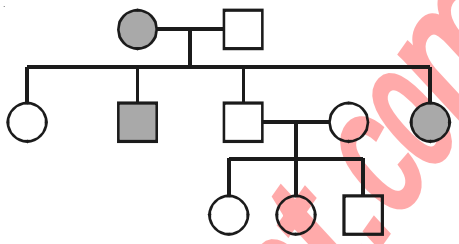
78. Which is not an effect of chemical mutagen HNO_2?
(1) Causes deamination of bases like A, G and C
(2) Causes methylation and ethylation of bases
(3) C is converted to U which pairs with A
(4) A is deaminated to hypoxanthine and pairs with C

79. Match the following **correctly**

	Column I		**Column II**
a.	Father of polygenic inheritance	(i)	Nilsson-Ehle
b.	Kernel colour in wheat	(ii)	Kolreuter
c.	Human skin colour	(iii)	Galton
d.	Human height	(iv)	Davenport

(1) a(ii), b(i), c(iv), d(iii) (2) a(i), b(ii), c(iv), d(iii)
(3) a(ii), b(i), c(iii), d(iv) (4) a(i), b(ii), c(iii), d(iv)

80. In the given pedigree, the shaded symbols indicate autosomal _____ trait.



(1) Recessive
(2) Dominant
(3) Incompletely dominant
(4) More than one option is correct

ZOOLOGY

[Chapter 11 : Reproduction in Organisms, Human Reproduction]

1. The type of parthenogenesis wherein the parthenogenetic egg may develop into individual of any sex is known as
(1) Arrhenotoky (2) Thelytoky
(3) Amphimixis (4) Amphitoky

2. Which of the following structure in the human male reproductive system can be considered equivalent to the mesorchium?
(1) Dartos muscles (2) Cremaster muscles
(3) Gubernaculum (4) Detrusor muscles

3. Testis in the male reproductive system is surrounded by 3 covers. Which of the following cover is the outermost?
(1) Mesorchium (2) Tunica vaginalis
(3) Tunica vasculosa (4) Tunica albuginea

4. Which of the following can't be taken as the character/function of the sertoli cell?
(1) Release of ABP
(2) Contribute to major part of semen
(3) Release of AMF
(4) Formation of blood testes barrier

5. Which of the following act as a direct link between the ovary and the wall of the uterus?
(1) Broad ligament (2) Mesovarium
(3) Ovarian ligament (4) Mesosalpnix

6. 'Inhibin' hormone which regulates the release of 'FSH' by acting on adenohypophysis and hyothalamus, is released by
(1) Endocrine cells or Interstitial cells of testes
(2) Sertoli cells of testes
(3) Granulosa cells of ovary
(4) Both (2) & (3)

7. Which of the following structrue in the Graafian follicle acts as a link between the developing oocyte and wall of the follicle?
(1) Tunica vaginalis (2) Jelly envelope
(3) Cumulus ovaricus (4) Corona radiata

8. If a female is having a menstrual cycle of 32 days, what will be the day of ovulation in this case?
(1) 14^{th} day (2) 10^{th} day
(3) 18^{th} day (4) 16^{th} day

9. If one of the ovary of a female fails to develop, how many ova will be released by her in one year provided no fertilisation occurs?
(1) Only 6
(2) No ova will be released
(3) Less than 6
(4) Approximately 12

10. Which of the following structure is referred to as white scar or white body of the ovary?
(1) Corpus albicans
(2) Stroma part of ovary
(3) Tunica albuginea of ovary
(4) Follicles of the ovary

11. At the time of ovulation, how many polar bodies will be present in the human ovum?

(1) Three (2) Two

(3) One (4) None of these

12. In human, the ovum is first released from the ovary into

(1) Body cavity (2) Isthmus part

(3) Fimbriae of oviduct (4) Ampulla part

13. Which of the following acrosomal enzyme of the sperm is involved in dissolution of proteoglycan filaments of granulosa layer surrounding the ovum?

(1) Hyaluronidase (2) Acrosin

(3) Zona lysin (4) Both (1) & (2)

14. Which part of the blastocyst contributes to the formation of foetal part of placenta?

(1) Epiblast layer (2) Trophoblast layer

(3) Hypoblast layer (4) Inner cell mass

15. Which of the following will be included under slow block to prevent polyspermy?

(1) Depolarisation of egg membrane

(2) Cortical reaction

(3) Zona reaction

(4) Both (2) & (3)

16. The type of placenta in early human embryo on the basis of distribution of chorionic villi is

(1) Discoidal (2) Diffuse

(3) Metadiscoidal (4) Zonary

17. The cells of the trophoblast which are in contact with the inner cell mass are called

(1) Extra embryonic cells

(2) Cells of Rauber

(3) Germinal cells

(4) Renshaw cells

18. In which of the following type of placenta, no maternal barrier is left *i.e.* only fetal layers are involved?

(a) Endotheliochorial

(b) Hemochorial

(c) Hemoendothelial

(1) Only (b) (2) Only (c)

(3) Both (a) & (c) (4) Both (b) & (c)

19. Which of the following is correct w.r.t. extra embryonic layers involved in formation of Allantois?

(1) Somatopleuric extra embryonic mesoderm + Trophoblast

(2) Splanchnopleuric extra embryonic mesoderm + Endoderm

(3) Somatopleuric extra embryonic mesoderm + Endoderm

(4) Splanchnopleuric extra embryonic mesoderm + ectoderm

20. Which of the following character can't be linked to the colostrum in human?

(1) Poor in Iron content

(2) Vitamin C is present in small quantity

(3) Contain IgM antibodies to provide immunity

(4) Casein and lactose are present

21. Which of the following structures in the testes acts as link between tubuli recti and vasa efferentia?

(1) Seminiferous tubule (2) Rete testis

(3) Vasa deferentia (4) Epididymis

22. Which of the following can't be taken as character of the Sertoli cells?

(1) Present in between germinal epithelial cells

(2) Elongated structure

(3) Secrete androgen and inhibin to regulate FSH

(4) Release Anti Mullerian factor

23. The type of blastula which develops from centrolecithal egg in which the yolk is present in centre of the egg

(1) Periblastula (2) Discoblastula

(3) Stereoblastula (4) Coeloblastula

24. Extra embryonic coelom *i.e.* chorionic cavity is lined by

(1) Ectoderm of chorion and endoderm of amnion

(2) Ectoderm of amnion and mesoderm of chorion

(3) Mesoderm of chorion and mesoderm of amnion

(4) Endoderm of allantois and ectoderm of amnion

25. If the foetal testis (within 8 months) is not able to produce sufficient amount of testosterone then

(1) Cremaster muscles are not allowed to form spermatic cord

(2) Testes fails to descend in scrotum

(3) Inguinal hernia is commonly reported

(4) No effect on sperm formation and maturation

26. Which of the following acts as ''precursor of the embryo'' in human embryonic development?

(1) Trophoectoderm (2) Primitive streak

(3) Cells of Rauber (4) Embryonic knob

27. The state of suspension of estrons cycle, during non-breeding season is called _____

(1) Polyestrous (2) Anestrum

(3) Monoestrous (4) Reflex ovulation

28. When every part of fertilized egg has a definite fate, so that fate of every blastomere is determined from beginning is called _____

(1) Indeterminate

(2) Regulative cleavage

(3) Determinate cleavage

(4) Both (1) & (2)

29. During embryonic development in human, Zona pellucida disappears _____

(1) After one month of pregnancy

(2) Just after fertilization

(3) Just before implantation

(4) Any time in 2nd trimester

30. Migration or spreading of the micromeres all over the megameres in the development of frog is known as

(1) Invagination (2) Involution

(3) Epiboly (4) Emboly

31. The egg membrane which is secreted by the follicular cells around the ovum is

(1) Primary egg membrane

(2) Secondary egg membrane

(3) Tertiary egg membrane

(4) Chalazae

32. Which of the following hormone induces cervical glands to secrete viscous mucus to form a protective plug?

(1) Estrogen (2) hCG

(3) Progesterone (4) GnRH

33. If a mother does not feed her baby, there is inhibition of milk production . The autocrine action thus meets the need of supply with demand, it is due to the presence of

(1) VIP (2) Inhibin

(3) Inhibitory peptide (4) CRH

34. During parturition which of the following stage involves the rupturing of the amniotic sac?

(1) Expulsion phase (2) Ectopic phase

(3) Stage of dilation (4) Placental phase

35. The type of reproduction in which only females are produced as a result of parthenogenesis is called as

(1) Thelytoky

(2) Arrhenotoky

(3) Natural parthenogenesis

(4) Amphitoky

36. After ovulation the path of secondary oocyte in fallopian tube is

(1) Fimbriae → Infundibulum → Ampulla → Isthmus

(2) Fimbriae → Isthmus → Infundibulum → Ampulla

(3) Fimbriae → Coelomic cavity → Infundibulum → Ampulla → Isthmus

(4) Isthmus → Fimbriae → Infundibulum → Ampulla

37. Spermiation is

(1) The process of release of sperms from seminiferous tubules

(2) The process of conversion of spermatids from spermatogonia

(3) The process of conversion of spermatids into sperms

(4) The low count of sperms in semen

38. Incomplete parthenogenesis is found in

(1) *Lacerta sexicola armaniaca*

(2) *Typhlina brahmina*

(3) *Ambystoma*

(4) Honey bees

39. The first movement of the foetus and appearance of hair on the head are usually observed during

(1) Fifth week (2) Fifth month

(3) Seventh month (4) Third month

40. Leydig cells stimulates synthesis and secretion of androgens under the influence of

(1) FSH (2) ICSH

(3) Estrogen (4) All of these

41. Primary oocytes undergo meiosis-I and get temporarily arrested at the stage called

(1) Metaphase-I

(2) Anaphase-I

(3) Diakinesis of prophase-I

(4) Diakinesis of prophase-II

42. Zona pellucida is formed in

(1) Primary oocyte (2) Primary follicle

(3) Secondary oocyte (4) Secondary follicle

43. Which of the following hormones achieves two peaks during the menstrual cycle?

(1) FSH (2) LH

(3) Estrogen (4) Progesteron

44. Capacitation of sperm includes all except

(1) Removal of membrane cholesterol present over acrosome

(2) Dilution of decapacitation factors

(3) Entry of Ca^{2+} into sperms causing rapid whiplash motion of the tail part

(4) It takes place in epididymis

45. Entry of sperm causes

(1) Breakdown of metaphase promoting factor and anaphase promoting factor

(2) Turning on metaphase promoting factor only

(3) Break down of anaphase promoting factor only

(4) Breakdown of metaphase promoting factor and turning on anaphase promoting complex

46. Which of the following is not a function of placenta?

(1) Nutrition (2) Endocrine

(3) Excretion (4) Haemopoiesis

47. Foetus is less susceptible to tetratogens

(1) During formation of extra embryonic embrane

(2) After first trimester

(3) After formation of placenta

(4) After formation of neural tube

48. Sertoli cells also termed as nurse cells secrete androgen binding proteins which helps in

(1) Inhibiting LH/ICSH released by anterior pituitary

(2) Concentrating testosterone in the seminiferous tubules

(3) Providing nutrition to developing spermatozoa

(4) Inhibiting development of mullerian duct in male

49. Which of the following is incorrect statement w.r.t. spermatogenesis and release of sperms

(1) FSH acts at the leydig cells and stimulates synthesis and secretion of androgens

(2) LH acts on the sertoli cells and stimulates secretion of some factors to assist spermiogenesis

(3) Secretion of epididymis, vas-deferens, seminal vesicle and prostate are essential for maturation and motility of sperms

(4) Both (1) & (2)

50. Which of the following is incorrectly matched?

(1) Hyaluronidase - Dissolves hyaluronic acid responsible for cementing granulosa cells

(2) Corona penetrating enzyme - Dissolved corona radiata

(3) Zona lysin - Digests the zona pellucida

(4) Cortical reaction - Fast block to check polyspermy

51. Implantation is the attachment of the blastocyst to the uterine wall. It occurs after

(1) 9 days of fertilization

(2) 5 days of fertilization

(3) 7 days of fertilization

(4) 120 hours of fertilization

52. Which of the following provides nutrition to the embryo?

(1) Zona pellucida (2) Corona radiata

(3) Trophoectoderm (4) Hypoblast layer

53. Embryoproper develops from

(1) Trophablast (2) Cells of Rauber

(3) Inner cell mass (4) Abembryonal end

54. The trophoblastic cells secrete

(1) hCG (2) hPL

(3) LH (4) Progesterone

55. A human male ejaculates about 200 - 300 millions sperms of which at least _____ sperms must have normal shape and size and at least _____ of them must show vigorous motility for normal fertility

(1) 60%, 40% (2) 10%, 20%

(3) 40%, 60% (4) 40%, 30%

56. Spermatic cord is inguinal cord containing following structure except

A. Artery and vein B. Nerve, lymph vessel

C. Cremaster muscle D. Dartos muscle

(1) A, B, C & D (2) B & D

(3) A, B & D (4) Only D

57. Glands of Tyson are modified _____ glands, located in the prepuce and glans penis.

(1) Sweat (2) Sebaceous

(3) Meibomian (4) Sudoriferic

58. Removal of womb is called

(1) Castration (2) Hysterectomy

(3) Cryptorchidism (4) Prostatectomy

59. Cremaster muscles are found in

(1) Scrotal sac (2) Testes

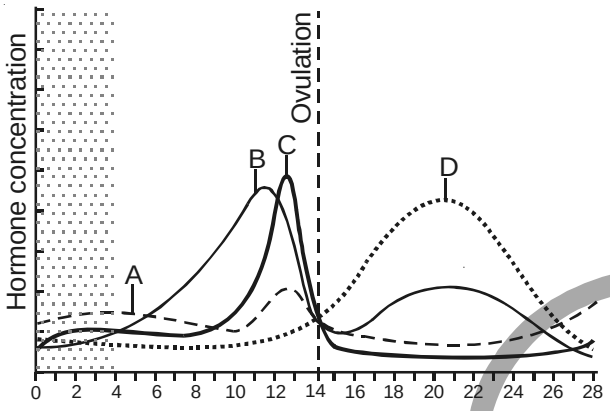
(3) Seminal vesicles (4) Spermatic cord

60. In girls, first event of puberty is called

(1) Thelarche (2) Pubarche

(3) Menarche (4) Menopause

61. Diagram is showing hormonal regulation of menstrual cycle. Which labelling is showing progesterone hormone



(1) A (2) B

(3) C (4) D

62. Vas deferens emerges from

(1) Caput epididymis (2) Corpus epididymis

(3) Cauda epididymis (4) Ejaculatory duct

63. A T.S. from glans penis will show

(1) Corpus spongiosum (2) Corpora cavernosa

(3) Penile urethra (4) Both (1) & (3)

64. Menstruation occurs in

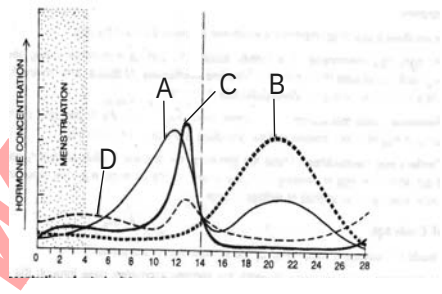
(1) Humans only

(2) All mammals

(3) Humans, apes and old world monkeys

(4) Humans, apes only

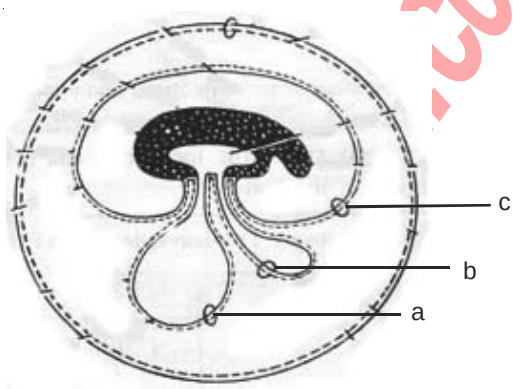
65. In the given graph the concentration of hormone in the blood in different stages of menstrual cycle has been shown. Identify the hormones which show the highest peak just prior to the ovulation.



(1) A = FSH (2) B = Oestrogen

(3) C = LH (4) Both A & B

66. The figure shows extraembryonic membranes. Identify the membranes marked as a, b and c.



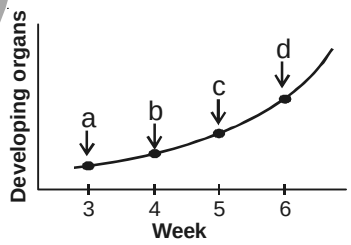
(1) a – Yolk sac ; b – Amnion ; c – Allantois

(2) a – Amnion ; b – Yolk sac ; c – Allantois

(3) a – Allantois ; b – Yolk sac ; c – Amnion

(4) a – Yolk sac ; b – Allantois ; c – Amnion

67. Developmental changes in human embryo during 3rd to 6th week have been depicted as a, b, c and d in the following graph. Identify them.



(1) a - Umbilical cord, b - Neural tube
c - Heart, d - Brain

(2) a - Neural tube, b - Heart, c - Limb bud, d - eye

(3) a - Umbilical cord, b - heart, c - Neural tube,
d - brain

(4) a - Neural tube, b - Umbilical cord, c - Heart,
d - Brain

68. Phocomelia is

(1) Absence of brain

(2) Reduplication of bones

(3) Absence of long bones

(4) None of these

1. Which of the following contraceptive device suppresses sperm motility and the fertilising capacity of the sperms?
   (1) Nonoxynol-9 (2) Sterilisation
   (3) Copper releasing IUD (4) Saheli
2. Choose the incorrect statement
   (1) Complete lactation could be a natural method of contraception
   (2) Creating awareness about sex related aspects is an effective method to improve reproductive health
   (3) Infertility is always due to defects in the female partner
   (4) Abortions can occur spontaneously too
3. The semen collected from healthy donor is artificially introduced into the uterus is called
   (1) Intra-uterine transfer (IUT)
   (2) Intra-uterine insemination (IUI)
   (3) Intra-uterine device (IUD)
   (4) Intra cytoplasmic sperm injection (ICSI)
4. Periodic abstinence is one of the natural contraceptive method in which the couples avoid or abstain from coitus from
   (1) Day 5 to 10 of the menstrual cycle
   (2) Day of ovulation till next menstruation
   (3) Day 10 to 17 of the menstrual cycle
   (4) Day 1 to 5 of menstrual cycle
5. Which of the following is incorrect w.r.t. minipill 'Saheli'?
   (1) Non steroidal
   (2) Causes asynchrony in the menstrual cycle
   (3) Prevents ovulation
   (4) Causes lining of the uterus to build more slowly
6. Consider following statements
   (i) Contraceptive pills alter the quality of cervical mucous to retard entry of sperms
   (ii) Saheli is an oral contraceptive contains steroid preparation
   (iii) Saheli is the "once a week" pill with very few side effects and high contraceptive value
   (iv) Cervical caps, vaults and diaphragms are reusable

   Which of the above statements are true?
   (1) (i), (ii) & (iii) (2) (ii), (iii) & (iv)
   (3) (i), (iii) & (iv) (4) (i), (ii), (iii) & (iv)
7. Which of the following criteria can be considered as the difference between oral contraceptive pills and injections or implants?
   (1) Mode of action
   (2) Mode of administration
   (3) Duration of effective periods
   (4) Both (2) & (3)
8. Administration of which contraceptive device within 72 hours of coitus have been found to be very effective as emergency contraceptives as they could be used to avoid possible pregnancy due to casual unprotected intercourse?
   (1) Progestogen estrogen combinations
   (2) IUDs
   (3) Barriers
   (4) Both (1) & (2)
9. MTP is legalised in India. It becomes essential in certain cases where
   (1) Continuation of the pregnancy could be harmful or even fatal either to the mother or to the foetus or both
   (2) To get rid of unwanted pregnancies either due to casual unprotected intercourse or due to rapes
   (3) Female child is not required
   (4) Both (1) & (2)
10. Choose **incorrect** statement among following
   (1) Some STDs like hepatitis-B and HIV can be transmitted by transfusion of blood or from an infected mother to the foetus
   (2) Except hepatitis-B and genital herpes, all other STDs are completely curable if detected early and treated properly
   (3) In STDs, infected females may often be asymptomatic and may remain undetected for long
   (4) Social stigma attached to STDs deters the infected persons from going for timely detection and proper treatment
11. Prevention or early detection and cure of STDs are given prime consideration under the reproductive health care programmes. Why?
   (1) Because incidences of STD infections are very high among persons in the age group of 15-24 years
   (2) STDs could leads to complications like abortions, stillbirths, ectopic pregnancies and PID
   (3) Because all the STDs are incurable
   (4) Because STDs remain always asymptomatic

12. Fertilisation outside the body in almost similar conditions as that in the body is called
(1) *In vivo* fertilization
(2) ZIFT
(3) GIFT
(4) *In vitro* fertilization (IVF)

13. Mark the correct statement
(1) Embryos formed by *in vivo* fertilization also could be used for ZIFT or IUT to assist those females who can not conceive
(2) Embryos with more than 8 blastomeres are transferred into the fallopian tube
(3) Transfer of ovum collected from a donor into uterus of another female is called GIFT
(4) Performing MTP in the 2nd trimester is safe and not riskier

14. Which of the following is hormone releasing IUD?
(1) Multiload 375 (2) LNG-20
(3) Lippes loop (4) CuT

15. Match the following

Column-I	**Column-II**
a. Syphilis	(i) HSV-2
b. Genital herpes	(ii) *Treponema pallidum*
c. Genital warts	(iii) Virus with ds DNA
d. Hepatitis-B	(iv) HSV-1
	(v) HPV

(1) a(iii), b(iv), c(ii), d(v) (2) a(ii), b(i), c(v), d(iii)
(3) a(ii), b(iv), c(v), d(iii) (4) a(ii), b(v), c(iv), d(i)

16. An STD caused by a spirochete and characterized by cerebellar damage which is manifested by uncoordinated movements is
(1) Gonorrhoea (2) Chlamydia
(3) French pox (4) Chancroid

17. Pap smear test is performed to detect the
(1) Time of ovulation
(2) Implantation
(3) Genetic defect of foetus
(4) Cervix cancer

18. Find out the **incorrect** statement
(1) French drug RU-486 can induce abortion
(2) RU-486 (Mifepristone) is an antiprogestin
(3) Ru-486 prepares the uterine endometrium for implantation
(4) The effectiveness of Norplant is about 99.7 percent

19. Find out the incorrect statement w.r.t. Norplant
(1) Contain progestin, the active ingredient in birth control pills
(2) Hormone containing six plastic cylinders are inserted directly under the skin of the upper arm
(3) It is effective for 5 months
(4) Effectiveness is about 99.7%

20. Which of the following is **incorrect** pair w.r.t. the disease and its causative agent?
(1) Syphilis : *Treponema pallidum*
(2) AIDS : HIV
(3) Chancroid : Human papilloma virus
(4) Gonorrhoea : *Neisseria gonorrhoeae*

21. Which of the following sexually transmitted diseases is/are not completely curable?
(1) Hepatitis B (2) Genital herpes
(3) HIV infection (4) All of these

22. Mark the detection technique for syphilis
(1) PCR
(2) VDRL
(3) Ames test
(4) ELISA

23. Which of the following contraceptive implant is inserted directly under the skin of the upper arm in a relatively simple surgical procedure?
(1) Depo-provera (2) Norplant
(3) CuT (4) LNG-20

24. Family planning programmes creating awareness among people about various reproduction related area are in operation under the name
(1) Mother and child health care(MCHC)
(2) Reproductive and child health care (RCH)
(3) Child health care (CHC)
(4) Reproductive and mother health care (RMC)

25. In females hundred percent effective method of birth control is provided by
(1) Vasectomy (2) Tubal ligation
(3) Depo provera (4) IUDs

26. Lactational amenorrhea method is based on:
(1) No ovulation therefore the cycle do not occur during the period of intense lactation following parturition
(2) Ovulation occur but cycle do not occur during the period of intense lactation following parturition
(3) This is reported to be effective only upto a maximum period of three months
(4) Chances of failure of this method is very low

27. Which of the following is odd one out?
(1) LNG-20 (2) Cu T
(3) Cu7 (4) Multiload 375

28. Match the following

	Column I		Column II
a.	Chancroid	(i)	VDRL
b.	Carcinogenicity	(ii)	Ames
c.	Syphilis	(iii)	ELISA
d.	Hepatitis	(iv)	Gram staining

(1) a(i), b(ii), c(iii), d(iv) (2) a(iv), b(ii), c(iii), d(i)
(3) a(iv), b(ii), c(i), d(iii) (4) a(iii), b(ii), c(i), d(iv)

29. Following are considered as method of ART except
(1) IUI (2) GIFT
(3) ZIFT (4) IUDs

30. Technique where another women carries embryo or a donor embryo to full term in her uterus is called
(1) Gestational carrier (2) Surrogacy
(3) ICSI (4) Both (1) & (2)

31. Medical termination of pregnancy is legalised upto
(1) 12 week (2) 20 week
(3) 4 week (4) 24 week

32. Birth pills are effective method of contraception. Which is not correct w.r.t. oral contraceptives?
(1) Pills contain estrogen and progesterone
(2) Ovarian follicles do not ripen in their presence
(3) Ovulation does not take place
(4) Failure rate is almost zero

33. It is non-steroidal, once a week contraceptive pill with very few side effects
(1) Mala-D (2) Norplant
(3) Saheli (4) RU 486

34. Which of the following statement is true w.r.t. use of diaphragm?
(1) Used together with a spermicide
(2) Toxic shock syndrome and recurrent urinary tract infections are associated with it
(3) Protect against STDs
(4) Only (1) & (2)

35. Which of the following is incorrectly matched?
(1) Hormone releasing IUD - Progestasert
(2) Induced abortion - Vacuum aspiration
(3) Condom - Protect against STD also
(4) Lippes loop - Cu releasing IUD

36. What is correct with the action of copper releasing IUDs?
(1) Are functional for specified limit of time
(2) Suppress sperm motility
(3) Reduces fertilising capacity of sperms
(4) All of these

37. Some studies have revealed that the following contraceptive may cause cancer. It is
(1) Norplant (2) RU-486
(3) Saheli (4) Depo provera

38. Infection of female genitals including pelvic cavity causing peritonitis commonly called as clap is caused by
(1) *Neisseria gonorrhoea*
(2) *Treponema pallidum*
(3) *Haemophilus ducryei*
(4) Human papilloma virus

39. One of the following is not advisable for a patient who requires emergency contraception
(1) Use of combined pills in overdose
(2) Use of mifepristone
(3) Insertion of IUD with 5 days of sexual activity
(4) Insertion of diaphragm

40. Yellow vaginal discharge with a particular offensive odour and severe vaginal itch are the symptoms related to infection of
(1) HPV
(2) *Trichomonas vaginalis*
(3) *Treponema pallidum*
(4) HSV-1

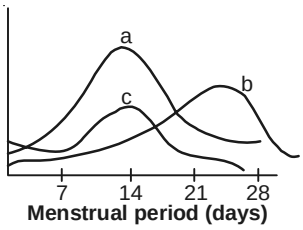
41. Which of the following immunological test is for sexually transmitted disease syphilis?
(1) Wassermann's test (2) Tourniquet
(3) Schick's test (4) Mantoux

42. *Haemophilus ducrei* is a causative agent of
(1) Genital warts (2) Chancroid
(3) Genital herpes (4) Chlamydia

43. Mark the non-invasive technique being used by physicians now a days to determine the foetal health condition
(1) Amniocentesis
(2) Chorionic villus sampling
(3) Ultrasonic imaging
(4) Tubectomy

44. Which of the following contraceptive is given as intramuscular injection once every 3 months, contains progestin that prevents maturation of ovum?
(1) Norplant (2) Saheli
(3) Mala-D (4) Depo provera

45. During menstrual period levels of different hormones (a,b,c) have been shown in the following graph. Find out the contraceptives which prevent their formation or action.



(1) a – Mifepristone ; b – Centchroman ; c – LNG-20

(2) a – LNG-20 ; b – Mifepristone ; c – Centchroman

(3) a – CuT ; b – Progestasert ; c – PoP

(4) a – PoP ; b – Mifepristone ; c – LNG-20

46. Mifepristone is

(1) Antiprogesterone (2) Antigonadotropin

(3) Antiestrogen (4) Antiandrogen

47. World population day is on

(1) 1st December (2) 11th July

(3) 26th June (4) 4th December

48. In the intrauterine transfer, which of the stage of early embryo is transferred into uterus?

(1) Zygote

(2) Upto 8 blastomere

(3) More than 8 blastomeres

(4) After first trimester

49. Formula for calculation of average annual growth rate is

(1) $\left[\frac{P_2-P_1}{P_1-N}\right]\times 100$ (2) $\left[\frac{P_2-P_1}{P_1\times N}\right]\times 100$

(3) $\left[\frac{P_1+P_2}{P_1\times N}\right]\times 100$ (4) $\left[\frac{P_1+P_2}{P_2+N}\right]\times 100$

50. Match the following

	Column-I		Column-II
a.	Saheli	(i)	Nonoxynol-9
b.	Gossypol	(ii)	Hormone releasing IUD
c.	Sponge	(iii)	Centchroman
d.	LNG-20	(iv)	Male contraceptive

(1) a(i), b(ii), c(iii), d(iv) (2) a(iii), b(iv), c(i), d(ii)

(3) a(iii), b(ii), c(i), d(iv) (4) a(ii), b(i), c(iv), d(iii)

51. Legalisation of MTP was done by Govt. of India in

(1) 1951 (2) 1971

(3) 1997 (4) 2001

52. Benign Prostatic hypertrophy can be checked by

(1) Removing source of testosterone

(2) Providing enough of testosterone

(3) Stimulating Sertoli cells to produce AMFs

(4) Stopping the release of FSH from pituitary

53. Which of the following is not a STD ?

(1) AIDS (2) Genital herpes

(3) Genital warts (4) Haemophilia

54. Which of the following oral contraceptive pills is correctly matched with its action?

A) Centchroman – Blocks implantation

B) Combined pill – Disintegration of sperm

C) Morning after pill – Inhibit ovulation

D) Progestin pill – Blocks fertilization

(1) Only A (2) A & B

(3) A, B & C (4) A, B, C & D

55. Mark the **incorrect** match w.r.t causative agent

(1) Chlamydia – *Haemophilus ducrei*

(2) Syphilis – *Treponema pallidum*

(3) Trichomoniasis – *Trichomonas vaginalis*

(4) Genital wart – *Human papilloma* virus

56. Replacement level is the number of children a couple must produce to replace themselves, so as to maintain the population at zero growth level. Replacement level in developed countries is

(1) 2.1 (2) 2.7

(3) 2.0 (4) Less than 2

57. In which of the stage of demographic transition there is declining birth rate and death rate being already low?

(1) Stage I (2) Stage II

(3) Stage III (4) Stage IV

❑ ❑ ❑

ANSWERS

[PHYSICS]

Chapter 14 : Electric Charges and Field

1.	(3)	2.	(1)	3.	(4)	4.	(3)	5.	(2)	6.	(4)	7.	(4)
8.	(4)	9.	(4)	10.	(1)	11.	(3)	12.	(1)	13.	(3)	14.	(3)
15.	(2)	16.	(1)	17.	(3)	18.	(4)	19.	(3)	20.	(2)	21.	(4)
22.	(4)	23.	(4)	24.	(1)	25.	(3)	26.	(2)	27.	(4)	28.	(1)
29.	(4)	30.	(1)	31.	(2)	32.	(3)	33.	(1)				

Chapter 15 : Electrostatics Potential and Capacitance

1.	(3)	2.	(4)	3.	(1)	4.	(4)	5.	(1)	6.	(3)	7.	(2)
8.	(3)	9.	(2)	10.	(1)	11.	(3)	12.	(1)	13.	(2)	14.	(2)
15.	(3)	16.	(1)	17.	(2)	18.	(2)	19.	(3)	20.	(4)	21.	(1)
22.	(1)	23.	(1)	24.	(2)	25.	(4)	26.	(3)	27.	(3)	28.	(2)
29.	(2)	30.	(3)	31.	(4)	32.	(3)	33.	(4)	34.	(1)	35.	(4)
36.	(4)	37.	(2)	38.	(3)	39.	(2)	40.	(4)	41.	(3)	42.	(2)
43.	(2)	44.	(2)	45.	(3)	46.	(1)	47.	(1)	48.	(1)	49.	(2)
50.	(2)	51.	(3)	52.	(3)	53.	(1)	54.	(2)	55.	(2)	56.	(4)
57.	(3)	58.	(1)	59.	(1)								

Chapter 16 : Current Electricity

1.	(2)	2.	(1)	3.	(2)	4.	(2)	5.	(2)	6.	(2)	7.	(2)
8.	(4)	9.	(1)	10.	(4)	11.	(2)	12.	(1)	13.	(1)	14.	(2)
15.	(1)	16.	(1)	17.	(2)	18.	(2)	19.	(2)	20.	(3)	21.	(4)
22.	(1)	23.	(1)	24.	(3)	25.	(1)	26.	(1)	27.	(1)	28.	(3)
29.	(2)	30.	(1)	31.	(1)	32.	(4)	33.	(2)	34.	(1)		

[CHEMISTRY]

Chapter 14 : Solid State

1.	(2)	2.	(4)	3.	(1)	4.	(4)	5.	(4)	6.	(2)	7.	(2)
8.	(1)	9.	(4)	10.	(3)	11.	(4)	12.	(4)	13.	(2)	14.	(1)
15.	(4)	16.	(2)	17.	(2)	18.	(3)	19.	(1)	20.	(1)	21.	(2)
22.	(4)	23.	(3)	24.	(4)	25.	(2)	26.	(3)				

Chapter 15 : Solution

1.	(1)	2.	(1)	3.	(1)	4.	(4)	5.	(1)	6.	(1)	7.	(3)
8.	(1)	9.	(4)	10.	(1)	11.	(3)	12.	(1)	13.	(2)	14.	(1)
15.	(1)	16.	(1)	17.	(2)	18.	(3)	19.	(1)	20.	(1)	21.	(3)
22.	(4)	23.	(1)	24.	(3)	25.	(3)	26.	(1)	27.	(1)	28.	(4)
29.	(4)	30.	(2)										

Chapter 16 : Electrochemistry

1. (3)	2. (3)	3. (4)	4. (4)	5. (1)	6. (1)	7. (3)
8. (3)	9. (3)	10. (3)	11. (3)	12. (4)	13. (2)	14. (1)
15. (3)	16. (3)	17. (3)	18. (4)	19. (2)	20. (4)	21. (2)
22. (3)	23. (4)	24. (3)	25. (4)	26. (1)	27. (1)	28. (2)
29. (2)	30. (1)	31. (3)	32. (3)	33. (3)	34. (4)	35. (4)
36. (3)	37. (2)	38. (4)	39. (2)	40. (1)	41. (1)	42. (2)
43. (4)	44. (2)	45. (2)	46. (1)	47. (2)		

Chapter 17 : Chemical Kinetics

1. (4)	2. (3)	3. (1)	4. (2)	5. (1)	6. (4)	7. (2)
8. (2)	9. (4)	10. (1)	11. (1)	12. (4)	13. (2)	14. (3)
15. (4)	16. (1)	17. (1)	18. (2)	19. (3)	20. (1)	21. (2)
22. (3)	23. (2)	24. (1)	25. (1)	26. (3)	27. (1)	28. (3)
29. (1)						

Chapter 18 : Surface Chemistry

1. (3)	2. (2)	3. (1)	4. (2)	5. (1)	6. (3)	7. (3)
8. (1)	9. (4)	10. (4)	11. (2)	12. (4)	13. (4)	14. (3)
15. (1)	16. (3)	17. (4)	18. (2)	19. (1)	20. (1)	

[BOTANY]

Chapter 13 : Reproduction in Organisms

1. (2)	2. (3)	3. (2)	4. (1)	5. (3)	6. (1)	7. (3)
8. (2)	9. (1)	10. (1)	11. (1)	12. (1)	13. (4)	14. (3)
15. (4)	16. (3)	17. (3)	18. (4)	19. (2)		

Chapter 14 : Sexual Reproduction in Flowering Plants

1. (1)	2. (4)	3. (2)	4. (1)	5. (3)	6. (2)	7. (3)
8. (2)	9. (3)	10. (2)	11. (3)	12. (1)	13. (1)	14. (2)
15. (1)	16. (2)	17. (2)	18. (1)	19. (4)	20. (2)	21. (4)
22. (2)	23. (1)	24. (2)	25. (3)	26. (3)	27. (4)	28. (3)
29. (2)	30. (1)	31. (3)	32. (2)	33. (2)	34. (4)	35. (1)
36. (2)	37. (1)	38. (3)	39. (3)	40. (3)	41. (3)	42. (2)
43. (1)	44. (1)	45. (4)	46. (2)	47. (3)	48. (3)	49. (3)
50. (4)	51. (3)	52. (3)	53. (4)	54. (2)	55. (3)	56. (4)
57. (1)	58. (3)	59. (3)	60. (2)	61. (1)	62. (3)	63. (2)
64. (4)	65. (4)	66. (4)	67. (3)	68. (3)	69. (2)	70. (1)
71. (4)	72. (4)	73. (1)	74. (1)	75. (1)	76. (1)	77. (4)
78. (3)	79. (1)	80. (4)	81 (2)			

Chapter 15 : Principies of Inheritance and Variation

1.	(4)	2.	(1)	3.	(3)	4.	(2)	5.	(3)	6.	(3)	7.	(1)
8.	(1)	9.	(4)	10.	(2)	11.	(4)	12.	(4)	13.	(3)	14.	(3)
15.	(4)	16.	(1)	17.	(1)	18.	(2)	19.	(2)	20.	(4)	21.	(1)
22.	(4)	23.	(4)	24.	(3)	25.	(4)	26.	(1)	27.	(3)	28.	(1)
29.	(2)	30.	(3)	31.	(3)	32.	(3)	33.	(2)	34.	(4)	35.	(4)
36.	(4)	37.	(3)	38.	(2)	39.	(4)	40.	(3)	41.	(4)	42.	(4)
43.	(3)	44.	(2)	45.	(2)	46.	(4)	47.	(4)	48.	(1)	49.	(3)
50.	(4)	51.	(4)	52.	(1)	53.	(1)	54.	(3)	55.	(1)	56.	(4)
57.	(1)	58.	(2)	59.	(3)	60.	(3)	61.	(1)	62.	(3)	63.	(4)
64.	(1)	65.	(1)	66.	(1)	67.	(3)	68.	(2)	69.	(1)	70.	(2)
71.	(3)	72.	(2)	73.	(4)	74.	(1)	75.	(3)	76.	(1)	77.	(2)
78.	(2)	79.	(1)	80.	(4)								

[ZOOLOGY]

Chapter 11 : Reproduction in Organisms, Human Reproduction

1.	(4)	2.	(3)	3.	(2)	4.	(2)	5.	(3)	6.	(4)	7.	(3)
8.	(3)	9.	(4)	10.	(1)	11.	(3)	12.	(1)	13.	(1)	14.	(2)
15.	(4)	16.	(2)	17.	(2)	18.	(4)	19.	(2)	20.	(3)	21.	(2)
22.	(3)	23.	(1)	24.	(3)	25.	(2)	26.	(4)	27.	(2)	28.	(3)
29.	(3)	30.	(3)	31.	(2)	32.	(3)	33.	(3)	34.	(3)	35.	(1)
36.	(1)	37.	(1)	38.	(4)	39.	(2)	40.	(2)	41.	(3)	42.	(3)
43.	(3)	44.	(4)	45.	(4)	46.	(4)	47.	(2)	48.	(2)	49.	(4)
50.	(4)	51.	(3)	52.	(3)	53.	(3)	54.	(1)	55.	(1)	56	(4)
57.	(2)	58.	(2)	59.	(4)	60.	(1)	61.	(4)	62.	(3)	63.	(4)
64.	(3)	65.	(3)	66.	(4)	67.	(2)	68.	(3)				

Chapter 12 : Reproductive Health

1.	(3)	2.	(3)	3.	(2)	4.	(3)	5.	(3)	6.	(3)	7.	(4)
8.	(4)	9.	(4)	10.	(2)	11.	(2)	12.	(4)	13.	(1)	14.	(2)
15.	(2)	16.	(3)	17.	(4)	18.	(3)	19.	(3)	20.	(3)	21.	(4)
22.	(2)	23.	(2)	24.	(2)	25.	(2)	26.	(1)	27.	(1)	28.	(3)
29.	(4)	30.	(4)	31.	(2)	32.	(4)	33.	(3)	34.	(4)	35.	(4)
36.	(4)	37.	(4)	38.	(1)	39.	(4)	40.	(2)	41.	(1)	42.	(2)
43.	(3)	44.	(4)	45.	(2)	46.	(1)	47.	(2)	48.	(3)	49.	(2)
50.	(2)	51.	(2)	52.	(1)	53.	(4)	54.	(1)	55.	(1)	56	(1)
57.	(3)												

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Practice Question Bank for NEET - 2013

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CONTENTS

2012-13

PHYSICS

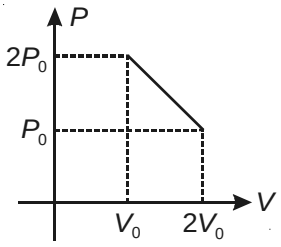
[Chapter-1.a) : Mathematical Tools]

1. If $y = (x^2 + R^2)^{3/2}$ where R is a positive constant, then find $\frac{dy}{dx}$

(1) $\frac{3}{2}\sqrt{x^2 + R^2}$ (2) $3x\sqrt{(x^2 + R^2)}$

(3) 2x (4) $\sqrt{(x^2 + R^2)}$

2. The variation of pressure with respect to volume is shown in the graph. Which of the following is correct relation between P and V?



(1) $P = 3P_0 - \left(\frac{P_0}{V_0}\right) V$ (2) $P = 3P_0 + \frac{P_0 V}{V_0}$

(3) $P = 2P_0 - \frac{P_0}{V_0} P$ (4) $P = P_0 - \left(\frac{P_0}{V_0}\right) V$

3. The charge flowing through a circuit in time interval dt is given by $dq = e^{-t/\tau} dt$, where τ is a constant. How much charge will flow through the circuit between $t = 0$ to $t = \tau$?

(1) $\frac{\tau}{e}$ (2) $\tau\left(1 + \frac{1}{e}\right)$

(3) $\tau\left(1 - \frac{1}{e}\right)$ (4) $\tau (e + 1)$

4. The force F varies with x as $F = Kx - x^2$. The maximum value of F is

(1) K^2 (2) $\frac{K^2}{2}$

(3) $\frac{K^2}{4}$ (4) Zero

[Chapter-1.b) : Units and Measurements]

1. The equation of a wave is $y = 2A \sin\left(\frac{2\pi}{\lambda}x\right)\cos\left(\frac{2\pi v}{\lambda}t\right)$. Which of the following expression is dimensionless?

(1) $\frac{2\pi}{\lambda}$ (2) $\frac{2\pi v}{\lambda}$

(3) $\frac{x}{vt}$ (4) $\frac{xt}{\lambda}$

2. If kinetic energy K and momentum p are related as $K = \frac{a + p^2}{b}$, then dimensions of a and b are respectively

(1) $[M^{-1}L^3T^{-1}]$, $[M^2L^2T^{-2}]$

(2) $[M^2L^2T^{-2}]$ and $[ML^0T^0]$

(3) $[M^1L^2T^{-2}]$, $[ML^{-3}T^{-1}]$

(4) $[M^{-2}L^{-2}T^2]$, $[M^1L^{+3}T^1]$

3. In a new system of dimensions force (F), distance (r) and gravitational constant (G) are the fundamental dimensions. Find the dimensions of mass

(1) $\left[F^{\frac{1}{2}} r^{\frac{1}{2}} G^{\frac{-1}{2}}\right]$ (2) $\left[F^{\frac{1}{2}} r^1 G^{-\frac{1}{2}}\right]$

(3) $[F^1 r^1 G^1]$ (4) $\left[F^{\frac{1}{2}} r^{-\frac{1}{2}} G^{\frac{1}{2}}\right]$

4. In a new system of units, the unit of mass is 100 kg, unit of length is 1 km and unit of time is 60 seconds. The numerical value of 1 joule in this system will be

(1) 3.6×10^{-5} (2) 3.6×10^{-7}

(3) 3.6 (4) 3.6×10^5

5. The density of a cube is found by measuring its mass and the length of its side. If the maximum errors in the measurement of mass and length are 0.1% and 0.3% respectively, the maximum error in the measurement of density is

(1) 1% (2) 0.4%

(3) 0.2% (4) 0.8%

6. The Bernoulli's equation may be written as $P + \frac{1}{2}\rho v^2 + h\rho g = K$ (constant) where P is pressure, ρ is density, v is velocity and h is height. The unit of $\frac{K}{\rho v^2}$ is same as that of

(1) Stress (2) Modulus of rigidity

(3) Density of a body (4) Relative density

7. If universal gravitational constant G, speed of light c and Planck's constant h are considered as fundamental quantities, then the dimensional formula of length will be given as $[G^{1/2}\ c^{-x}\ h^{1/2}]$, where x is equal to

(1) $\frac{1}{2}$ (2) $-\frac{1}{2}$

(3) $\frac{3}{2}$ (4) $-\frac{3}{2}$

8. A quantity q depends on three variables x, y and z as $q = k\ (x^a\ y^b\ z^c)$, where k, a, b, c are dimensionless constants. If percentage error in x, y and z are respectively α, β and γ, then percentage error in q will be

(1) $\alpha + \beta + \gamma$ (2) $\alpha a + \beta b + \gamma c$

(3) $\frac{\alpha}{a} + \frac{\beta}{b} + \frac{\gamma}{c}$ (4) $\alpha^a + \beta^b + \gamma^c$

9. The amplitude of damped oscillations varies with time t as $A = A_0 e^{-\left(\frac{b}{2m}\right)t}$, where b and m are constants. The dimensions of $\left(\frac{b}{2m}\right)$ are same as that of

(1) Frequency (2) Time

(3) Velocity (4) Displacement

10. The electric field near a point charge varies with distance x as $E = \frac{b}{x^2}$, where b is a constant. If percentage error in x is 1%, then percentage error in E will be

(1) 0.5% (2) – 2%

(3) 2% (4) 4%

11. The amplitude (A) of damped oscillations is given as $A = \alpha.e^{-\beta t}$, where t is time and α, β are constants. The product αβ may represent

(1) Speed (2) Angular momentum

(3) Acceleration (4) Linear momentum

12. If work done is $W = \frac{A\sqrt{t}}{t^2 + B}$ then dimensional formula of AB will be

(1) $M^1L^2T^{-1}$ (2) $M^1L^1T^{5/2}$

(3) $M^1L^2T^{3/2}$ (4) $M^1L^2T^{5/2}$

13. Given that $y = A^2 \sin\left(\frac{t}{p} - qx\right)\cos\frac{2\pi M}{Z}$ then which statement is wrong?

(1) Dimension of A is same as that of $\sqrt{y}$

(2) Dimension of $\frac{t}{x}$ is same as that of qp

(3) Dimension of M is same as that of z

(4) Dimension of $\frac{M}{Z}$ is same as that of $\frac{qx}{t}$

14. Which of the following equation is dimensionally incorrect? (U = potential energy, E = energy, P = momentum, m = mass, τ = torque, θ = angular displacement, F = force, K = force constant, x = displacement, v = speed)

(1) $U = E + \frac{P^2}{2m}$ (2) $U = mv^2 + \frac{P^2}{2m} + \tau\theta$

(3) $W = U - E + \frac{F^2}{K}$ (4) $U = \frac{P^2}{4m} + \frac{F^2}{K} + \tau x$

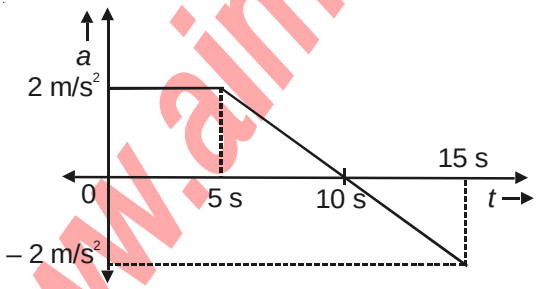
15. Time taken by a vehicle to go from one station to the other is 100 s. It is recorded with a stop watch having the least count 1 s, significant figures in time t = 100 s is

(1) 3 (2) 4

(3) 2 (4) 1

[Chapter-2.a) : Motion in a Straight line]

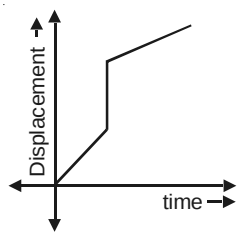
1. Acceleration (a) versus time (t) graph of a body is as shown in figure, velocity of the body is maximum at

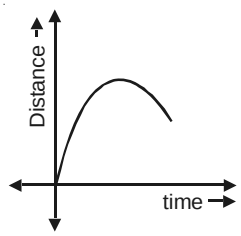


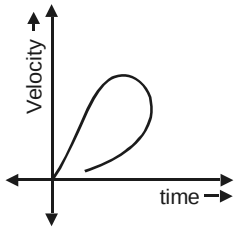
(1) t = 5 s (2) t = 10 s

(3) t = 15 s (4) Both (1) & (3)

2. Which of the following graphs is/are not possible for a particle moving in a straight line?

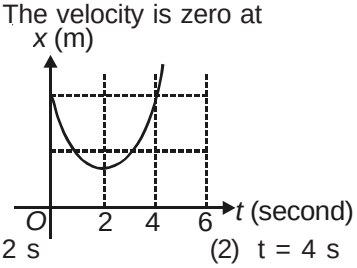
(1) 

(2) 

(3) 

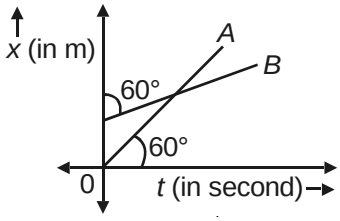
(4) All of these

3. Position (x) versus time (t) graph of a particle is as shown. The velocity is zero at



(1) t = 2 s (2) t = 4 s
(3) t = 6 s (4) Nowhere

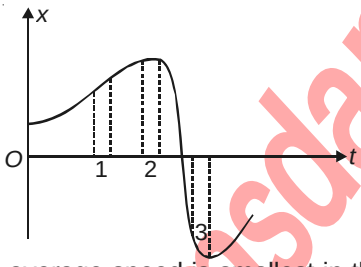
4. Position time graph of two particles A and B are as shown in figure. Velocity of A w.r.t. B is



(1) $\frac{1}{\sqrt{3}}$ m/s (2) $\frac{2}{\sqrt{3}}$ m/s
(3) $\sqrt{3}$ m/s (4) $\frac{4}{\sqrt{3}}$ m/s

5. A body thrown vertically up takes time t_1 during upward journey and time t_2 during downward journey. If air friction is taken into consideration, then the correct relation between t_1 and t_2 will be
(1) $t_1 > t_2$
(2) $t_1 < t_2$
(3) $t_1 = t_2$
(4) None of the above

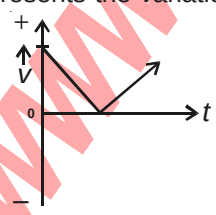
6. The diagram shown below is the position-time graph of a particle in one dimensional motion. Three equal intervals of time are shown. Pick-up the wrong statement



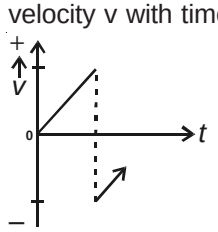
(1) The average speed is smallest in the interval 2
(2) The average speed is largest in the interval 3
(3) Velocity is positive in the interval 1
(4) Average velocity is zero in the interval 3

7. A tennis ball is released so that it falls vertically to the floor and bounces again. Taking velocity upwards as positive, which of the following graphs best represents the variation of its velocity v with time t?

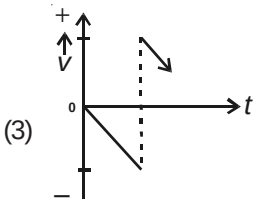
(1)



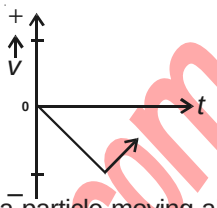
(2)



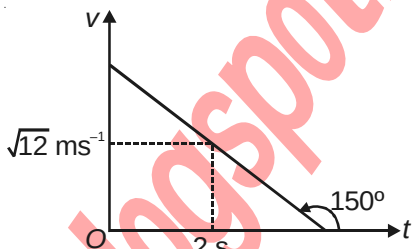
(3)



(4)

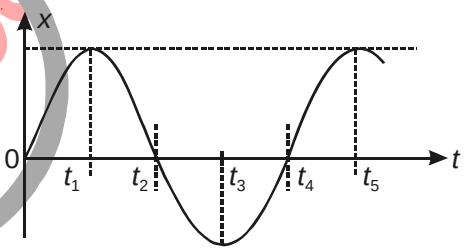


8. Velocity versus time curve for a particle moving along a straight line is shown in figure. The acceleration at t = 2 s will be



(1) $-\frac{1}{\sqrt{3}}$ ms^{-2} (2) $\frac{1}{\sqrt{3}}$ ms^{-2}
(3) $\sqrt{3}$ ms^{-2} (4) $-\sqrt{3}$ ms^{-2}

9. If the position (x) varies with time (t) as shown in the diagram. The particle has zero average velocity during

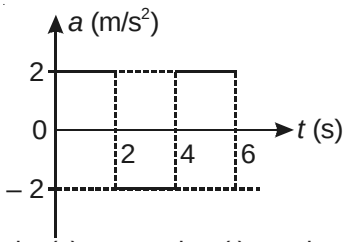


(1) t = t_1 to t = t_3 (2) t = 0 to t = t_3
(3) t = t_1 to t = t_4 (4) t = t_1 to t = t_5

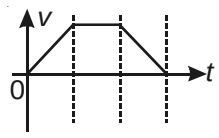
10. A motor-boat can move with constant speed v in still water. It moves from point A to another point B in the downstream and comes back to the point A. Time taken in downstream journey is 10 minute and that in the upstream journey is 20 minute. The speed of the river flow is

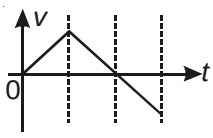
(1) $\frac{v}{2}$ (2) $\frac{v}{3}$
(3) $\frac{3v}{4}$ (4) $\frac{2v}{5}$

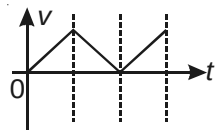
11. A particle starts from rest and moves with an acceleration a that varies with time (t) as shown

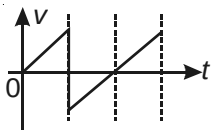


The velocity (v) versus time(t) graph will be

(1) 

(2) 

(3) 

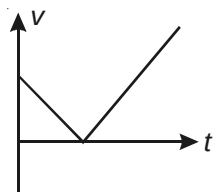
(4) 

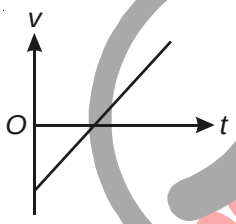
12. A particle thrown vertically up with speed 50 ms^{-1} attains the height h after 3 second. After 7 second from the start, the height of the particle is ($g = 10\ ms^{-2}$)

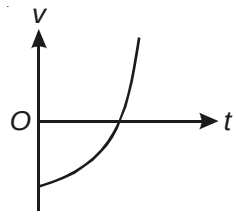
(1) $\frac{h}{2}$ (2) $\left(\frac{7}{3}\right)h$

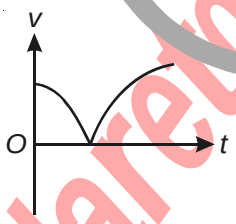
(3) $\left(\frac{3}{7}\right)h$ (4) h

13. The position (x) of a particle moving along x-axis varies with time (t) as $x = t^2 - 8t + 3$. The speed (v) versus time graph will be

(1) 

(2) 

(3) 

(4) 

14. A train 'A' moving with velocity 20 m/s approaches another train 'B' moving in the same direction on the same track, with velocity 10 m/s. If the maximum retardation that can be produced in the train A is 2 m/s^2 on applying the brakes fully, what should be minimum separation between the two trains to avoid collision?

(1) 12.5 m (2) 25 m

(3) 40 m (4) 50 m

15. A car accelerates from rest at 3 ms^{-2} and then retards to rest at 5 ms^{-2}. The maximum velocity of the car is 30 ms^{-1}, what is the distance covered by the car?

(1) 150 m (2) 240 m

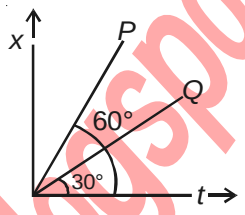
(3) 300 m (4) 360 m

16. A body projected vertically upward from the surface of earth is same height at t = 6 s and t = 11 s. The speed with which it is projected vertically upward is [Take g = 10 m/s^2]

(1) 60 m/s (2) 40 m/s

(3) 20 m/s (4) 85 m/s

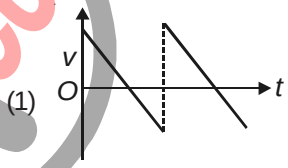
17. Displacement versus time curve of two particles P and Q are given. Calculate ratio of velocities of P and Q

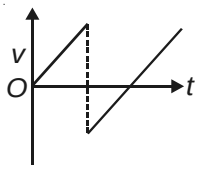


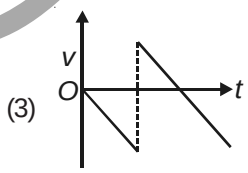
(1) $\frac{3}{1}$ (2) $\frac{1}{3}$

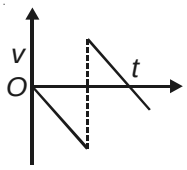
(3) $\frac{3}{2}$ (4) $\frac{2}{3}$

18. A ball is projected with velocity v vertically upward from ground. It comes back and rebounds. Assume that collision is elastic, The curve between velocity and time is (take upward directions positive)

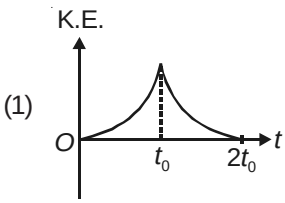
(1) 

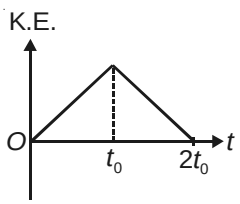
(2) 

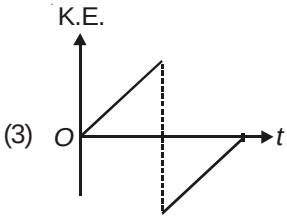
(3) 

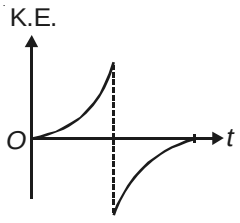
(4) 

19. A particle of mass m is released from rest from certain height H. It strikes the ground elastically. What will be the graph between kinetic energy (K.E.) and time (t) till it returns to its initial position?

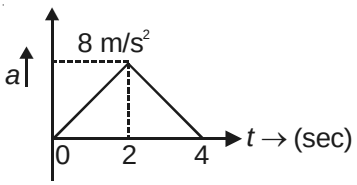
(1) 

(2) 

(3) 

(4) 

20. Acceleration time graph of a particle moving in a straight line is shown. Velocity of particle at t = 0 is 5 m/s. The velocity of the particle at the end of fourth second is



(1) 16 m/s (2) 11 m/s

(3) 21 m/s (4) 5 m/s

21. A person walking on an escalator takes time t_1 to reach at the top of tower when escalator is at rest. If man is at rest and escalator moves then it takes t_2 time to reach at top of tower. If both man and escalator move, then how much time will he take to reach at top?

(1) $t_2 - t_1$ (2) $\frac{t_1 t_2}{t_1 - t_2}$

(3) $\frac{t_2 - t_1}{t_1 t_2}$ (4) $\frac{t_1 t_2}{t_1 + t_2}$

22. A particle is projected vertically upward. If t_1 and t_2 are the time related with a height h, then its total time of flight is

(1) $2(t_1 + t_2)$ (2) $\frac{t_1 + t_2}{2}$

(3) $t_1 + t_2$ (4) $\frac{2t_1 + t_2}{t_1 + t_2}$

23. Two particles start moving from origin along same straight line such that one moves with constant velocity v and another with constant acceleration a. During the time that elapses before the second catches the first, the greatest distance between the particle is

(1) $\frac{v^2}{2a}$ (2) $\frac{v^2}{a}$

(3) $\frac{2v^2}{a}$ (4) $\frac{v^2}{3a}$

24. A car moves with speed v_1 upto $\frac{t}{3}$ time and then with speed v_2 upto $\frac{2t}{3}$ time. Path is straight line. What is the average speed of car?

(1) $\frac{2v_1 v_2}{v_1 + v_2}$ (2) $\frac{v_1 + v_2}{2}$

(3) $\frac{2v_1 + v_2}{3}$ (4) $\frac{v_1 + 2v_2}{3}$

[Chapter-2.b) : Motion in a Plane]

1. Rain is pouring vertically downward with 10 km/h. The velocity of the rain with respect to a man running toward north on a horizontal ground with 10 km/h is

(1) $10\sqrt{2}$ km/h from north east

(2) $10\sqrt{2}$ km/h from north west

(3) $10\sqrt{2}$ km/h at 45° with the vertical toward south

(4) $10\sqrt{2}$ km/h at 45° with the vertical towards north

2. A particle is thrown with 50 m/s at an angle 60° above horizontal from the top of a tower. If g = 10 m/s², then change in velocity of the body in first 5 s is

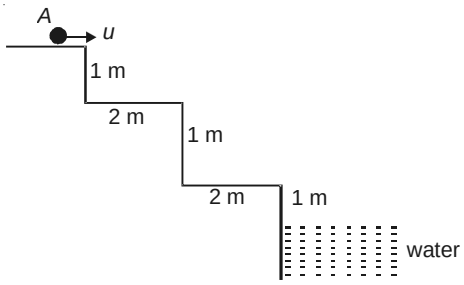
(1) 50 m/s vertically up

(2) 50 m/s vertically down

(3) $50\sqrt{2}$ m/s at 45° below horizontal

(4) $50\sqrt{2}$ m/s at 45° above horizontal

3. Stairs of height 1 m and width 2 m are as shown in figure. Minimum horizontal velocity u given to the ball A for which it will hit water directly is



(1) $\sqrt{10}$ m/s (2) $2\sqrt{10}$ m/s

(3) $4\sqrt{10}$ m/s (4) $\frac{\sqrt{10}}{2}$ m/s

4. A river (width = 200 m) is flowing at a speed of 3 km/h. A man swims across the river along the shortest path and swims back the same way. If the velocity of swimming of man is 5 km/h in still water then time taken by the man for his round trip is

(1) $\frac{1}{10}$ h (2) $\frac{1}{20}$ h

(3) $\frac{1}{40}$ h (4) $\frac{1}{60}$ h

5. A particle is thrown horizontally from the top of a tower of height H with velocity v. Time taken by it to hit the ground is T. If another particle is thrown horizontally from the same point with speed 2v, then time taken by it to reach the ground is

(1) T (2) 2T

(3) $\frac{T}{2}$ (4) $\sqrt{2}\,T$

6. Six persons are standing of a regular hexagon of side 'a'. Each person starts moving towards the person standing at the adjacent corner with speed 'v'. They will meet after a time

(1) $\frac{3v}{a}$ (2) $\frac{6v}{a}$

(3) $\frac{a}{6v}$ (4) $\frac{2a}{v}$

7. Two vectors $\vec{A} = 2\hat{i} + 3\hat{j} - y\hat{k}$ and $\vec{B} = x\hat{i} - \hat{j} + 3\hat{k}$ are given. If $(\vec{A} + \vec{B})$ is a vector of magnitude 2 along +y axis then the values of x and y will be

(1) 2, 3 (2) –2, 3

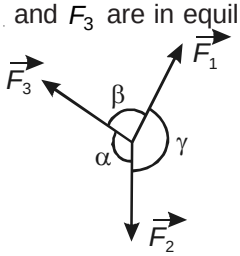
(3) 2, –3 (4) –2, –3

8. A projectile is fired with a speed u at an angle 'θ' with the horizontal. When its direction of motion makes an angle α with the horizontal, its speed at that instant is

(1) u cos α sec θ (2) u cos θ sec α

(3) $u\frac{\cos\alpha}{\sec\theta}$ (4) $u\frac{\sec\theta}{\cos\alpha}$

9. In the situation shown in figure, the three concurrent forces $\vec{F_1}$, $\vec{F_2}$ and $\vec{F_3}$ are in equilibrium then



(1) $\frac{F_1}{\sin\alpha} = \frac{F_2}{\sin\beta} = \frac{F_3}{\sin\gamma}$

(2) $\frac{F_1}{\cos\alpha} = \frac{F_2}{\cos\beta} = \frac{F_3}{\cos\gamma}$

(3) $\frac{F_1}{\text{cosec}\,\alpha} = \frac{F_2}{\text{cosec}\,\beta} = \frac{F_3}{\text{cosec}\,\gamma}$

(4) $\frac{F_1}{\sec\alpha} = \frac{F_2}{\sec\beta} = \frac{F_3}{\sec\gamma}$

10. A body of mass 7 kg at rest explodes into three fragments having masses in the ratio 3 : 3 : 1. The fragments with equal masses fly in mutually perpendicular directions with speed 15 ms^{-1}. What will be the speed of the lighter fragment?

(1) 15 m/s (2) $15\sqrt{2}$ m/s

(3) 45 m/s (4) $45\sqrt{2}$ m/s

11. Two projectile projected from ground towards each other with same initial speed u but at angles θ and (90 – θ) from horizontal. If initial separation between them is equal to range (R) of projection, then time after which they cross same vertical line is

(1) $\frac{R}{\cos\theta}$ (2) $\frac{R}{\sin\theta}$

(3) $\frac{R}{u(\sin\theta + \cos\theta)}$ (4) $\frac{R}{u^2(\sin\theta + \cos\theta)}$

12. In non-uniform circular motion. If radial vector is rotated by an angle 30°, then the velocity vector is rotated by

(1) 15° (2) 30°

(3) 60° (4) 120°

13. A projectile is projected at an angle θ with horizontal with speed u. If air resistance is taken into account, then angle with vertical at time of hitting the ground will be

(1) More than (90 – θ) (2) Less than (90 – θ)

(3) (90 + θ) (4) Equal to θ

14. Choose correct relation [where s, θ and r are displacement of particle, angular displacement and radius of circle respectively]

(1) $\frac{1}{r}\frac{ds}{dt} = \frac{d\theta}{dt}$ (2) $\frac{d\theta}{dt} = s$

(3) $\frac{rds}{dt} = \frac{d\theta}{dt}$ (4) $\frac{dv}{dt} = \frac{1}{r}\frac{d\omega}{dt}$

15. Unit vector of a vector $\vec{A} = 3\hat{i} + 8\hat{j} - \hat{k}$ is

(1) $\frac{\vec{A}}{\sqrt{74}}$ (2) $\frac{\vec{A}}{\sqrt{72}}$

(3) $\vec{A}$ (4) Zero

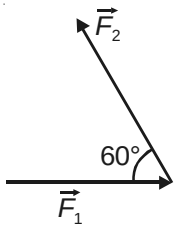
16. The magnitude of resultant of two forces $\vec{F_1}$ and $\vec{F_2}$ each of magnitude 10 N as shown in figure is

(1) $F\sqrt{3}$

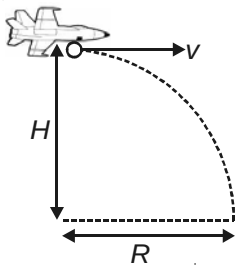
(2) $\frac{F}{\sqrt{3}}$

(3) F

(4) $\frac{F\sqrt{3}}{2}$



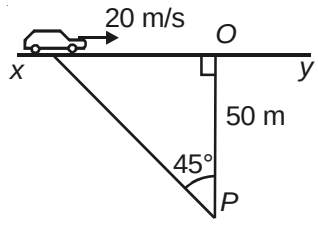
17. A fighter plane moving with velocity v horizontally drops a bomb from height H. The horizontal range at which bomb will strike the ground is



(1) $\frac{2H}{g}$ (2) $\frac{2H}{gv}$

(3) $v\sqrt{\frac{2H}{g}}$ (4) $\sqrt{\frac{H}{2g}}$

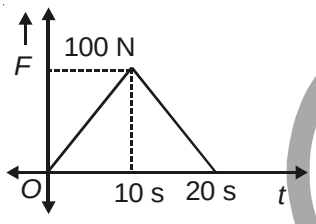
1. A car is moving at a constant velocity 20 m/s on a straight road xy. P is an observer at a perpendicular distance 50 m from the cross O. The angular velocity of the car with respect to the observer at the instant shown is



(1) 0.1 rad/s (2) 0.2 rad/s

(3) 0.3 rad/s (4) 0.4 rad/s

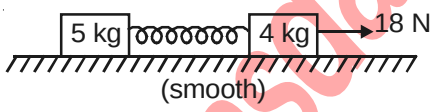
2. Force-time graph of a body is as shown in figure. The body starts with initial velocity 10 m/s at t = 0. Change in momentum of the body in the interval 0 to 20 s is



(1) 1000 Ns (2) 2000 Ns

(3) 100 Ns (4) 500 Ns

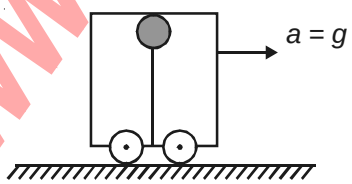
3. Two blocks of masses 5 kg and 4 kg are connected by a massless spring as shown in figure. If the instantaneous acceleration of the 5 kg body is 4 m/s^2 towards right, then instantaneous acceleration of the 4 kg body will be



(1) 0.5 m/s^2 to right (2) 0.5 m/s^2 to left

(3) 5 m/s^2 to right (4) 5 m/s^2 to left

4. A hydrogen balloon is fixed by a string at the bottom of a closed car as shown in figure. If the car accelerates horizontally with acceleration a = g, then the balloon will



(1) Shift to right through 45°

(2) Shift to left through 45°

(3) Remain vertical

(4) Shift to left through any angle

5. A motor delivers water of density ρ at a constant speed v through a pipe of area A. Force exerted by motor on water is

(1) $Av^2\rho$ (2) $Av\rho$

(3) $Av^3\rho$ (4) $A\rho^2v$

6. Linear momentum of a body of mass 5 kg is given by $\vec{p} = \left(\frac{t^2}{2} + 5\right)\hat{i}$ Ns. Acceleration of the body at t = 5 s is

(1) $-1\ \text{ms}^{-2}\ \hat{i}$ (2) $1\ \text{ms}^{-2}\ \hat{i}$

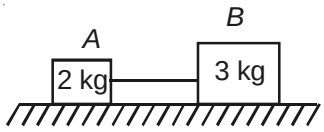
(3) $-1\ \text{ms}^{-2}\ \hat{j}$ (4) $1\ \text{ms}^{-2}\ \hat{j}$

7. N small balls each of mass m hit a surface each second elastically with velocity u. The force experienced by the surface is

(1) Nmu (2) $\frac{Nmu}{2}$

(3) 2Nmu (4) 4Nmu

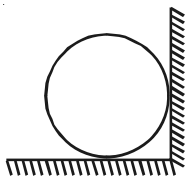
8. Two blocks A and B are connected by a massless string. A and B are kept on a horizontal frictionless floor. When B is pulled to right by a force horizontally, tension in the string is T_1. When A is pulled to left by the same force horizontally, tension in the string is T_2. The ratio $\frac{T_1}{T_2}$ is



(1) 1 : 1 (2) 2 : 3

(3) 4 : 9 (4) 5 : 3

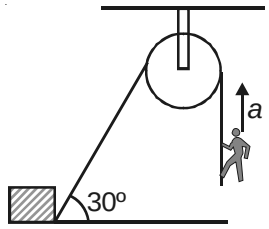
9. A sphere is placed between two walls. How many normal reactions are acting on the sphere?



(1) 1 (2) 3

(3) 2 (4) 4

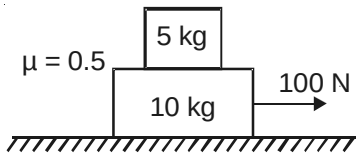
10. A light string passes over a pulley as shown in figure. A man of mass 5 kg climbs up the rope. If tension in the rope is equal to 80 N, what will be the acceleration of man in upward direction? ($g = 10\ m/s^2$)



(1) 4 ms^{-2} (2) 8 ms^{-2}

(3) 6 ms^{-2} (4) 2 ms^{-2}

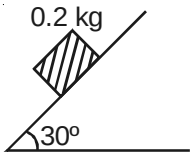
11. Two blocks having masses 10 kg and 5 kg are placed on smooth surface, having co-efficient of friction between the surfaces of block as shown in figure. Find the acceleration of mass 10 kg



(1) 0 ms^{-2} (2) 3.75 ms^{-2}

(3) 0.1 ms^{-2} (4) 7.5 ms^{-2}

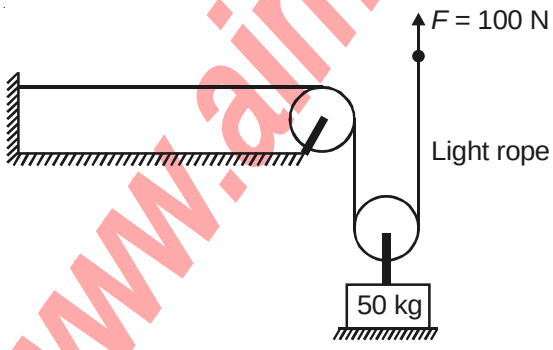
12. In the figure shown below, if the inclined plane has coeff. of friction, $\mu = 0.3$, then 0.2 kg mass will move down with an acceleration



(1) 0.2 ms^{-2} (2) 0.4 ms^{-2}

(3) 2.4 ms^{-2} (4) 0.8 ms^{-2}

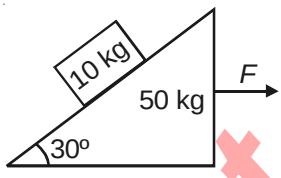
13. In the arrangement shown, the rope is light and inextensible and pulley is light and smooth. The normal reaction between the 50 kg block and ground is ($g = 10\ m/s^2$)



(1) 200 N (2) 300 N

(3) 500 N (4) Zero

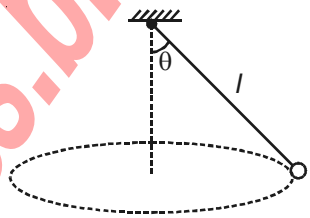
14. A body m of mass 10 kg is placed on an inclined plank of mass M of 50 kg as shown in figure. If 10 kg mass falls freely, then contact force between M and m will be



(1) 100 N (2) $100\sqrt{3}$

(3) $\frac{100}{\sqrt{3}}$ (4) Zero

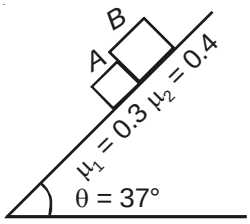
15. A body of mass m is suspended by a string of length l. The string is fixed at the other end and the body moves in a horizontal circle such that the string makes angle θ with vertical. The time period of its circular motion is



(1) $2\pi\sqrt{\frac{l}{g}}$ (2) $2\pi\sqrt{\frac{l\cos\theta}{g}}$

(3) $2\pi\sqrt{\frac{l}{g\cos\theta}}$ (4) $2\pi\sqrt{\frac{l\sin\theta}{g}}$

16. Two blocks A and B of mass 2 kg and 3 kg are kept in contact with each other on a rough inclined plane as shown in figure. Coefficient of static fraction of block A and block B with plane are 0.3 and 0.4 respectively. If both are released simultaneously, then reaction between A and B is



(1) 10 N (2) 5 N

(3) 15 N (4) Zero

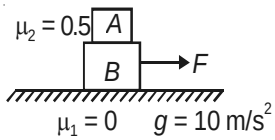
17. Block B is pulled by a horizontal force F. Maximum acceleration of the blocks for which A will not slip over B is

(1) 5 m/s^2

(2) 10 m/s^2

(3) 2 m/s^2

(4) 8 m/s^2

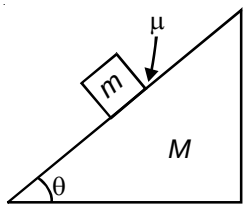


18. Two weights W_1 and W_2 are suspended from the ends of a light string passing over a smooth fixed pulley. The net force on the pulley will be

(1) $\frac{8W_1W_2}{(W_1+W_2)}$ (2) $\frac{4W_1W_2}{(W_1+W_2)}$

(3) $\frac{4W_1W_2}{(W_1+W_2)}g$ (4) Zero

19. A small block of mass m is placed on a rough fixed wedge of mass M as shown. If the coefficient of friction between m and M is μ and θ is less than $\tan^{-1}(\mu)$, then the force exerted by M on m will be



(1) mg cosθ (2) mg sinθ

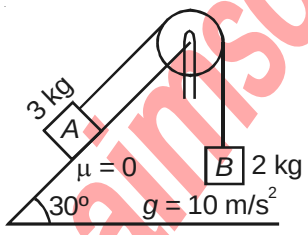
(3) μmg cosθ (4) mg

20. A hemispherical bowl of radius R is rotating about its own axis (vertical) with an angular velocity ω. A particle of mass 10^{-2} kg on the frictionless inner surface of bowl is also rotating with the same angular velocity. The particle is at a height h from botton of bowl. The condition to be satisfied to have a non-zero value of h is

(1) $\omega > \sqrt{\frac{g}{R}}$ (2) $\omega < \sqrt{\frac{g}{R}}$

(3) $\omega > \sqrt{\frac{R}{g}}$ (4) $\omega = \frac{R}{g}$

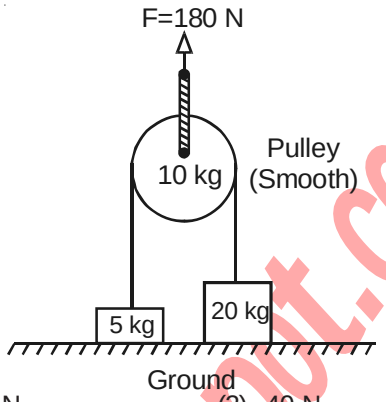
21. Pulley and string shown in the figure are massless and frictionless. Tension in the string will be



(1) 20 N (2) 18 N

(3) 16 N (4) 12 N

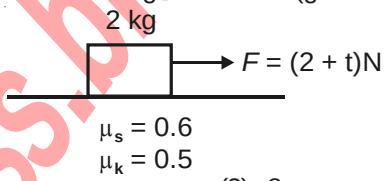
22. Figure shows two blocks of masses 5 kg and 20 kg connected by a light, inextensible string passing over a smooth pulley of mass 10 kg. An upward pulling force is applied on the pulley as shown. The reaction force between 5 kg block and ground is



(1) 50 N (2) 40 N

(3) 10 N (4) Zero

23. A block of mass 2 kg is kept on horizontal surface with coefficient of friction as indicated in figure. A horizontal time varying force F = (2 + t)N starts acting on the block at t = 0. Find the time after which the block begins to slide (g = 10 ms^{-2})



(1) 2 s (2) 8 s

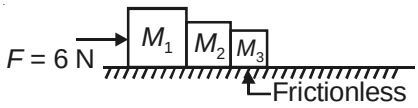
(3) 10 s (4) 16 s

24. A uniform rope of mass M and length L is hanging from the ceiling inside a lift going vertically upward with a constant acceleration a. The tension in the rope at a distance x (x < L) below its upper end is

(1) $\frac{Mx}{L}(g+a)$ (2) $M\left(1-\frac{x}{L}\right)(g+a)$

(3) $M\left(\frac{L}{x}-1\right)(g+a)$ (4) $M\left(1-\frac{x}{L}\right)(g-a)$

25. If in the given figure M_1 = 1 kg; M_2 = 2 kg; M_3 = 3 kg, then



the acceleration of mass M_2 will be

(1) 2 m/s^2 (2) 1 m/s^2

(3) 6 m/s^2 (4) 3 m/s^2

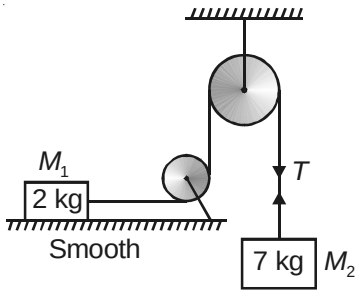
26. Two masses M_1 and M_2 of mass 2 kg and 7 kg respectively attached to massless and frictionless pulleys with light string as shown. Tension in string will be

(1) $\frac{70}{9}$ N

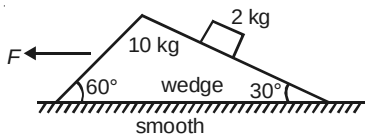
(2) $\frac{140}{9}$ N

(3) $\frac{90}{7}$ N

(4) $\frac{90}{14}$ N



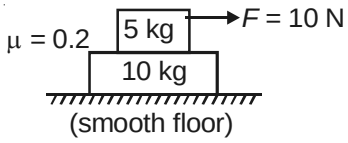
27. A wedge and block having masses 10 kg and 2 kg respectively shown in figure. A force F is applied on the wedge towards left so that block falls freely. At time of falling, contact force between wedge and block is



(1) $2g\cos30°$ (2) $2g\cos60°$

(3) $g\sin30°$ (4) Zero

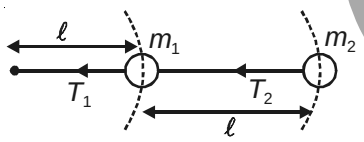
28. Accelerations of the blocks m_1 and m_2 in the given figure are (m_1 = 5 Kg, m_2 = 10 Kg)



(1) 1 m/s^2, 0 (2) 2 m/s^2, $\frac{2}{3}$ m/s^2

(3) $\frac{2}{3}$ m/s^2, 1 m/s^2 (4) $\frac{2}{3}$ m/s^2, $\frac{2}{3}$ m/s^2

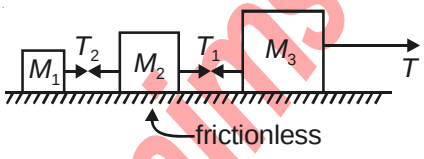
29. Two masses m_1 and m_2 are connected by massless string as shown in figure. If both are moving in a circle with same angular speed and T_1 and T_2 are tensions in the strings, then



(1) $T_1 < T_2$ (2) $T_2 = T_1$

(3) $T_1 > T_2$ (4) $T_2 > T_1$ if $m_2 > m_1$

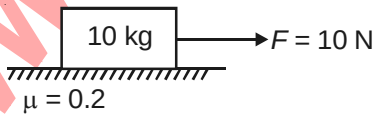
30. Three masses M_1, M_2, M_3 of masses 1 kg, 3 kg and 3 kg respectively are attached as shown in figure. Correct relation between T, T_1 and T_2 is



(1) $T < T_1 < T_2$ (2) $T > T_1 > T_2$

(3) $T = T_1 > T_2$ (4) $T_1 > T_2 > T$

31. In given figure a body of mass 10 kg placed on a rough horizontal surface of coefficient friction of

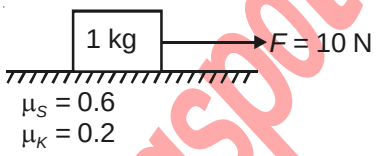


If a horizontal force F = 10 N applied on it, then the value of acceleration of the body will be

(1) 1 m/s^2 (2) 0.8 m/s^2

(3) Zero (4) 1.2 m/s^2

32. A block of mass 1 kg is placed on a rough horizontal surface. Find acceleration of body if horizontal force F = 10 N applied on it. (Initially block is at rest)



(1) 1 m/s^2 (2) 8 m/s^2

(3) Zero (4) 1.2 m/s^2

33. If a nucleus of mass m eject an α - particle of mass $\frac{m}{59}$ with velocity u, then recoil speed of product nucleus is

(1) $\frac{u}{59}$ (2) $\frac{58u}{59}$

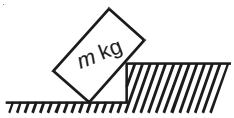
(3) $\frac{u}{58}$ (4) $\frac{59u}{58}$

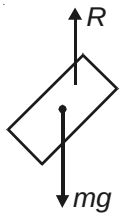
34. A bullet of mass 10 g fired by a gun at speed 150 m/s. It comes to rest in 0.01 s after collision with a wall, then average force applied by the wall on it is

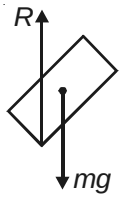
(1) 15 N (2) 30 N

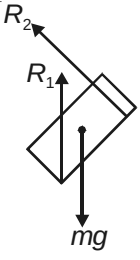
(3) 150 N (4) 1500 N

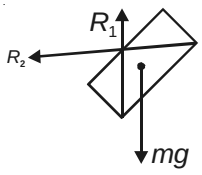
35. Free body diagram of a block of mass m at rest on an unlevelled ground as shown in figure is



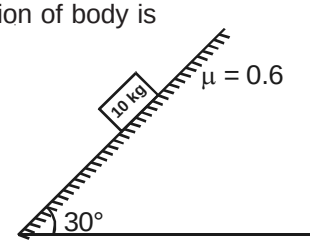
(1) 

(2) 

(3) 

(4) 

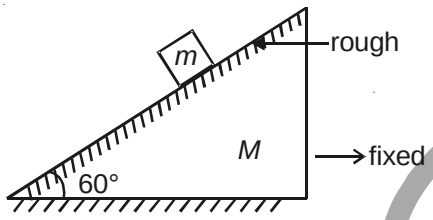
36. A block of mass 10 kg is at rest on a rough surface coefficient of friction $\mu = 0.6$, then downward acceleration of body is



(1) gsin30° (2) gcos30°

(3) $\frac{g}{\sin 30°}$ (4) Zero

37. A block of mass m kg rest on a fixed rough wedge of inclination 60° having mass M kg. Then minimum value of coefficient of friction between block and wedge is



(1) $\frac{mg}{\cos 60°}$ (2) gcot60°

(3) $\sqrt{3}$ (4) $\frac{1}{\sqrt{3}}$

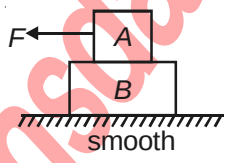
38. Two block A & B are placed as in figure ($m_A < m_B$). A force F acts on block A towards left. Friction force acting on B due to A block is in direction [μ is friction coefficient between A & B]

(1) Toward right

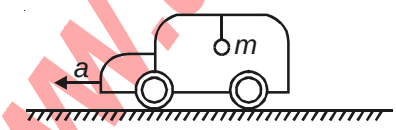
(2) Towards left

(3) Towards up

(4) Towards down



39. A car is accelerating horizontally with acceleration a towards left. A bob of mass m suspended from its roof by a string. The angle made by string from vertical at equilibrium is



(1) $\sec^{-1}\left(\frac{g}{a}\right)$ (2) $\tan^{-1}\left(\frac{g}{a}\right)$

(3) $\tan^{-1}\left(\frac{a}{g}\right)$ (4) $\cot^{-1}\left(\frac{a}{g}\right)$

40. On a highway at a horizontal sharp turn of radius 20 m a sign board indicate that the maximum speed of vehicles will be 20 m/s. The minimum coefficient of friction between tyres of vehicle and road is

(1) 0.02 (2) 0.2

(3) 2 (4) 20

41. A circular road of radius 40 m is banked at an angle of 45° with horizontal. The speed of vehicle on the road at which effect of friction neglected is

(1) 40 km/h (2) 72 km/h

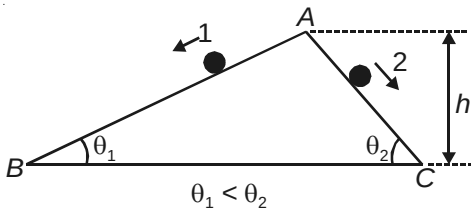
(3) 20 km/h (4) 80 km/h

42. A man slides down on a rough vertical pole with an acceleration equal to one-fifth of acceleration due to gravity (g). The frictional force between man and pole is (w = weight of man)

(1) $\frac{w}{5}$ (2) $\frac{3w}{5}$

(3) $\frac{4w}{5}$ (4) $\frac{w}{2}$

43. Two inclined frictionless tracks, one gradual and the other step meet at A from where two stones are allowed to slide down from rest one on each track (figure). Then mark correct option



(1) Both stones reach the bottom at same speed

(2) They will reach the bottom at different time

(3) Stone (2) will reach bottom first

(4) All of these

1. A particle is moving in a region, where its potential energy U varies with co-ordinates x, y and z as $U=\frac{a}{2}(x^2+y^2+z^2)$, where a is a positive constant. The force acting on the particle is

(1) $-a(x\hat{i}+y\hat{j}+z\hat{k})$ (2) $-2a(x\hat{i}+y\hat{j}+z\hat{k})$

(3) $-\frac{a}{2}(x^2+y^2+z^2)$ (4) $(x\hat{i}+y\hat{j}+z\hat{k})$

2. A knife having mass m is dropped from a height h above the surface of earth. If the knife penetrates upto distance x in the soil. The average force applied by the soil is

(1) $mg\left(\frac{h}{x}+1\right)$ (2) $\frac{mgh}{x}$

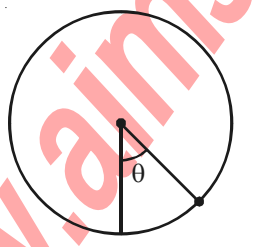
(3) $mg\left(\frac{h}{x}-1\right)$ (4) $\frac{mgx}{h}$

3. The potential energy U of a diatomic molecule varies with interatomic separation r as $U=\frac{a}{r^{12}}-\frac{b}{r^6}$, where a and b are positive constants. Find the interatomic separation for which atoms are in equilibrium

(1) Zero (2) $\left(\frac{b}{2a}\right)^{1/6}$

(3) $\left(\frac{2a}{b}\right)^{1/6}$ (4) $\left(\frac{a}{b}\right)^{1/6}$

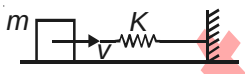
4. A stone is tied to a string of length ℓ and is moving in vertical circle such that the tension in the string at the highest position of stone is zero. Find the angle θ of string with lowest position when tension in the string is equal to the weight of stone



(1) $\cos^{-1}\left(\frac{1}{3}\right)$ (2) $\cos^{-1}\left(\frac{2}{3}\right)$

(3) $\cos^{-1}\left(-\frac{2}{3}\right)$ (4) $\sin^{-1}\left(\frac{1}{3}\right)$

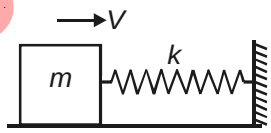
5. A body of mass (m) moving with speed v compresses a spring of spring constant(K). Maximum compression in spring is given by



(1) $x=\sqrt{\frac{m}{2K}}V$ (2) $x=\sqrt{\frac{m}{K}}V$

(3) $x=\sqrt{\frac{m}{K}}V^2$ (4) $x=\sqrt{\frac{2m}{K}}V$

6. A block moving with speed V starts compressing a spring of spring constant k as shown in figure. The compression in spring when speed of block becomes $\frac{V}{2}$ is



(1) $V\sqrt{\frac{m}{k}}$ (2) $\frac{V}{2}\sqrt{\frac{3m}{k}}$

(3) $\frac{V}{2}\sqrt{\frac{3m}{4k}}$ (4) $V\sqrt{\frac{2m}{k}}$

7. Work done against spring force in increasing the extension in a spring from x_1 to x_2 is (spring constant is k)

(1) $\frac{1}{2}k(x_2-x_1)^2$ (2) $\frac{1}{2}k\left(\frac{x_2-x_1}{2}\right)^2$

(3) $\frac{1}{2}k(x_2-x_1)(x_2+x_1)$ (4) $\frac{1}{2}k(x_1^2-x_2^2)$

8. A block of mass m is lowered vertically by a distance d with constant acceleration g/4 by means of a light inextensible string. Work done on the block by gravity is

(1) $\frac{mgd}{4}$

(2) $\frac{3mgd}{4}$

(3) $-\frac{3mgd}{4}$

(4) mgd

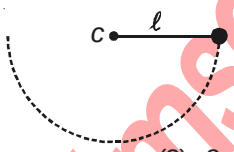
9. A body of mass m is lifted up from the earth surface to a height R above the earth's surface without changing its kinetic energy. The work done in this process is equal to
(1) Zero by the resultant force acting on the body
(2) $\frac{mgR}{2}$ by the applied force acting on the body
(3) $\frac{-mgR}{2}$ by the gravitational force acting on the body
(4) All of these

10. A body of mass m initially at rest starts moving and attains a velocity A in time T. Then, what is the instantaneous power delivered by force to the body in time t?
(1) $m\frac{A^2}{T^2}t$ (2) $m\frac{A^2}{T^2}t^2$
(3) $m\frac{A}{T}t$ (4) $m\frac{A^2}{T}t^2$

11. A bullet of mass m is moving with speed u hits a stationary wooden block of mass M placed on a smooth surface and gets embedded into it, then the percentage loss of energy during collision is
(1) $\left(\frac{100M}{M+m}\right)\%$ (2) $\left(\frac{100m}{M+m}\right)\%$
(3) $\left(\frac{m}{M+m}\right)\%$ (4) $\left(\frac{100m}{M}\right)\%$

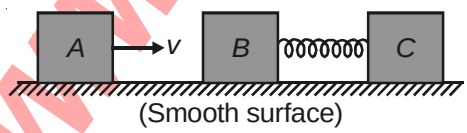
12. A radioactive nucleus of mass number A initially at rest emits an α-particle having kinetic energy K. The KE of recoiling nucleus will be
(1) K (2) $\frac{K}{A-4}$
(3) $\frac{4K}{A-4}$ (4) $\frac{K}{4}$

13. If a small particle of mass m is released from horizontal position as shown. (c is centre of circular path). Then the maximum tension in thread will be



(1) mg (2) 2mg
(3) 3mg (4) 4mg

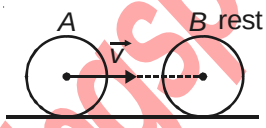
14. The blocks shown in figure are identical and each has mass 2 kg. If block A moving with speed 4 m/s collides with B and collision is perfectly elastic then the maximum compression produced in spring will be [spring constant k = 100 N/m]



(1) 0.4 m (2) 0.8 m
(3) 1.2 m (4) 1.6 m

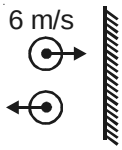
15. A ball of mass 500 gm moving with speed 2 m/s collide to a floor making an angle of 45° with vertical. If coefficient of restitution is $\frac{1}{\sqrt{3}}$, then the angle made by the ball with normal, after collision is
(1) 60° (2) 30°
(3) 45° (4) 37°

16. A body A of mass m elastically collides with another identical body B as shown in figure. The velocity of body A after collision is



(1) $\vec{v}$ (2) $\frac{\vec{v}}{2}$
(3) Zero (4) $\frac{\vec{v}}{3}$

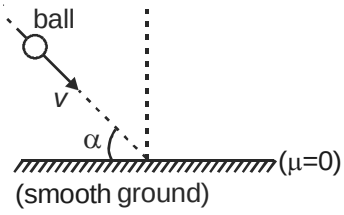
17. A ball moving with velocity = 6 m/s perpendicular to a wall collides with it. Magnitude of change in velocity of ball the due to collision is (Assuming coefficient of restitution = $\frac{1}{3}$)



(1) 2 m/s (2) 6 m/s
(3) 9 m/s (4) 8 m/s

18. A body of mass m moving with a constant velocity v hits another body of the same mass moving with the same speed v in the opposite direction and sticks to it. The speed of the compound body after collision is
(1) $v\sqrt{2}$ (2) 2v
(3) $\frac{v}{2}$ (4) Zero

19. If coefficient of restitution between ball and ground is e, then find speed of ball just after collision



(1) ev (2) v
(3) $v\sqrt{\sin^2\alpha + e^2\cos^2\alpha}$ (4) $v\sqrt{\cos^2\alpha + e^2\sin^2\alpha}$

20. A ball is dropped from height 32 cm above ground level. If the coefficient of restitution between the ball and ground is 0.5 then, to what height will it rise after first collision?
(1) 16 m (2) 8 m
(3) 4 m (4) 0.8 m

21. A bullet of mass m moving horizontally with velocity v is fired into a large wooden block of mass M kept at rest on a smooth horizontal surface. The magnitude of final velocity of this bullet-block system is
(1) $\frac{(m+M)v}{m}$ (2) $\frac{(m+M)v}{M}$
(3) $\frac{mv}{M+m}$ (4) $\frac{(M-m)v}{m}$

22. A ball of mass 10 kg is moving with velocity 10 m/s strikes the bob of a pendulum at rest. The mass of the bob is also 10 kg. If the collision is perfectly inelastic, then the height to which the combination of two will rise is
(1) 2 m (2) 1.6 m
(3) 1 m (4) 1.25 m

23. A ball is dropped from a height h = 10 m on the ground. If the coefficient of restitution is e, the height to which the ball goes up after it rebounds for the nth time is
(1) $\frac{e^{2n}}{10}$ m (2) $10e^{2n}$ m
(3) ne^{10} m (4) $10e^{n}$ m

24. A bullet loses $\frac{1}{n}$th of its velocity passing through one plank. How many such planks are required to stop the bullet?
(1) $\left(\frac{2n-1}{n^2}\right)$ (2) $\left(\frac{n}{n-1}\right)$
(3) $\frac{n^2}{(2n-1)}$ (4) $\frac{(n-1)}{n}$

25 A stationary body explodes into two pieces of masse 6 kg and 4 kg, which move in opposite directions. The ratio of their kinetic energies $\frac{E_1}{E_2}$ is
(1) $\frac{3}{2}$ (2) $\frac{13}{2}$
(3) $\frac{2}{3}$ (4) $\frac{2}{13}$

26. A bomb at rest explodes into two fragments of masses 3 kg and 1 kg. The ratio of magnitude of velocities of the smaller and bigger fragment is
(1) 3 (2) 1
(3) $\frac{1}{2}$ (4) $\frac{1}{3}$

CHEMISTRY

[Chapter-1 : Some Basic Concepts of Chemistry]

1. The equivalent weight of Fe_2S_3 in the reaction is
$Fe_2S_3 \rightarrow FeSO_4 + SO_2$
(1) $\frac{\text{Mol. wt.}}{4}$ (2) $\frac{\text{Mol. wt.}}{16}$
(3) $\frac{\text{Mol. wt.}}{22}$ (4) $\frac{\text{Mol. wt.}}{20}$

2. A compound contains 0.08% sulphur. The minimum molecular mass of the compound is
(1) 10,000 (2) 20,000
(3) 35,000 (4) 40,000

3. A zinc rod weighing 25g was kept in 100 ml of 1 M $CuSO_4$ solution. After a certain time the molarity of Cu^{2+} in the solution was 0.8 M. The weight of Zn rod left is equal to [At. mass of Zn = 65, Cu = 63.5]
(1) 1.308 g (2) 23.692 g
(3) 25 g (4) 26.8 g

4. In hot alkaline solution, Br_2 disproportionates to Br^- and BrO_3^-
$3Br_2 + 6OH^- \rightarrow 5Br^- + BrO_3^- + 3\,H_2O$
hence equivalent weight of Br_2 is (Mol. wt. = M)
(1) $\frac{M}{6}$ (2) $\frac{M}{5}$
(3) $\frac{3M}{5}$ (4) $\frac{5M}{3}$

5. On heating a litre of $\frac{N}{2}$ HCl, 1.375 g of HCl is lost and the volume of solution becomes 400 ml. The normality of resulting solution will be
(1) 0.58 (2) 1.155
(3) 0.057 (4) 5.7

6. H_3BO_3 on heating decomposes in two ways
I $H_3BO_3 \rightarrow HBO_2 + H_2O$
II $H_3BO_3 \rightarrow B_2O_3 + H_2O$
If 9 moles of H_3BO_3 is taken and some part decomposed like (I) and remaining like (II). If total 11 moles of water are formed, the moles of B_2O_3 formed is
(1) 6 (2) 5
(3) 3 (4) 2

7. 12.5 ml of a solution containing 6.0 g of a dibasic acid in one litre was found to be neutralized by 10 ml of a decinormal solution of NaOH. The molecular weight of the acid is

(1) 110 (2) 75

(3) 120 (4) 150

8. One litre of CO and CO_2 is passed through a tube containing red hot charcoal. The volume now becomes 1.6 L at same conditions of temperature and pressure. The composition of mixture is

(1) 0.8 L CO, 0.2 L CO_2 (2) 0.2 L CO, 0.8 L CO_2

(3) 0.4 L CO, 0.6 L CO_2 (4) 0.6 L CO, 0.4 L CO_2

9. X g of silver dissolved in HNO_3 and the solution was treated with excess of NaCl when 2.87 g of AgCl was precipitated. The value of x is

(1) 2.70 g (2) 2.16 g

(3) 1.08 g (4) 1.62 g

10. An oxide of metal contains 60% by mass of metal. Metal (M) has relative atomic mass of 24. The empirical formula of the oxide is

(1) M_2O (2) MO

(3) M_2O_3 (4) M_3O

11. 100 ml of a mixture of NaOH and Na_2SO_4 is neutralised by 10 ml of 0.5 M H_2SO_4. The amount of NaOH in 100 ml solution is

(1) 0.2 g (2) 0.4 g

(3) 0.6 g (4) 0.8 g

12. Dehydration of sucrose, by concentrated H_2SO_4 gives purest form of carbon. The amount of carbon which can be obtained by 34.2 g sucrose is

(1) 14.4 g atoms (2) 12 g atoms

(3) 3.2 g atoms (4) 1.2 g atoms

13. The number of gram atoms of oxygen present in 0.3 gram mole of $(CH_2COOH)_2.2H_2O$ is

(1) 0.6 (2) 1.8

(3) 1.2 (4) 3.6

14. 100 ml of 0.1 N hypo decolourised iodine by the addition of x g of crystalline copper sulphate to excess of KI. The value of x is (Mol. wt. of $CuSO_4.5H_2O$ is 250)

(1) 5.0 g (2) 1.25 g

(3) 2.5 g (4) 4 g

15. A gaseous mixture contains CH_4 and C_2H_6 in equimolar proportion. The weight of 2.24 L of this mixture at S.T.P is

(1) 4.6 g (2) 1.6 g

(3) 2.3 g (4) 1.8 g

16. The specific heat of a metal is 0.16. Its approximate atomic weight would be

(1) 32 (2) 16

(3) 40 (4) 64

17. Iodometric titration is based on the following reaction

$I_2(s) + I^- \rightleftharpoons I_3^-$

The equivalent weight of iodine in reaction is

(1) M (2) $\frac{3M}{2}$

(3) $\frac{M}{3}$ (4) $\frac{M}{4}$

18. 0.275 g of metal dissolved in dil H_2SO_4 and 120 ml of H_2 was evolved. The equivalent mass of metal is

(1) 29.4 (2) 25.6

(3) 51.2 (4) 2.78

19. If isotopic distribution of C-12 and C-14 is 98% and 2% respectively, then the number of C-14 atoms in 12 g of carbon is

(1) 1.032×10^{22} (2) 3.01×10^{22}

(3) 5.88×10^{23} (4) 6.023×10^{23}

20. 12 L of H_2 and 11.2 L of Cl_2 are mixed and exploded. The composition by volume of the mixture is

(1) 24 L of HCl

(2) 0.8 L Cl_2 and 20.8 HCl

(3) 0.8 L H_2, 22.4 L HCl

(4) 22.4 L HCl

21. The crystalline salt $Na_2SO_4.xH_2O$ on heating loses 56% of its weight. The formula of the crystalline salt is

(1) $Na_2SO_4.5H_2O$ (2) $Na_2SO_4.7H_2O$

(3) $Na_2SO_4.10H_2O$ (4) $Na_2SO_4.6H_2O$

22. Maximum moles of NO, that will be obtained by using 10 mole each of NH_3 and O_2 in the reaction $4NH_3(g) + 5O_2(g) \rightarrow 4NOg + 6H_2O(l)$ is

(1) 8 (2) 10

(3) 12 (4) 14

23. Superoxide is used for generating O_2 in space programmes. The volume of O_2 produced on reaction of 0.15 mole KO_2 and 0.12 mole H_2O at STP will be

$2KO_2 + 2H_2O \rightarrow 2KOH + H_2O_2 + O_2$

(1) 1.344 L (2) 1.68 L

(3) 2.688 L (4) 3.36 L

24. Cl_2 is produced in lab by the action of HCl on MnO_2. The mass of pure MnO_2 required to produce 10 mole of Cl_2 is (At mass of Mn = 55)

$MnO_2 + 4HCl \rightarrow MnCl_2 + Cl_2 + 2H_2O$

(1) 1160 g (2) 870 g

(3) 652.5 g (4) 600 g

25. The number of significant figures in 6.02×10^{23} is

(1) 23 (2) 3

(3) 4 (4) 26

26. 1 kg of NaOH solution contains 4 g of NaOH. The approximate concentration of solution is

(1) 1 M (2) 0.1 M

(3) $\frac{1}{100}$M (4) 10 M

27. The maximum moles of barrium phosphate that can be obtained on complete reaction of 1 mole each of $BaCl_2$ and Na_3PO_4 is

$BaCl_2 + Na_3PO_4 \rightarrow NaCl + Ba_3(PO_4)_2$

(1) 1 mole (2) $\frac{1}{2}$ mole

(3) $\frac{1}{3}$ mole (4) $\frac{2}{3}$ mole

28. Mass of sulphur that will be produced by action of 10 L each of SO_2 and H_2S at STP is

$SO_2 + H_2S \rightarrow S + H_2O$

(1) 42.86 g (2) 21.43 g

(3) 18.34 g (4) 14.23 g

29. Moles of H_3PO_4 required to completely neutralise 1 mole of NaOH will be

(1) $\frac{1}{3}$ (2) $\frac{1}{2}$

(3) 2 (4) 3

30. The concentration term which doesn't changes with temperature is

(1) g-strength (2) Normality

(3) Molarity (4) Percentage by weight

31. 1g of a mixture of NaCl and Na_2CO_3 is completely reacted with 75 ml $\frac{N}{10}$ HCl. The % of Na_2CO_3 in the mixture is

(1) 53 (2) 39.75

(3) 26.5 (4) 79.5

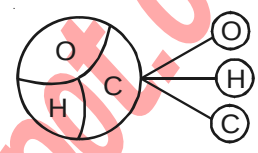
32. A ball made of C, H and O, gets fragmented in such a way that all the atoms of same elements goes together. If the mass of each fragement is equal then number of moles in the ratio of O, H and C respectively is

(1) 16 : 1 : 12

(2) 8 : 1 : 6

(3) 3 : 48 : 4

(4) 1 : 1 : 1



33. 1.575 g $(COOH)_2.xH_2O$ is dissolved in water and diluted upto 250 ml. 25 ml of this solution is completely neutralised with 25 ml $\frac{N}{10}$ NaOH. The value of x is

(1) 1 (2) 2

(3) 5 (4) 10

34. 5.6 L of an ideal diatomic gas at STP contains n-'molecules', then the number of atoms in another triatomic gas in its 11.2 L at STP is

(1) 2n (2) 3n

(3) 4n (4) 6n

35. A compound containing elements A, B and C contains 30% each of A and C. If atomic masses of A, B and C are respectively 60, 40 and 30, the empiricial formula of the compound will be

(1) A_2B_2C (2) A_2BC_2

(3) AB_2C_2 (4) $A_6B_9C_{16}$

36. In an ozonizer, oxygen is converted into ozone as per the reaction $3O_2(g) \longrightarrow 2O_3(g)$ 1L O_2 on passing through ozonizer reduces to 0.8 L mixture of O_2 and O_3 at STP. The ratio of volume of O_2 and O_3 in the mixture will be

(1) 1 : 1 (2) 1 : 2

(3) 2 : 3 (4) 3 : 2

[Chapter-2 : Structure of Atom]

1. The energy of electron of H atom in an orbit is –1.51 eV. Its angular momentum in that orbit will be

(1) $\frac{h}{2\pi}$ (2) $\frac{h}{\pi}$

(3) $1.5\frac{h}{\pi}$ (4) $2\frac{h}{\pi}$

2. Number of waves made by electron in 3rd orbit of hydrogen atom is

(1) 2 (2) 3

(3) 4 (4) 5

3. If E is the kinetic energy of the particle than which of the following expressions is correct for the de-Broglie wavelngth of the particle ?

(1) $\lambda = \frac{h}{2mE}$ (2) $\lambda = \sqrt{\frac{h}{2mE}}$

(3) $\lambda = \frac{h}{\sqrt{2mE}}$ (4) $\lambda = \sqrt{\frac{2mE}{h}}$

4. Which of the following orbitals has a maximum number of radial node?

(1) 6s (2) 6p

(3) 6d (4) 6f

5. The two particles A and B have de-Broglie wavelengths 1 nm and 5 nm respectively. If mass of A is four times the mass of B, the ratio of kinetic energies of A and B would be

(1) 5 : 1 (2) 25 : 4

(3) 20 : 1 (4) 5 : 4

6. Out of the following radiations, which one is most easily stopped by air?

(1) X-rays (2) α-rays

(3) β-rays (4) γ-rays

7. If threshold wavelength for ejection of electron from metal is 330 nm, then work function for the photoelectric emission is

(1) 6×10^{-10} J (2) 1.2×10^{-18} J

(3) 3×10^{-19} J (4) 6×10^{-19} J

8. The energy of the second orbit of hydrogen is equal to the energy of

(1) Fourth orbit of He^+ (2) Fourth orbit of Li^{2+}

(3) Second orbit of He^+ (4) Second orbit of Li^{2+}

9. The de-Broglie wavelength of an electron accelerated by a potential difference of 'V' volts is given by the relationship

(1) $\frac{12.28}{\sqrt{V}}$ Å (2) $\frac{12.28}{\sqrt{V}}$ cm

(3) $\frac{12.28}{\sqrt{V}}$ m (4) $\frac{12.28}{V}$ Å

10. The threshold frequency of a metal is 1×10^{15} s^{-1}. The ratio of maximum kinetic energy of the photoelectrons when the metal is irradiated with radiations of frequency 1.5×10^{15} s^{-1} and 2.0×10^{15} s^{-1} respectively, would be

(1) 3 : 4 (2) 1 : 2

(3) 2 : 1 (4) 4 : 3

11. If the quantum numbers of electron in a multielectron atom is 2, 0, 0, $\frac{1}{2}$ and 2, 0, 0, $-\frac{1}{2}$. What is the next higher allowed set of n and l quantum numbers for this atom in its ground state?

(1) n = 2, l = 0 (2) n = 2, l = 1

(3) n = 3, l = 0 (4) n = 3, l = 1

12. An electron in H atom in its ground state absorbs 1.50 times as much energy as the minimum required for ionisation of the atom. Thus KE of emitted electron is

(1) 13.6 eV (2) 20.4 eV

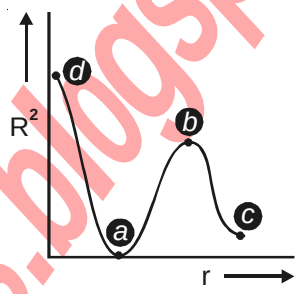
(3) 34.0 eV (4) 6.8 eV

13. The number of radial nodes for 4s, 4f, 5p orbitals are respectively

(1) 0, 3, 1 (2) 4, 4, 5

(3) 3, 0, 3 (4) 3, 3, 4

14. The region where $\psi^2 = 0$ is marked in the graph as



(1) a (2) b

(3) c (4) d

15. Potential energy of electron of He^+ is

(1) $-\frac{e^2}{4\pi\varepsilon_0 r}$ (2) $-\frac{e^2}{\pi\varepsilon_0 r}$

(3) $-\frac{e^2}{2\pi\varepsilon_0 r}$ (4) $+\frac{2e^2}{4\pi\varepsilon_0 r}$

16. Which of the following spectrum series of hydrogen belongs to visible region?

(1) Lyman series (2) Balmer series

(3) Paschen series (4) Pfund series

17. Which of the d orbitals lie/s in the xy plane?

(1) d_{xz} only (2) d_{xy} only

(3) $d_{x^2-y^2}$ only (4) d_{xy} and $d_{x^2-y^2}$

18. A 10^{-10} volt, accelerating potential is applied to an electron beam, then the order of wavelength of electron is approximately

(1) 10^{-4} m (2) 10^{-5} m

(3) 10^{-6} m (4) 10^{-7} m

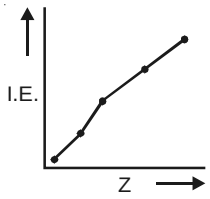
19. If electron jumps from n = 6 to n = 2 then total number of spectral lines obtained in infrared region are

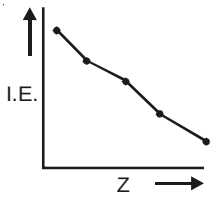
(1) 10 (2) 6

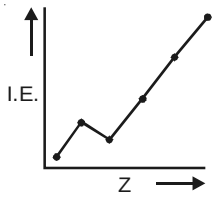
(3) 15 (4) 5

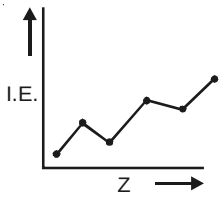
[Chapter-3 : Classification of Elements and Periodicity]

1. Which is correct order of electron affinity?
   (1) Cl > F (2) Br > Cl
   (3) F > Cl (4) I > Br
2. The correct plot of ionisation energy of elements of group 2 is

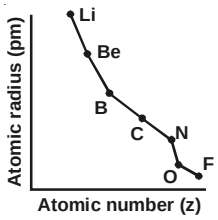
(1) 

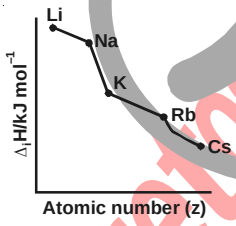
(2) 

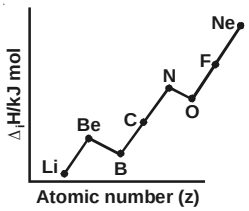
(3) 

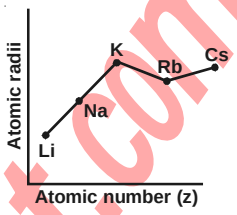
(4) 

3. The first ionisation energy of magnesium and aluminium are respectively given by
   (1) 7.64, 5.98 (2) 7.64, 7.64
   (3) 5.98, 7.64 (4) 5.98, 5.98
4. Which of the following graph is incorrect?

(1) 

(2) 

(3) 

(4) 

5. Which of the following element is having least negative electron gain enthalpy?
   (1) P (2) S
   (3) Cl (4) F
6. Which of the following statement is incorrect?
   (1) The first ionisation energy of N is greater than O
   (2) The second ionisation energy of O is greater than N
   (3) The first ionisation energy of F is greater than Ne
   (4) The first ionisation energy of He is greater than Ne
7. The correct decreasing order of negative electron gain enthalpy of oxygen family is
   (1) S > Se > Te > Po > O
   (2) S > O > Se > Te > Po
   (3) O > S > Se > Te > Po
   (4) O > Se > S > Te > Po

[Chapter-4 : Chemical bonding and Molecular Structure]

1. Which of the following compound is/are polar?

CCl_4	BCl_3	NH_3	AsH_3
(A)	(B)	(C)	(D)

   (1) B, C & D (2) C & D
   (3) C only (4) B & C
2. Compound in which central atom assumes sp^3d hybridization
   (1) XeF_4 (2) SF_4
   (3) PCl_3 (4) XeO_3
3. In the formation of O_2^+ from O_2 the electron is removed from
   (1) A σ orbital (2) A π orbital
   (3) A σ* orbital (4) A π* orbital
4. When BF_3 react with KF to form KBF_4, F–B–F bond angle
   (1) Increases
   (2) Decreases
   (3) Remains same
   (4) Depends on pressure
5. If the observed dipole moment of LiF is 6.32 D and Li–F bond length is 0.156 nm, then what will be percentage of ionic character?
   (1) 84.4 (2) 44.8
   (3) 26.5 (4) 33.33
6. In PCl_5
   (1) Axial P—Cl bond is shorter than equatorial P—Cl bond
   (2) Axial P—Cl bond is longer than equatorial P—Cl bond
   (3) Axial P—Cl bond is neither longer nor shorter than equatorial P—Cl bond
   (4) Axial P—Cl bond feel lesser repulsive force than equatorial P—Cl bond

7. Which of the following observation is correct?

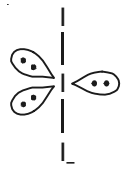
(1) CaO > NaCl (m.p.)

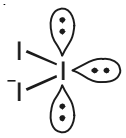
(2) LiCl < KCl (Ionic character)

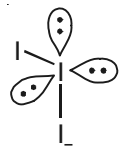
(3) KCl < AgCl (Covalent character)

(4) All of these

8. Correct structure of I_3^- ion is

(1) 

(2) 

(3) 

(4) 

9. Among the following compound which has square planar shape?

(1) $NH_4^{\oplus}$ (2) $BF_4^{\ominus}$

(3) XeF_4 (4) SF_4

10. Which has highest bond angle among NO_2, NO_2^+ & NO_2^-?

(1) NO_2^- (2) NO_2^+

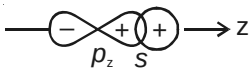
(3) NO_2 (4) All are equal

11. Which of the following is paramagnetic?

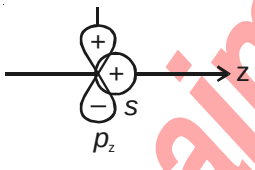
(1) KO_2 (2) Na_2O

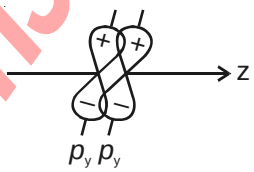
(3) Na_2O_2 (4) BaO_2

12. Which of the following diagram represents zero overlapping of s and p atomic orbitals?

(1) 

(2) 

(3) 

(4) 

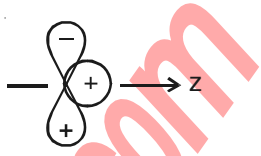
13. The molecular orbital shown below is

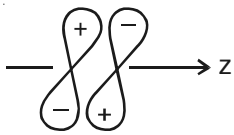
(1) $2p_x \pi^*$ (2) $2p_x \pi$

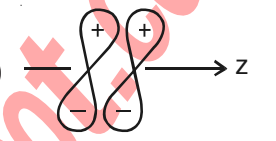
(3) σ_{2p_z} (4) $\sigma^*_{2p_z}$

14. Which of the following represents positive overlaps?

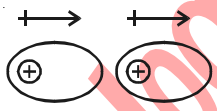
(1) 

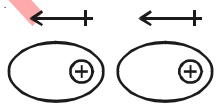
(2) 

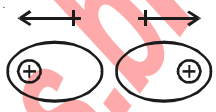
(3) 

(4) 

15. Which of the following figure represents dispersion forces?

(1) 

(2) 

(3) 

(4) Both (1) & (2)

16. Which of the following is correct statement?

(1) CH_4, CCl_4 and NH_4^+ contain same number of electrons and their shapes are same

(2) The shape of BeF_2 and XeF_2 are linear but different hybridization

(3) Lone pair of e^- in BF_3 and ClF_3 are same

(4) Hybridization of B in BF_3 and Cl in ClF_3 are same

17. Which of the following is correct order of bond angle?

(1) $SO_2 > H_2O > NH_3 > CH_4$

(2) $CH_4 > NH_3 > H_2O > SO_2$

(3) $SO_2 > CH_4 > NH_3 > H_2O$

(4) $NH_3 > SO_2 > CH_4 > H_2O$

18. Which of the following species have both σ and π bond according to M.O.T?

(1) N_2 (2) B_2

(3) C_2 (4) All of these

19. In which of the following pairs, the two structures are iso-structural?

(1) SF_4 and CF_4 (2) NCl_3 and BCl_3

(3) SO_3^{-2} and NO_3^- (4) BrO_3^- and XeO_3

1. van der Waal's equation at very high pressure for 1 mole of gas may be written as

(1) $P(V - b) = RT$ (2) $\left(P + \frac{a}{V^2}\right) V = RT$

(3) $\left(P + \frac{a}{V^2}\right) (V - b)$ (4) $P(V + b) = RT$

2. An open flask contains air at 27ºC. The temperature at which the flask must be heated to escape out the one third of air measured at 27ºC would be

(1) 289 K (2) 450 K

(3) 500 K (4) 380 K

3. The ratio of rates of diffusion of gases P and Q is 1 : 4 and ratio of their masses present in the mixture is 2 : 3 then ratio of their mole fraction will be

(1) 1 : 4 (2) 1 : 24

(3) 1 : 6 (4) 2 : 5

4. If relative humidity of air is 60%, it means that partial pressure of water vapour in air is

(1) 6 times more than vapour pressure of water at that temperature

(2) 0.06 times more than vapour pressure of water at that temperature

(3) 0.6 times more than vapour pressure of water at that temperature

(4) 60 times more than vapour pressure of water at that temperature

5. Two gases A and B having the mole ratio 4 : 7 in a container, exert a pressure of 11 atm. If gas A is removed then the pressure exerted by B at constant temperature will be

(1) 11 atm (2) 4 atm

(3) 7 atm (4) 5.5 atm

6. The ratio $\frac{a}{b}$ (a and b being the van der Waal's constants of real gases) has the dimensions of

(1) atm mol^{-1} (2) 1 mol^{-1}

(3) atm L mol^{-1} (4) atm L mol^{-2}

7. A gaseous mixture of 2 moles of A, 3 moles of B, 5 moles of C and 10 moles of D is contained in a vessel. Assuming that gases are ideal and the partial pressure of C is 1.5 atm, the total pressure is

(1) 3 atm (2) 6 atm

(3) 9 atm (4) 0.6 atm

8. Helium gas at 1 atm and SO_2 at 2 atm pressure, temperature being the same, are released separately at the same moment into 1 m long evacuated tubes of equal diameter. If He reaches the other end of tube in one second. What distance SO_2 would traverse in the same interval in the other tube?

(1) 25 cm (2) 50 cm

(3) 60 cm (4) 75 cm

9. 2 mol of NH_3 and 1 mol of HCl are introduced into a 10 L evacuated closed container at 27°C. The pressure set up in the container will be

(1) $\frac{3 \times 0.0821 \times 300}{10}$ atm (2) $\frac{2 \times 0.0821 \times 300}{10}$ atm

(3) $\frac{1 \times 0.0821 \times 300}{10}$ atm (4) $\frac{4 \times 0.0821 \times 300}{10}$ atm

10. Relative humidity of air is 80% at 27°. If the aqueous tension at the same temperature is 27 mm Hg, partial pressure of water vapour in the air will be

(1) 27 mm Hg (2) 25 mm Hg

(3) 23 mm Hg (4) 21.60 mm Hg

11. Two flasks X and Y of volumes 250 ml and 300 ml respectively at the same temperature are connected by a stop cock of negligible volume. The flask X contains nitrogen gas at a pressure of 660 torr and the flask Y contains neon at pressure of 825 torr. If the stop cock is opened to allow the two gases to mix. The partial pressure of neon and total pressure of the system will be

(1) 300 torr, 700 torr (2) 400 torr, 700 torr

(3) 450 torr, 750 torr (4) 300 torr, 750 torr

12. The reciprocal of compressibility factor of a real gas in critical state is

(1) $\frac{3}{8}$ (2) $\frac{3}{4}$

(3) $\frac{8}{3}$ (4) $\frac{1}{3}$

13. If V is the volume of one molecule of gas under given conditions, the van der Waal's constant b is

(1) 4 V (2) $\frac{4V}{N_0}$

(3) $\frac{N_0}{4V}$ (4) $4 V N_0$

14. The density of gas A is twice that of a gas B at the same temperature. The molecular mass of gas B is thrice that of A. The ratio of pressure acting on A and B will be

(1) 6 : 1 (2) 7 : 8

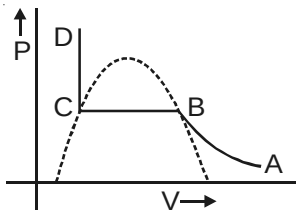
(3) 2 : 5 (4) 1 : 4

15. What should be the percentage increase in the pressure for a 5% decrease in volume of gas at constant temperature?

(1) 2.12 (2) 4.23

(3) 5.26 (4) 6.97

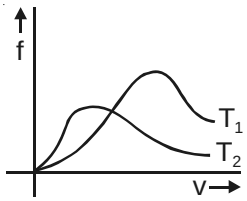
16. In the given isotherm for liquefaction of a gas, the part of the graph which represents liquefaction is

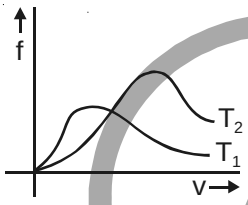


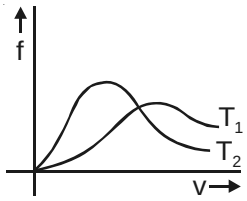
(1) A to B (2) B to C

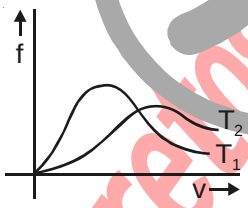
(3) C to D (4) A to C

17. If $T_1 > T_2$ then select the correct graph from the followings (f = fractions of molecules ; v = molecular speed)

(1)


(2)


(3)


(4)


18. The percentage increase in pressure at a constant temperature to reduce volume of given amount of a gas to 80% of initial volume will be

(1) 20% (2) 25%

(3) 30% (4) 40%

19. Ratio of average speed to that of most probable speed is

(1) $\sqrt{2.5}$ (2) $\sqrt{1.27}$

(3) $\sqrt{0.5}$ (4) $\sqrt{0.25}$

20. Pressure and temperature at bottom of a pond are 2 atm and 17ºC, while at the top it is 1 atm and 27ºC. Give the fractional increase in volume of an air bubble when it comes from bottom to top

(1) 1.06 (2) 1.6

(3) 2.06 (4) 3.02

21. Pressure exerted by one mole of an ideal gas kept in a vessel of 'V' L having root mean square speed of molecules 'v' and 'm' mass of each molecule is correctly given by the equation

(1) $P = \frac{1}{2}\frac{N_A}{V}mv^2$ (2) $P = \frac{1}{3}\frac{N_A}{V}mv^2$

(3) $P = \frac{2}{3}\frac{N_A}{V}mv^2$ (4) $P = \frac{3}{2}\frac{N_A}{V}mv^2$

22. NH_3 and HCl gases are introduced from the two ends of a straight tube under same condition. The formation of NH_4Cl is first observed at 'x' distance from NH_3 end and 'y' distance from HCl end, then

(1) x = y (2) x > y

(3) x < y (4) Can't be predicted

23. In two vessels (A) and (B) there are O_2 and N_2 under same temperature and pressure. (A) contains equal moles of O_2 & N_2 while (B) contains their equal masses. The partial pressure of O_2 in two vessels is correctly given as

(1) $p_{O_2(A)} > p_{O_2(B)}$ (2) $p_{O_2(A)} < p_{O_2(B)}$

(3) $p_{O_2(A)} = p_{O_2(B)}$ (4) Can't be calculated

24. Let inversion temperature of H_2 and CO_2 are respectively T_1 and T_2, then

(1) $T_1 > 25^oC > T_2$ (2) $T_1 > 25^oC < T_2$

(3) $T_1 < 25^oC < T_2$ (4) $T_1 < 25^oC > T_2$

25. A mixture of H_2 and O_2 gas contains 30% by weight of H_2. The partial pressure exerted by O_2 is (if total pressure of mixture is P)

(1) $\frac{9P}{50}$ (2) $\frac{11P}{59}$

(3) $\frac{7P}{55}$ (4) $\frac{15P}{72}$

26. The van der Waal's constant 'b' is

(1) Two times of actual volume of gaseous molecules

(2) Three times of actual volume of gaseous molecules

(3) Four times of actual volume of gaseous molecules

(4) Five times of actual volume of gaseous molecules

27. The pressure required to compress 1000 dm^3 of a gas at 1 atm to 700 dm^3 at room temperature is

(1) 1.42 atm (2) 1.90 atm

(3) 0.95 atm (4) 1.20 atm

28. If pressure and temperature of a x litre O_2 gas are doubled, the new volume of gas would be

(1) x litre (2) $\frac{x}{2}$ litre

(3) 2x litre (4) $\frac{x}{4}$ litre

29. van der Waal's equation for half mole of real gas is

(1) $\left(\frac{4PV^2+a}{4V^2}\right)(2V-b)=RT$

(2) $\left(\frac{3PV^2+a}{4V}\right)(2V-b)=RT$

(3) $\left(\frac{4PV+a}{4V^2}\right)(2V-b)=RT$

(4) $\left(\frac{2PV^2+a}{3V^2}\right)\left(V-\frac{b}{2}\right)=RT$

30. At 1 atm pressure and 1 bar pressure boiling temperature respectively, called is

(1) Normal boiling point and standard boiling point

(2) Standard boiling point and normal boiling point

(3) Normal boiling point in both

(4) Standard boiling point in both

31. The density of a gas at STP is x gm litre^{-1}. The density of gas at 17ºC and 2 atm pressure would be

(1) $\frac{1\times 290}{x\times 2\times 273}$ (2) $\frac{x\times 2\times 273}{1\times 290\times 3}$

(3) $\frac{1\times 290\times 3}{x\times 2\times 273}$ (4) $\frac{x\times 2\times 273}{1\times 290}$

BOTANY

Chapter - 1 : Living World

1. *Mangifera indica* belongs to the order and family respectively

(1) Sapindales and Annonaceae

(2) Parietals and Cruciferae

(3) Malvales and Malvaceae

(4) Sapindales and Anacardiaceae

2. Six kingdoms (by Carl Woese) are naturally clustered into 3 domains on the basis of

(1) 16 S r-RNA gene

(2) Major ecological role

(3) DNA gene

(4) Mode of Nutrition

3. Identify the **correct** sequence of taxonomical categories

(1) Species → Genus → Family → Class → Order

(2) Tribe → Subfamily → Family → Order → Class

(3) Variety → Tribe → Class→ Genus → Family

(4) Subspecies → Species → Order → Family → Class

4. Systematics

a. Is the study of diversity of organisms and their evolutionary relationship

b. Term was first used by Carolus Linnaeus

c. Theophrastus is considered as Father of Systematics

(1) Only a is correct

(2) Only b is incorrect

(3) Only c is incorrect

(4) b & c both are incorrect

5. Mark the incorrect statement

(1) Isolated metabolic reactions *in vitro* are not living things but surely living reactions

(2) Plant species in botanical gardens are grown for identification purposes

(3) No non-living object exhibits growth

(4) Cellular organisation of the body is the defining feature of life forms

6. Kew Bulletin and Index Kewensis are the two premier publications of

(1) Orto Botanico Garden

(2) Villa Toranto Garden

(3) Royal Botanical Garden

(4) Botanischer Garten

7. Mark the incorrect one

(1) Growth is extrinsic type in non-living objects

(2) Self-consciousness is present in human beings

(3) Most living and some non-living objects are capable of reproduction

(4) Cellular organisation is the defining feature of life forms

8. Select correct statement w.r.t. identification key

(1) Different taxonomic categories are identified by separate taxonomic keys

(2) Based on the pair of similar characters as couplet

(3) Each statement of key is grade

(4) Indented key is most popular and analytical in nature

9. Specimen selected from original material to serve as nomenclatural type when the holotype is missing is

(1) Isotype (2) Syntype

(3) Topotype (4) Lectotype

1. Terminal swollen structure of germ tube for penetration and attachment is regarded as
   (1) Appressorium (2) Haustoria
   (3) Sclerotium (4) Rhizomorph
2. Which of the following characteristic is not possessed by gram positive bacteria?
   (1) Presence of teichoic acid
   (2) Sensitivity to penicillin
   (3) Produce exotoxins
   (4) Presence of porins in cell wall
3. Which of the following is **incorrect**?
   (1) Slime layer does not contain D-glutamic acid
   (2) Central mesosomes help in holding the nucleoid
   (3) Teichoic acids are acidic polymers consisting of aminoacids, sulphates and aldehyde
   (4) *Chlorobium* is photolithotrophic and green sulphur bacteria
4. When DNA fragment from donor bacterium is not integrated in the genome of recipient bacterium and is lost after one or few generations. This is regarded as
   (1) Restricted transduction
   (2) Specialised transduction
   (3) Abortive transduction
   (4) Transformation
5. Match the following

	Column-I		**Column-II**
a.	*Morchella*	(i)	Drosophila of plant kingdom
b.	*Mucor mucedo*	(ii)	Blue/green mould
c.	*Penicillium*	(iii)	Dung mould
d.	*Neurospora crassa*	(iv)	Sponge mushroom

   (1) a(i), b(ii), c(iii), d(iv) (2) a(ii), b(iii), c(iv), d(i)
   (3) a(iv), b(iii), c(ii), d(i) (4) a(iii), b(ii), c(i), d(iv)
6. What is the **correct** sequence for the formation of spores of *Puccinia graminis*?
   (1) Uredospores → Basidiospores → Aeciospores → Pycniospores
   (2) Teleutospores → Uredospores → Basidiospores → Aeciospores
   (3) Pycniospores → Uredospores → Aeciospores → Teleutospores
   (4) Teleutospores → Basidiospores → Pycniospores → Aeciospores
7. Gram positive bacteria are characterised by all **except**
   (1) Presence of teichoic acid
   (2) Presence of single layered thick cell wall
   (3) Presence of diaminopimellic acid in the cell wall
   (4) Presence of more amino sugars in cell wall as compared to gram negative bacteria
8. Which of the following group of bacteria give rise to sphaeroplast when treated with lysozyme?
   (1) *E. coli* and *Lactobacillus*
   (2) *Rhizobium* and *Clostridium*
   (3) *Staphylococcus* and *Vibrio*
   (4) *Agrobacterium* and *Xanthomonas*
9. Which of the following is **correct** w.r.t. *Mycoplasma* out of the following features?
   i. Diseases like potato witches broom and little leaf of brinjal are caused
   ii. Contain flagella made up of protein flagellin
   iii. Filterable through bacterial filters and are resistant to antibiotics like penicillin
   (1) i & ii (2) ii & iii
   (3) i & iii (4) Only i
10. Which of the following group of viruses contain ss-RNA?
    (1) Hepatitis B virus and chicken pox virus
    (2) Cauliflower mosaic virus and herpes virus
    (3) Polio virus and $\phi \times 174$
    (4) Rabies virus and mumps virus
11. Cellular slime moulds are not characterised by which of the following feature?
    (1) Presence of wall-less uninucleate myxamoebae
    (2) Formation of pseudoplasmodium by the aggregation of macrocyst
    (3) Capillitia are lacking in the sporangium
    (4) Presence of cellulosic wall around spores
12. Which of the following is **incorrect** statement w.r.t. *Agaricus?*
    (1) The vegetative or assimilative part of mycelium is subterranean
    (2) Primary mycelium is short lived and consists of septate hyphae, having monokaryotic cells
    (3) In button stage the pileus is connected to gills by a memberane called velum
    (4) Basidiospores are the product of meiosis and hence are haploid

13. Endospores are thick walled highly dehydrated and resistant spores formed under adverse conditions usually by *Bacillus* and *Clostridium*. It is regarded as a method of perennation, not reproduction because
(1) Produced endogenously
(2) Cortex has dipicolinic acid
(3) One endospore produces one bacterium
(4) No genetic variation in bacterium

14. Conidia produced at tip of conidiophores in fungi are
(1) Always diploid (2) Mitospores
(3) Meiospores (4) Produced sexually

15. Lichens are
(1) Not indicator of SO_2
(2) Capable of N_2 fixing if they have BGA as phycobiont
(3) Pioneer vegetation in a hydrosere
(4) Symbiotic association between fungi and roots of higher plants

16. Select **incorrect** statement regarding protists
(1) Group of unicellular eukaryotes
(2) They have diversified type of nutrition
(3) Flagella and cilia have 9 + 0 arrangment of microtubules
(4) They may have both plant and animal like characters

17. Match the following

	Column I (Nucleoid)		**Column II (Virus)**
a.	ds DNA	(i)	Hepatitis
b.	ss DNA	(ii)	Reo virus
c.	ds RNA	(iii)	Dengue
d.	ss RNA	(iv)	$\phi \times 174$

(1) a(i), b(iv), c(iii), d(ii) (2) a(i), b(iv), c(ii), d(iii)
(3) a(i), b(ii), c(iv), d(iii) (4) a(iv), b(i), c(ii), d(iii)

18. Basidiocarp of mushroom (*e.g. Agaricus*)
(1) Is made up of primary mycelium
(2) Produce exogenous meiospores
(3) Has upper part stipe and lower part pileus
(4) Has many vertically hanging gills which bears paraphyses only at their tips

19. Which of the following is common in murein and chitin?
(1) NAG (2) NAM
(3) Tetrapeptide (4) Teichoic Acid

20. Mycoplasma are / have
(1) Sensitive to penicillin
(2) Filterable through bacterial filters
(3) Non pathogenic organisms
(4) ss, circular DNA

21. A similarity between diatoms and dinoflagellate is
(1) Both are non-flagellated forms
(2) Both have chl-a and chl-c
(3) Both are sewage pollution indicator
(4) Both have diplontic life cycle

22. Site of karyogamy in ascomycetes is
(1) Ascogonia (2) Ascospore
(3) Ascus (4) Ascocarp

23. Match the column A and B

	Name of organism		**Disease**
a.	*Albugo*	(i)	Early blight
b.	*Claviceps*	(ii)	Wheat rust
c.	*Puccinia*	(iii)	White rust
d.	*Alternaria*	(iv)	Ergot

(1) a(iii), b(iv), c(i), d(ii) (2) a(iii), b(ii), c(i), d(iv)
(3) a(iii), b(iv), c(ii), d(i) (4) a(ii), b(iv), c(i), d(iii)

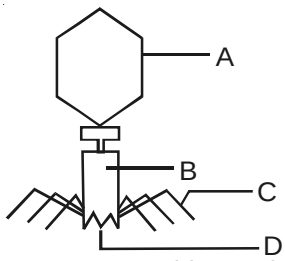
24. Which of the following amino acid is absent in tetrapeptide chain of cell wall of bacteria which also possess teichoic acid?
(1) L-lysine (2) Diaminopimellic acid
(3) D-glutamic acid (4) L-alanine

25. Bacteria utilising light and H_2S as electron and H^+ donor for CO_2 reduction are called
(1) Oxygenic photoautotrophs
(2) Photolithotrophs
(3) Photoheterotrophs
(4) Chemoautotrophs

26. Gram negative monerans with lamellasome show
(1) Absence of motile structure
(2) Presence of heterocyst with PS I and PS II
(3) Absence of peptidoglycan in cell wall
(4) Ability to form red tide by excessive cell division

27. Archaebacteria are able to grow in adverse conditions by decreasing membrane fluidity and increasing resistance to high temperature and low pH by the presence of
(1) Capsule
(2) Cell wall without peptidoglycan
(3) Branched chain lipid
(4) N-acetyltalosaminuronic acid

28. Observe the diagram of a bacteriophage. The following is/are non-contractile



(1) A, B, D (2) A only
(3) C and D (4) B only

29. Bordeaux mixture used as fungicide is

(1) $CuSO_4 + Ca(OH)_2 + H_2O$

(2) $CaSO_4 + Cu(OH)_2 + H_2O$

(3) $CaCO_3 + Cu(OH)_2 + H_2O$

(4) $CaCO_3 + Ca(OH)_2 + H_2O$

30. A **correct** match is

(1) *Trichophyton* - Athlete's foot

(2) *Phytophthora* - Early blight of potato

(3) *Erysiphe* - Damping off of seedlings

(4) *Protomyces* - Smut of bajra

31. In Whittaker system of classification, taxon *Chlamydomonas* and *Chlorella* were brought together in a kingdom with which one of the following group of members?

(1) *Spirogyra* and *Ulothrix*

(2) *Paramoecium* and *Amoeba*

(3) *Rhodospirillum* and *Spirulina*

(4) *Riccia* and *Tillandsia*

32. Which of the following feature is **not** possessed by diatoms?

(1) Movement is brought about by mucilage propulsion

(2) Serve as sewage pollution indicators

(3) Gamete grows into a rejuvenescent cell called auxospore

(4) Body covering is called frustule

33. Most primitive and ancient group of bacteria as living fossils show

(1) Peptidoglycan nature of cell wall

(2) Presence of branched chain lipids which increases membrane fluidity

(3) Reddish pigment in their membrane to trap light energy with chemoheterotrophic nutrition

(4) Exonic DNA only

34. Match the following

	Column I	**Column II**
a.	Algin	(i) *Funaria*
b.	Carrageenin	(ii) *Marchantia*
c.	Elater	(iii) *Chondrus*
d.	Peristome	(iv) *Laminaria*

(1) a(iii), b(iv), c(i), d(ii)

(2) a(iv), b(iii), c(ii), d(i)

(3) a(iii), b(iv), c(ii), d(i)

(4) a(iv), b(iii), c(i), d(ii)

35. They form a primitive group of bacteria and are oldest of the living fossils. What is **not correct** for these organisms?

(1) Their cell wall lacks muramic acid and peptidoglycan

(2) They all are obligate anaerobes

(3) Their membrane lipid contains phytanyl side groups

(4) Their ribosomal proteins are unusually acidic

36. Match the following and choose the **correct** answer

Column I **[Parasexual methods]**	**Column II** **[Example]**
a. Transformation	(i) T_4-bacteriophage
b. Conjugation	(ii) λ-bacteriophage
c. Generalised transduction	(iii) *Escherichia coli*
d. Restricted transduction	(iv) *Diplococcus pneumoniae*

(1) a(iii), b(iv), c(i), d(ii) (2) a(iii), b(iv), c(ii), d(i)

(3) a(iv), b(iii), c(i), d(ii) (4) a(iv), b(iii), c(ii), d(i)

37. In the life cycle of communal slime moulds, acrasin is secreted by

(1) Pseudoplasmodium (2) Myxamoebae

(3) Macrocyst (4) Sporangia

38. Which mycorrhiza forms hartig net in intercellular spaces of host plant?

(1) Endomycorrhiza

(2) Ectomycorrhiza

(3) VAM

(4) More than one option is correct

39. Vegetative reproduction using hormogones is common in certain members of

(1) Oxygenic photoautotrophs

(2) Non-oxygenic monerans

(3) Myxomycetes

(4) Mollicuta

40. Formation of red tides is related to _____ that produces _____

(1) *Gonyaulax*, aflatoxin

(2) *Gonyaulax,* saxitoxin

(3) *Gymnodinium,* astaxanthin

(4) *Noctiluca,* exotoxin

41. Select an **incorrect** statement w.r.t. life cycle of *Rhizopus*

(1) Occurence of four types of hypha

(2) Chemotactic stimulus of trisporic acid for attraction of asexual hypha

(3) Only one haploid nucleus survives after meiosis in zygote

(4) Vegetative hypha are of two types

42. Fertile layer of gill in *Agaricus* is

(1) Hymenium (2) Subhymenium

(3) Paraphyses (4) Trama

43. In addition to the normal chromosomal DNA, some extrachromosomal genetic elements are often found in bacteria. These elements are

(1) Not capable of autonomous replication

(2) Linear pieces of RNA

(3) Called mesosomes

(4) Circular pieces of ds-DNA

44. Which of the following category is made up of related orders?

(1) Genus (2) Family

(3) Class (4) Species

45. Gram positive as well as Gram negative eubacteria

(1) Make sphaeroplast on treating with lysozyme

(2) Produce exotoxins only

(3) Have similar type of linkage between the NAM and NAG

(4) Produce endotoxins only

46. Which structure holds the nucleoid and help in the separation of nucleoid and septa formation?

(1) Centriole

(2) Peripheral mesosome

(3) Central mesosome

(4) Slime layer

47. In bacteria, porins function as channels for the entry and exit of

(1) Hydrophilic low molecular weight substances

(2) Hydrophobic low molecular weight substances

(3) Hydrophilic high molecular weight substances

(4) Hydrophobic high molecular weight substances

48. If source of carbon and energy is CO_2 and sunlight respectively, then type of nutrition in this organism is

(1) Chemoautotrophic

(2) Photoautotrophic

(3) Photoheterotrophic

(4) Chemoheterotrophic

49. Prokaryotes those survive successfully in salt ponds and salted hides are also able to

(1) Digest cellulose in the rumen of cattle

(2) Reduce sulphur to H_2S at very low pH

(3) Synthesize cell wall with the help of muramic acid

(4) Synthesize ATP with the help of a reddish pigment

50. Diatomaceous earth is used for all, **except**

(1) Polishing of earth

(2) Filtration of oil

(3) Cleaning agent in tooth pastes

(4) Conductor in refrigerators

51. Select the **incorrect** statement (w.r.t. slime moulds)

(1) Spores are produced under unfavourable conditions

(2) Fruiting bodies bear spores at their tips

(3) True walls are absent in the spores

(4) Spores are dispersed by air currents

52. Read the statement carefully and choose the **incorrect** one for Ascomycetes

a. Mycelium is branched and septate

b. Plasmogamy is soon followed by meiosis

c. Conidia is produced exogenously

d. Dikaryophase is totally absent

(1) a, b are incorrect (2) a, d are incorrect

(3) b, c are incorrect (4) b, d are incorrect

53. Meiosis is absent in

(1) *Mucor* (2) *Rhizopus*

(3) *Alternaria* (4) *Ustilago*

54. Lichens are very good pollution indicators because

(1) They grow extensively in polluted area

(2) They don't grow in polluted area

(3) Their chemical composition changes in polluted area

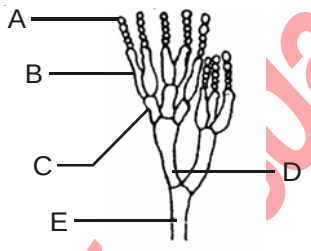
(4) Their absorbing capacity of water and minerals increases

55. What is **incorrect** for prions?
(1) Are sub-viral particles
(2) Have ssRNA as genetic material
(3) Causal agent of mad cow disease
(4) Resistant to high temperature and UV-radiation

56. In lytic cycle
a. Host DNA is degraded into fragments
b. Cellular machinery of host is completely taken over by viral genome
c. Prophage is formed
d. Virus is temperate and liberated rarely
(1) a and c are correct
(2) a and b are correct
(3) a, c and d are correct
(4) Only c is incorrect

57. Consider the following statements for *Agaricus*
a. Primary mycelium is monokaryotic
b. Buttons are formed by aggregation of primary mycelium
c. Undersurface of stipe bears gills or lamellae
d. Basidium is the site for both karyogamy and meiosis
e. Hymenium consists of both basidia and paraphyses
The **correct** statements are
(1) a, d, e
(2) a, b, e
(3) b, c, d
(4) a, c, d

58. Correct match for the diagram given below is



(1) A–Conidia, B–Rami, C–Metulae, D–Sterigmata, E–Conidiophore
(2) A–Conidia, B–Sterigmata, C–Metulae, D–Rami, E–Conidiophore
(3) A–Conidiophore, B–Sterigmata, C–Conidia, D–Rami, E–Metulae
(4) A–Conidia, B–Sterigmata, C–Rami, D–Metulae, E–Conidiophore

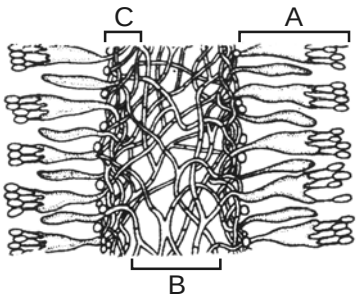
59. Out of the following statements
a. Production of uredospores on wheat plant
b. Formation of dikaryotic aeciospores on barberry leaf
c. Sexual reproduction by somatogamy
d. Production of basidiospores in soil
e. Secondary mycelium with dolipore septum
The **correct** statements for *Puccinia graminis tritici* are
(1) a & e (2) a, b & d
(3) b, d & e (4) a, c & d

60. Which of the following features is not related to heterocyst?
(1) Oxidation of atmospheric nitrogen
(2) Asexual reproduction
(3) Absence of photolysis of water
(4) Maintenance of anaerobic environment in the cell

61. The two kingdom classification of Linnaeus did not distinguish between
a. Photosynthetic and non-photosynthetic organisms
b. Eukaryotes and prokaryotes
c. Walled and wall-less organisms
(1) Only a is correct
(2) Only a & b are correct
(3) Only b & c are correct
(4) All of these are correct

62. *Rhodospirillum* is
(1) Purple non-sulphur bacteria
(2) Green sulphur bacteria
(3) Green non-sulphur bacteria
(4) Purple sulphur bacteria

63. What is **correct** for the diagram given below?



(1) A–Basidium, B–Monokaryotic mycelium, C–Dikaryotic mycelium
(2) A–Hymenium, B–Trama, C–Subhymenium
(3) A–Hymenium, B–Subhymenium, C–Trama
(4) A–Pileus, B–Gill, C–Stipe

64. Organism is aerobic but can live anaerobically also, is known as

(1) Obligate aerobe (2) Facultative aerobe

(3) Obligate anaerobe (4) Facultative anaerobe

65. Match the following

	Column I		**Column II**
a.	Algal fungi	(i)	Zygomycetes
b.	Conjugation fungi	(ii)	Ascomycetes
c.	Club fungi	(iii)	Basidiomycetes
d.	Sac fungi	(iv)	Phycomycetes

(1) a(ii), b(iii), c(iv), d(i) (2) a(iv), b(i), c(iii), d(ii)

(3) a(iii), b(ii), c(i), d(iv) (4) a(i), b(iv), c(ii), d(iii)

66. Generalized transduction involves

(1) Always the loss of transferred segment

(2) Transfer of nonspecific genes from donor to recipient using virus

(3) Transfer of a specific segment from donor to recipient cell using virus

(4) Transfer of a specific segment from donor to recipient using a passage formed by sex pili

67. Select a **correct** match

(1) PPLO - Obligate intracellular parasite

(2) *Mycobacterium* - Actinomycetes

(3) Halophiles - Peptidoglycans

(4) Microcystis - L-form bacteria

68. The causal agent of which of the following disease does not show dikaryophase in life cycle?

(1) Whip smut of sugarcane

(2) Powdery mildew of cereals

(3) Ergot of rye

(4) White rust of crucifers

69. Gram negative bacterium contains cell wall which has

(1) Low lipid content and teichoic acid

(2) High peptidoglycan content and hopanoids

(3) Low lipid and high peptidoglycan content

(4) High lipid and low peptidoglycan content

70. Archaebacteria live in some of the most harsh habitats such as extreme salty areas, hot springs and marshy areas. These bacteria differ from eubacteria in

(1) Absence of branched lipids in cell membrane

(2) Presence of peptidoglycan

(3) Presence of same cell wall structure

(4) Absence of NAM and D-amino acids in cell wall

71. Read the following conditions

a. Shortage of space

b. Lack of nutrient availability

c. Accumulation of waste products

d. Presence of bacteriophage and destroying bacteria

Under which conditions the process of asexual reproduction in bacteria gradually slows down and ultimately stops?

(1) Only b (2) a & b only

(3) a & c only (4) a, b, c & d

72. Which of the following activity is present in heterocyst of cyanobacteria?

(1) PS-II activities

(2) CO_2 fixation

(3) Photophosphorylation

(4) O_2 evolution

73. Which of the following fungus caused great Irish famine disease?

(1) *Helminthosporium oryzae*

(2) *Cystopus candidus*

(3) *Puccinia graminis tritici*

(4) *Phytophthora infestans*

74. Which of the following disease is caused by an algal fungi?

(1) Smut of corn

(2) Powdery mildew of cereals

(3) Stripe rust of wheat

(4) Downy mildew of cereals

75. Viroids

(1) Have circular ssRNA enclosed by an envelope

(2) Cause disease in plants and animals

(3) Have RNA of high molecular weight

(4) Cause chrysanthemum stunt disease

76. Which of the following is not absent in viruses?

(1) Growth

(2) Protein synthesis machinery

(3) Mutation

(4) Meiosis

77. Methanogens are
(1) Obligate aerobes
(2) Obligate anaerobes
(3) Facultative aerobes
(4) Facultative anaerobes

78. Swarm cells in acellular slime mould fuse in pairs at the _____ ends
(1) Posterior (2) Anterior
(3) Lateral (4) Any

79. Which one of the following is incorrect statement regarding cyanobacteria?
(1) Oxygenic photosynthesis
(2) Cell wall has NAG and NAM and are gram positive
(3) Contain pigments phycobilins
(4) Reserve food is cyanophycean starch

Chapter - 3 : Plant Kingdom

1. Which of the following is **correct** statement for pteridophytes?
(1) Vascular tissue is devoid of phloem, contain only xylem
(2) They represent first heterosporous group
(3) Archegonial neck is made up of 6 vertical rows of cells
(4) In xylem true vessels are present

2. Elaters in *Marchantia* are _____
(1) Diploid without any thickening
(2) Haploid with spiral thickening
(3) Diploid with spiral thickening
(4) Haploid without any thickening

3. A class of algae characterised by having spermatangia and carpogonia and non-flagellated gametes contain which of the following as photosynthetic pigment?
(1) Chlorophyll b (2) Chlorophyll c
(3) Phycoerythrins (4) Floridean starch

4. Which of the following is true for embryogeny of *Selaginella*?
(1) Embryo is exoscopic and meroblastic
(2) Embryo is endoscopic and holoblastic
(3) Embryo is endoscopic and meroblastic
(4) Embryo is exoscopic and holoblastic

5. Match the following

	Column-I		**Column-II**
a.	Ectophloic siphonostele	(i)	*Marsilea*
b.	Amphiphloic siphonostele	(ii)	*Botrychium*
c.	Actinostele	(iii)	*Selaginella*
d.	Polystele	(iv)	*Lycopodium serratum*

(1) a(i), b(ii), c(iii), d(iv) (2) a(ii), b(i), c(iv), d(iii)
(3) a(iii), b(ii), c(iv), d(i) (4) a(iv), b(iii), c(ii), d(i)

6. Which of the following statement is **incorrect**?
(1) In *Selaginella* exosporic 13-celled male gametophyte is produced
(2) The individual unit of the stele of *Dryopteris* is meristele
(3) False indusium is found in *Adiantum* species
(4) In the prothallus of *Dryopteris* the antheridia are present among rhizoids

7. Which of the following is **incorrect** w.r.t. *Pinus*?
(1) Male cones are homologous to dwarf branches
(2) Each ovuliferous scale bears only single ovule
(3) Each microsporophyll bears two microsporangia
(4) Male gametophyte has two prothalial cells

8. In the life cycle of angiosperms the meiosis occurs at the time of
(1) Gamete formation
(2) Spore formation
(3) Development of male gametophyte
(4) Germination of zygote

9. Which of the following is not true w.r.t. *Chlamydomonas*?
(1) Single cup shaped chloroplast contains single pyrenoid
(2) Each *Chlamydomonas* cell contains single contractile vacuole
(3) Life cycle is haplontic
(4) Cell wall is made up of glycoprotein

10. Choose **correct** statement
(1) *Harveyella* is red algae and it is parasitic on other red algae
(2) *Harveyella* is red algae and it is parasitic on green algae
(3) Carrageenin is thickening and binding agent found in the cell wall of brown algae
(4) Red rust of tea is caused by *Cephaleuros virescence* which is a red algae

11. When there is no pith in the centre and central most part is occupied by xylem which is present in the form of radiating arms. Such type of stele is called as _____ and is present in _____
(1) Plectostele, *Rhynia*
(2) Amphiphloic siphonostele, *Osmunda*
(3) Actinostele, *Lycopodium serratum*
(4) Haplostele, *Lycopodium clavatum*

12. Angiosperms differ from gymnosperms in the absence of
(1) Double fertilization
(2) Sieve tubes
(3) Companion cells
(4) Haploid endosperm

13. Out of the following which one is **correct**?
(a) *Batrachospermum* is a red algae but not red in colour
(b) *Chlamydomonas braunii* reproduces by anisogamy
(c) Chlorophyll 'e' is found in members of xanthophyceae and chlorophyll 'd' in members of rhodophyceae
(1) (a), (b) & (c) (2) Both (b) & (c)
(3) Both (a) & (b) (4) (b) only

14. Heterosporous non-archegoniate plants are characterized by the
(1) Direct fertilization (2) Double fertilization
(3) Zooidogamy (4) Haplontic life cycle

15. Red algae is different from brown algae
(1) In presence of chlorophyll - a
(2) In presence of phycocolloids
(3) In not having the isogamous and anisogamous reproduction
(4) In absence of phycoerythrin

16. The important characteristic feature of brown algae is/ are
(a) Laterally inserted flagella
(b) Heterokont condition
(c) Presence of fucoxanthin
(d) Isokont condition
(1) (a) and (d) (2) (b), (c) and (d)
(3) (a), (b) and (c) (4) Only (c)

17. Total number of zygospores required for the formation of 80 daughter filaments in *Spirogyra* are
(1) 20 (2) 80
(3) 40 (4) 320

18. Pollen grains of *Cycas* and *Pinus* are pollinated by air in
(1) 13 and 4 celled stage respectively
(2) 4 and 3 celled stage respectively
(3) 3 and 4 celled stage respectively
(4) 4 & 13 celled stage respectively

19. In *Funaria*, rhizoids are
(1) Tubular
(2) Tuberculate
(3) Tubular and tuburculate
(4) Multicellular, branched with oblique septa

20. Basal swollen part of ligule of *Selaginella* leaf is called
(1) Suspensor (2) Glossopodium
(3) Organ suigeneris (4) Tuber

21. *Pinus* ovule is
(1) Unitegmic and trilayered
(2) Unitegmic and tetralayered
(3) Bitegmic
(4) Tritegmic

22. In *Funaria hygrometrica*
(1) Apophysis has columella and air sacs
(2) Outer peristome teeth are hygroscopic in nature
(3) All cells of sporophyte undergo reduction division
(4) Protonema is formed when zygote develops

23. Oogamy is the most advanced type of sexual reproduction which is observed in all, **except**
(1) All atracheophytic embryophytes
(2) All atracheophytic non-embryophytes
(3) All tracheophytic embryophytes
(4) All marine rhodophytes

24. Find **odd** one w.r.t. laminarian starch
(1) *Fucus* (2) *Sargassum*
(3) *Ulva* (4) *Macrocystis*

25. During scalariform conjugation the entire conjugation tube is made by
(1) The cell containing male gamete
(2) The combined activity of both of the parental cells
(3) The cell containing female gamete
(4) The two cells of same filament

26. Bryophytes seldom grow tall. It is due to the absence of
(1) Xylem but not phloem
(2) Rhizoids
(3) Mechanical tissue
(4) Haplodiplontic life cycle

27. Pteridophytes, gymnosperms and angiosperms are embryophytic plants. All members of these groups have
(1) Seeds
(2) Heterosporous condition only
(3) Archegonia
(4) Stele

28. Which of the following feature is peculiar to *Selaginella* among the member of lycopsida?
(1) Rhizophore
(2) Biflagellate male gamete
(3) Root, stem & leaves
(4) Ligule

29. Match the following

	Column I		**Column II**
a.	Ciliated sperm	(i)	*Ephedra*
b.	No archegonium	(ii)	*Pinus*
c.	Cold resistant enzymes	(iii)	*Ginkgo*
d.	Largest pollen chamber	(iv)	*Gnetum*

(1) a-(i), b-(iii), c-(ii), d-(iv)
(2) a-(ii), b-(i), c-(iv), d-(iii)
(3) a-(iv), b-(iii), c-(i), d-(ii)
(4) a-(iii), b-(iv), c-(ii), d-(i)

30. Gemma found in *Marchantia* is meant for
(1) Absorption of nutrients from the soil
(2) Retaining moisture
(3) Protecting growing apex
(4) Vegetative reproduction

31. Select the **correct** order of arrangement
(1) Microsporophyll, Microsporangium, Microspore, Generative cell, Microgamete
(2) Microsporangium, Microsporophyll, Microspore, generative cell, Microgamete
(3) Microsporophyll, Microsporangium, Generative cell, Microspore, Microgamete
(4) Microsporophyll, Microsporangium, Microspore, Microgamete, Generative cell

32. *Dryopteris* differs from conifers in
(1) Showing asiphonogamy and zooidogamy
(2) Ploidy status of main plant body
(3) Presence of stele and sporic meiosis
(4) Having heteroxylous wood

33. Bryophytes are similar to pteridophytes in
(1) Having dominant sporophytic phase
(2) Having multi-celled parasitic gametophyte
(3) The production of two kinds of spores
(4) Having independent multi-celled gametophyte

34. What is **incorrect** for fern prothallus?
(1) Multicellular and photosynthetic
(2) Do not have rhizoids
(3) Monoecious and heart shaped
(4) Absence of vascular tissues

35. Which of these is **not** a feature of *Pinus*?
(1) Clear dimorphism in stem branches
(2) Absence of root cap and root hairs in mycorrhizal root
(3) Excurrent habit but not well adapted to xeric conditions
(4) Needle like leaves with thick cuticle and sunken stomata

36. Mature pollen grain at the time of its release from microsporangium in **Cycas** has
(1) Prothallial cell, tube cell and body cell
(2) Prothallial cell, tube cell and generative cell
(3) Two prothallial cells and one tube cell
(4) Prothallial cell, generative cell and body cell

37. The cell wall of green algae is composed of
(1) Cellulose and pectin
(2) Cellulose and NAM
(3) Pectin & phycocolloids
(4) Chitin

38. Smallest group of plant kingdom
a. Does not possess antheridia
b. Have direct pollination
c. Has porous wood always
d. Form haploid endosperm and fruit
(1) Only a, b are correct
(2) Only a and c are correct
(3) Only b and d are correct
(4) Only b and c are correct

39. Gymnosperms differ from pteridophytes like *Selaginella* in
(1) Presence of heterospory
(2) Absence of pollination
(3) Absence of ovules
(4) Absence of free living independent gametophyte

40. Male cones of *Pinus* are homologous to
(1) Shoot of unlimited growth
(2) Spur shoot
(3) Dwarf branches
(4) More than one option is correct

41. Members of class rhodophyceae

a. Are always multicellular

b. Are always photosynthetic

c. Are always devoid of flagella

d. Are always red in colour

(1) a and b are incorrect

(2) c and d are incorrect

(3) Only c is incorrect

(4) a, b, d are incorrect

42. In neuromotor apparatus of *Chlamydomonas*, rhizoplast

(1) Connects both blepharoplast

(2) Connects nucleus and centrosome

(3) Connects one blepharoplast with centrosome

(4) Connects blepharoplast with paradesmose

43. Which one is never found in algae?

(1) Sex organs (2) Parasitism

(3) Embryo (4) Gametic meiosis

44. A common feature of *Cycas* and *Dryopteris* is presence of

(1) Tap roots (2) Transfusion tissue

(3) Cone (4) Circinate ptyxis

45. Which of the following are demerits of Bentham and Hooker system of classification?

(1) Angiosperms were placed between dicot and monocot

(2) Orchidaceae have been considered as primitive

(3) Renales have been given a primitive position

(4) It has practical utility

46. The class Gymnospermae is characterised by all, **except**

(1) Heterosporous

(2) Ovule without integument

(3) Seeds are naked

(4) Endosperm is haploid

47. Choose **wrong** statement for Adansonian taxonomy

(1) It uses statistical methods

(2) All selected characters are given unequal importance

(3) Use of computers

(4) It is also known as taximetrics

48. Thallophyta possesses

(1) Undifferentiated plant body

(2) Jacketed reproductive organs

(3) Well developed embryo stage

(4) Asexual reproduction by meio spores

49. Among the following

a. Filamentous fresh water algae

b. Commonly known as frog spawn alga

c. Female sex organ is carpogonia

d. Male gametes are flagellated

e. Colour is blue-green to purple

The **correct** for *Batrachospermum* is

(1) a, b, c, d and e (2) a, b, c and d

(3) a, b, c and e (4) c, d and e

50. Gametes are pyriform and bear two laterally attached flagella in

(1) Chlorophyll-c containing multicellular algae

(2) Chlorophyll-c containing unicellular algae

(3) Chlorophyll-b containing fresh water algae

(4) Chlorophyll-a and b containing marine algae

51. Choose **incorrect** match

(1) *Spirogyra* – Ribbon like chloroplast

(2) *Ulothrix* – Girdle like chloroplast

(3) *Chara* – Star like chloroplast

(4) *Chlamydomonas* – Cup shaped chloroplast

52. Choose **correct** one from the main characteristics common in all divisions of algae

(1) Chlorophyll-a, chl. b and carotene

(2) Chlorophyll-a, chl. b and xanthophyll

(3) Carotenoids and chlorophyll-a

(4) Carotenoids and chlorophyll-b

53. Sexual reproduction by oogamy that is accompanied by complex post fertilization development is the feature of

(1) Blue green algae (2) Green algae

(3) Brown algae (4) Red algae

54. Choose **wrong** statement

(1) The plant body of bryophytes is less differentiated than that of algae

(2) The main plant body of bryophyte is haploid

(3) The sporophyte in moss is partially dependent on gametophyte

(4) Rhizoids in liverworts are unicellular

55. The specialized structures called gemmae are

(1) Green, multicellular asexual bodies

(2) Non-green, unicellular asexual bodies

(3) Non-green, multicellular, sexual structures present in male as well as female thalli

(4) Formed in small closed cavity called gemma cup

56. Choose **incorrect** statement regarding leafy liverworts
(1) Male gametes are biflagellate and spirally coiled
(2) Sporophyte depends on gametophyte
(3) Juvenile gametophyte, formed by germination of spore is filamentous structure called protonema
(4) Fertilization is called syngamy

57. The positive evidence to aquatic ancestry of bryophytes is
(1) Green diploid main plant body
(2) Heterosporous condition
(3) Ciliated sperms
(4) Presence of saprophytic forms

58. Which of the given algal masses is specifically called coenobium, and have a fix number of members in a colony?
(1) *Volvox* (2) *Spirogyra*
(3) *Chlamydomonas* (4) *Ulva*

59. Hypnospores of *Chlamydomonas* causes _____; while *Cephaleuros* causes _____.
(1) Red rust, red snow (2) Red snow, red rust
(3) Red tide, red rot (4) Red rot, red snow

60. Elaters of *Marchantia* are responsible for spore dispersal and these structures are
(1) 2n and develop from cells of archegonia
(2) 2n and develop from zygote directly
(3) 2n and develop from spore mother cells
(4) n and develop from rhizoids

61. What will be the number of chromosomes in theca cells, operculum cells, apophysis cells and columella cells, if the cell of neck canal has 20 chromosomes?
(1) 20, 20, 20, 20 (2) 40, 40, 40, 40
(3) 20, 20, 40, 40 (4) 40, 40, 20, 20

62. None of the member of cryptogamae show
(1) Heterospory
(2) Diplontic life cycle
(3) Integumented megasporangium
(4) Xylem with vessels

63. What is **correct** for the non-vascular amphibians of plant kingdom?
(1) Gametophyte completely or partly dependent upon sporophyte
(2) First spermatophytes
(3) Sperms show chemotropic movement
(4) Have great ecological importance but little economic importance

64. The most advanced group of plants have seeds present inside the pericarp. Out of the following features
a. Monoecious gametophyte
b. Pistil as female sex organ
c. Phloem with sieve cells only
d. Diplontic life cycle
e. Pollination mostly through wind

The **correct** ones for these plants are
(1) b, d & e (2) Only b & d
(3) a, d & e (4) Only a & c

65. A plant that forms yellow clouds in the forest is also found to produce
(1) Winged pollen, winged seed, multicotyledonary embryo
(2) Largest ovule, largest egg, coralloid root
(3) Heteroxylous wood, bitegmic ovule, absence of archegonia
(4) Closed vascular bundle, mycorrhizal root, diploid endosperm

66. In *Pinus*
(1) Seeds are winged
(2) Fruits are winged
(3) Pollen are winged
(4) More than one option is correct

67. Isomorphic diplo-haplontic life cycle is shown by
(1) Bryophytes, pteridophytes and some algae
(2) Some green and brown algae
(3) All brown and red algae
(4) Some bryophytes and algae

68. Out of the following statements
a. Food reserve is laminarin starch and mannitol
b. Plant body in several members divided into hold fast, stipe and frond
c. Presence of phycobilin pigments
d. Gametes have two anteriorly placed whiplash flagella
e. Female sex organ is called carpogonium

The **correct** statements for algae that possess non-sulphated phycocolloids in their cell wall are
(1) a & b (2) c & e
(3) a, c & d (4) b, d & e

69. A characteristic feature present in true mosses but not found in other bryophytes is
(1) Independent gametophyte
(2) Presence of leafy shoot
(3) Protonemal stage in life-cycle
(4) Gemma formation

70. Match the column

Column I		Column II	
a.	Sporocarp	(i)	*Dryopteris*
b.	Rhizophore	(ii)	*Marsilea*
c.	True indusium	(iii)	*Adiantum*
d.	False indusium	(iv)	*Selaginella*

(1) a(ii), b(iv), c(i), d(iii) (2) a(ii), b(iv), c(iii), d(i)

(3) a(iv), b(i), c(iii), d(ii) (4) a(iv), b(i), c(ii), d(iii)

71. A pair of characteristics not associated with *Selaginella* are

(1) Cespitose habit, heterospory

(2) Chemotaxis, seed habit

(3) Exosporic male gametophyte, holoblastic embryogeny

(4) Bulbil formation, heterophilly

72. Haploid stage formed in *Pinus* male cone

(1) Has wings formed by ovuliferous scale

(2) Forms the sulphur shower

(3) Produces flagellated sperms

(4) Forms compact strobili

73. A characteristic feature of gymnosperms is production of pollination drop. It is required to facilitate

(1) Anemophily

(2) Entomophily

(3) Rapid pollen germination

(4) Siphonogamy

74. Zooidogamous type of fertilization is shown by

(1) Bryophytes and angiosperms

(2) Bryophytes and pteridophytes

(3) Pteridophytes and gymnosperms

(4) Gymnosperm and angiosperm

75. Choose the **odd** out w.r.t. liverworts

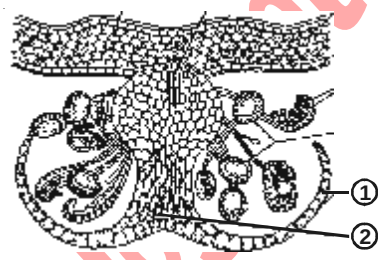
(1) Multicellular, branched rhizoids

(2) Possess scales on ventral surface

(3) Reproduce through progressive death and decay

(4) Sporophyte is completely dependent

76. Label 1 and 2 in the figure of T.S. of sorus



(1) Sporangium, Mesophyll cells

(2) Indusium, Placenta

(3) Placenta, Indusium

(4) Mesophyll cells, Sporangium

77. The feature of *Cycas* which resembles the dicots is

(1) Reticulate venation

(2) Seeds with 2 cotyledons

(3) Presence of vessels

(4) Top-shaped multicilliate male gamete

78. The most accepted natural system of classification

(1) Is post-Darwinian in concept

(2) Dicotyledons are placed after monocotyledons

(3) Dicotyledons are divided into 3 sub-classes : Polypetalae, Gamopetalae and Monochlamydeae

(4) Monocotyledons end with microspermae including orchidaceae

ZOOLOGY

Chapter 1 : Animal Kingdom

1. Insects have

(1) Head, thorax and abdomen, three pairs of jointed appendages which arise from abdomen

(2) Cephalothorax, one pair of antenna and chitinous exoskeleton

(3) Head, thorax and abdomen, one pair of antenna and 3 pairs of jointed legs which arise from thoracic segments

(4) No antennae

2. Which of the following animal has green glands and biramous appendages?

(1) Cray fish (2) Silver fish

(3) Scorpion (4) Mosquito

3. The body symmetry and coelom are similar in
   (1) Annelids and sponges
   (2) Annelids and liver fluke
   (3) Annelids and arthropods
   (4) Mollusca and echinodermata

4. Osphradium of *Pila* is
   (1) Tangoreceptor (2) Photoreceptor
   (3) Masticatory apparatus (4) Chemoreceptor

5. Which of the following is **not** a character of echinoderms?
   (1) Larvae are bilaterally symmetrical but the adults have radial symmetry
   (2) Presence of water vascular system which is a part of coelom
   (3) Tube feet also serve as equivalents to gills during respiration
   (4) All marine, triploblastic with schizocoelom

6. Which of the following is not a character of hemichordata?
   (1) Open circulatory system
   (2) Stomochord present which is mesodermal in origin
   (3) Excretory organ is proboscis gland
   (4) Respiration takes place through the gills

7. Which of the following is a characteristic feature of cnidoblasts?
   a. They are used for anchorage, defense and for the capture of the prey
   b. Are absent in the region of basal disc
   c. Once discharged cannot be reused
   d. New cnidoblasts are formed from interstitial cells
   (1) a only (2) a and d
   (3) a, b and c (4) a, b, c and d

8. Retrogressive metamorphosis is exhibited by
   (1) Ammocoete larva (2) Tornaria larva
   (3) Ascidian tadpole (4) Trochophore larva

9. Mark the **incorrect** match w.r.t. excretory organ
   (1) Urochordates – Neural gland
   (2) Cephalochordates – Solenocytes
   (3) Cyclostomes – Proboscis gland
   (4) Osteichthyes – Kidney

10. There are ampullary pores on the snout of *Scoliodon*. Each pore leads to ampullary duct and then into Ampulla of *Lorenzini*. They have
   (1) Olfactoreceptors (2) Thermoreceptors
   (3) Chemoreceptors (4) Rheoreceptors

11. Pigeons milk is
   (1) Secreted by pigeon only
   (2) Secreted by crop in birds through out the year
   (3) Nutritive secretion produced by crop glands in birds during breeding season
   (4) Oily secretion secreted by uropygial gland present at tail base

12. Mark the **correct** statement
   (1) Cranium (Brain box) is present in all chordates
   (2) Metamerism is found in chordates
   (3) Two pairs of pentadactyl limb present in all tetrapods
   (4) Dissection of vertebrates is always from dorsal site

13. Given below are four matchings of an animal and its kind of excretory organ
   a. Insects – Malpighian tubules
   b. *Planaria* – Flame cells
   c. Cray fish – Green glands
   d. *Achatina* – Organ of Bojanus
   The correct matchings are
   (1) a and d (2) a, b and c
   (3) b and d (4) a, b, c and d

14. The appropriate sequence of numbered animals from column II matching with the sequence of characteristics in column I is

Column I	**Column II**
❖ The mouth contains a file-like rasping organ	a. *Ancylostoma*
❖ Dioecious, possess lateral appendages parapodia which help in swimming	b. *Pheretima*
❖ Monoecious, botryoidal tissue	c. *Pila*
❖ Triploblastic, pseudoc-oelomate	d. *Hirudinaria*
	e. *Nereis*

   (1) c, a, d, e (2) c, a, e, d
   (3) c, e, d, a (4) a, c, b, e

15. Which of the following is **not** a characteristic of phylum ctenophora?
   (1) They are exclusively marine, radially symmetrical animals
   (2) They move by cilia, which join together to form eight median comb plates
   (3) When the tentacles are present they are two in number and contain cnidoblasts
   (4) Reproduction takes place only by sexual means

16. Which one of the following phylum is **correctly** matched with its general characteristics?

(1) Porifera – Choanocytes or collar cells line spongocoel and canals. Sexes are usually separate, fertilisation external.

(2) Mollusca – Mollusca are basically oviparous and development is through planula larva

(3) Arthropoda – They have a segmented body. The body consists of head, thorax and abdomen, in same cases, head and thorax may be fused to form cephalothorax.

(4) Echinodermata – Sexes are separate. Reproduction is sexual. Fertilization is usually internal.

17. Aristotle's lantern in *Echinus* is

(1) Photoreceptor

(2) Masticatory apparatus

(3) Bioluminescent structure

(4) Locomotory structure

18. Which of the following **incorrect** match between disease, casual organism, medium of transfer and symptoms?

Disease	Causal organism	Medium of transfer	Symptoms
(1) Ascariasis	*Ascaris*	Through contaminated vegetables fruits and water	Internal bleeding/ Muscular pain/ Anaemia/ Fever and blockage of intestine.
(2) Amoebiasis	*Entamoeba histolytica*	Drinking water and food contaminated with faecal matter.	Stools with excess of mucous and blood.
(3) Malaria	*Plasmodium vivax*	Female *Anopheles*	Chill and high fever recurring after 48 hours
(4) Elephantiasis	*Wuchereria*	Round worm	Lymphatic vessels of lower limb affected.

19. Mark the incorrect one w.r.t. phylum and typical larvae

(1) Glochidium – Mollusca

(2) Trochophore – Annelida

(3) Parenchymula – Coelenterata

(4) Bipinnaria – Echinodermata

20. Tissue level of organisation with division of labour appears first in phylum?

(1) Porifera (2) Cnidaria

(3) Annelida (4) Platyhelminthes

21. Cartilaginous fishes have to swim continuously to avoid sinking but the bony fishes do not face this problem due to presence of

(1) Stream lined body

(2) Operculum

(3) Swim bladder (air bladder)

(4) Terminal mouth

22. Match the columns

	Column I		Column II
a.	*Neopilina*	(i)	Connecting link between annelida and mollusca
b.	*Peripatus*	(ii)	Connecting link between annelida and Arthropoda
c.	*Lepidosiren*	(iii)	South American lung fish
		(iv)	African lung fish
d.	*Protopterus*	(v)	Australian lung fish

(1) a(ii), b(i), c(iii), d(iv) (2) a(i), b(ii), c(iii), d(iv)

(3) a(ii), b(i), c(v), d(iii) (4) a(i), b(ii), c(iv), d(v)

23. Some comparison between protostomes and deuterostomes is given below, which one is wrong?

	Protostomes		Deuterostomes
(1)	Blastopore forms mouth	–	Blastopore forms anus
(2)	Pattern of cleavage is radial	–	Pattern of cleavage is spiral
(3)	Fate of cleavage can be determinate	–	Fate of cleavage is indeterminate
(4)	Schizocoel coelom	–	Enterocoel coelom

24. Find out the incorrect statement

(1) *Fasciola* causes a disease known as liver rot

(2) In *Fasciola*, metacercaria is the infective stage for the secondary host

(3) In *Taenia*, shedding of gravid proglottids is termed as apolysis

(4) Rostellum and hooks are absent in *T. saginata*

25. The class cephalopoda amongst molluscs is known for bearing all the given features listed below except one

(1) Presence of closed circulatory system

(2) Presence of internal shell

(3) Presence of ink sac

(4) Presence of hectocotylised arm, used by female to transfer zygotes in water

26. Female *Ascaris* differs from male *Ascaris* in all the following features except one
(1) Presence of anus
(2) Absence of pineal spicules
(3) Absence of pre and post anal papillae
(4) Presence of amphids on ventrolateral lips

27. Cestodes differ from other classes of platyhelminthes in showing property of
(1) Ladder like nervous system
(2) Pseudometamerism
(3) Absence of cephalisation
(4) Presence of incomplete digestive system

28. Arthropods show a number of structures in different classes meant for the purpose of respiration mentioned below except one
(1) Book lungs (2) Gill books
(3) Trachae (4) Ctenidia

29. One of the following statements given below is not related with success of reptiles on land
(1) Internal fertilisation
(2) Development of amniotic cavity around the embryo
(3) Laying of cleidoic eggs
(4) Presence of long tail

30. One of the following features of aves may not be considered as a contributory factor in reducing the weight of body
(1) Presence of single ovary
(2) Presence of four chambered heart
(3) Absence of urinary bladder
(4) Pneumatic bones

31. Presence of single median nostril is a characteristic feature of
(1) Chondrichthyes (2) Osteichthyes
(3) Cyclostomes (4) Lung fishes

32. Common feature of earthworm and cockroach is
(1) Hermaphroditism
(2) Ventral nerve cord
(3) Excretion by nephridia
(4) Moulting of cuticle

33. Bidder's canal is found in
(1) Spiracles of Cockroach
(2) Kidney of frog
(3) Kidney of rat
(4) Malpighian tubules of cockroach

34. Mark the correct statement :
(1) All chordates are vertebrates
(2) All vertebrates are chordates
(3) All triploblastic are coelomates
(4) Haemocoel and pseudocoel is a type of eucoelom

35. Connecting link between amphibia and reptilia was
(1) Lycaenops (2) Seymouria
(3) Synapsida (4) Anapsida

36. Lateral line system is well developed in bony fishes, formed by sensory neuromast cells. These are
(1) Tactoreceptor
(2) Chemoreceptor
(3) Similar to Jacobson's organ in function
(4) Rheoreceptor

37. Tube feet/podia of the echinoderm is related to
(1) Locomotion
(2) Respiration
(3) Excretion
(4) All of these

38. Which of the following is not the characteristic of open circulatory system?
(1) Low pressure system
(2) Blood conveyed directly to the organs without formation of capillaries
(3) Blood returns to the heart rapidly
(4) Found in most arthropod and non-cephalopod molluscs

39. Vertebrate with monocondylic skull, 12-pairs cranial nerves, amniote and only right systemic arch present are
(1) Pisces (2) Aves
(3) Amphibians (4) Reptiles

40. All of the following are characters of cephalochordates except
(1) Members are commonly called as *Lancelets*
(2) Filter feeder, no scales over the body
(3) Numerous gonads with long gonoduct
(4) Excretory organs-Protonephridia with solenocytes

41. Find out the incorrect statement w.r.t. flatworms
(1) Lack of alimentary canal in all
(2) Mouth ventral and the pharynx is protrusible in *Planaria*
(3) Redia and metacercaria stages are absent in *Schistosoma*
(4) Triploblastic, acoelomate

42. The hypothetical ancestor of sponge is
(1) *Scypha* (2) *Euplectella*
(3) *Olynthus* (4) *Cliona*

43. Cerebral or fatal malignant malaria is caused by
(1) *Plasmodium vivax* (2) *P. ovale*
(3) *P. malariae* (4) *P. falciparum*

44. Which of the following is **not** a character of amphibians?
(1) Body is divided into head and trunk there is no neck
(2) A tympanum is present in place of external ear
(3) The amphibian skin is moist and naked (without scales)
(4) Pentadactyl limbs with claws

45. Which of the following statement is **wrong** about mammals?
A. External ears or pinnae are present in all mammals without exception
B. Teeth are present in sockets
C. The most advanced mammals are the primates and they have opposable thumb
D. Testis are present in scrotal sacs in monotremes
(1) A only (2) A and B
(3) A and D (4) D only

46. Which of the following phase of schizogony does not take place inside RBC in the asexual life cycle of *Plasmodium*?
(1) Pre erythrocytic schizogony
(2) Exo erythrocytic schizogony
(3) Post erythrocytic schizogony
(4) All of these

47. Mark the correct match w.r.t. types of amoebocytes and their function in poriferans.
(1) Archaeocytes - Undifferentiated 'totipotent' cells
(2) Trophocytes - Store food granules
(3) Collenocytes - Closing and opening of osculum
(4) Myocytes - Secrete collagen fibres

48. Unsegmented worm like body, triploblastic nature of body wall, complete alimentary canal, bilateral symmetry and excretion by renette cell are the characteristic features of which phylum?
(1) Platyhelminthes (2) Aschelminthes
(3) Ctenophora (4) Coelenterata

49. Mammilated egg of *Ascaris* of oval in shape with three protective covering. Mark the correct sequence from outer to inner
(1) Chitnous shell, protein, esterified glycosides
(2) Protein, chitinous shell, esterified glycosides
(3) Esterified glycosides, protein, chitinous shell
(4) Protein, esterified glycosides chitinous shell

50. In ascon type of canal system the course of water is as follows:
Water $\rightarrow$ ostia $\rightarrow$ X $\rightarrow$ Y $\rightarrow$ outside.
X and Y are respectively
(1) Osculum, spongocoel
(2) Spongocoel, osculum
(3) Radial canal, osculum
(4) Spongocoel, radial canal

51. Protozoans differ from poriferans on the basis of following points except one. Mark the **except** one
(1) Sub-cellular level of organisation
(2) Absence of canal system
(3) Intracellular digestion
(4) Presence of contractile vacuole in fresh water protozoans

52. Mark the feature which can't be associated with *Paramecium*
(1) Surface feeder
(2) Asexual reproduction occurs by longitudinal binary fission
(3) Shows nuclear dimorphism
(4) Two contractile vacuoles

53. Mark the characters which evolved for the first time in Annelida
a. Mesoderm
b. True coelom
c. Metamerism
d. Closed blood circulation
(1) b & c (2) a, b & c
(3) b, c & d (4) a, b, c & d

54. Match the animal of column I with the suitable of column II

Column I	**Column II**
a. *Nereis*	(i) Botryoidal tissue
b. *Chaetopterus*	(ii) Blood worm
c. *Tubifex*	(iii) Bioluminescence
d. Leech	(iv) Trochophore

(1) a(iv), b(ii), c(iii), d(i) (2) a(iv), b(iii), c(ii), d(i)
(3) a(iv), b(i), c(iii), d(ii) (4) a(ii), b(iv), c(iii), d(i)

55. Mark the characters which suggest that molluscs have descended from the annelids
a. Presence of trochophore larva in some molluscs
b. Presence of ganglia, nerve ring and nerve cord
c. Presence of haemocoel
d. Segmentation in some molluscs
(1) Only a (2) b & c
(3) a & d (4) a, c & d

56. *Peripatus* (walking worm) is connecting link between Annelida and Arthropoda and sharing the characters of both. Choose the annelidan characters present in *Peripatus*
a. Segmentally arranged nephridia
b. Unjointed, stumpy legs
c. Ciliated genital duct
d. Haemocoel
(1) Only a (2) a & d
(3) a, b & c (4) a, b & d

57. Choose correct statements regarding *Latimeria* (coelacanth)

a. A living fossil

b. Oldest among living fishes

c. Connecting link between fish and amphibia

d. Belongs to group crossopterygii from which perhaps amphibian have evolved

(1) a & b (2) Only c

(3) a, b & c (4) a, b, c & d

58. Reptiles are the first true land vertebrates. Mark the characters which help the reptiles in leading successful land life

a. Dry, scaly and glandless skin

b. Internal fertilization

c. Presence of amnion

d. Leathery shelled calcareous eggs

(1) Only c (2) b & c

(3) a, b & c (4) a, b, c & d

59. Birds are truly flying vertebrates characterised by following characters except

(1) Are feathered bipeds

(2) Forelimbs are modified into wings and each foot usually bears four clawed toes

(3) Exoskeleton consists of feathers, scales and claws which are dermal derivatives

(4) Synsacrum is a fused bone formed by fusion of posterior thoracic, lumbar, sacral and anterior caudal vertebrae.

60. Mark the correct statements related to birds

a. Bones spongy and pneumatic

b. Developed marrow canal

c. Monocondylic skull

d. Opisthocoelous centrum

(1) a & b (2) a & c

(3) a, b & c (4) a, b, c & d

61. Amphibia represents

(1) Reduced hepatic portal and developed renal portal systems

(2) Reduced renal portal and developed hepatic portal systems

(3) Well developed both hepatic portal and renal portal systems

(4) Absence of both hepatic portal and renal portal systems

62. Mollusca represents 2nd largest phylum of animalia. From given statements mark incorrect w.r.t. mollusca

a. All have soft segmented body which is differentiated into head, foot and visceral mass

b. Visceral mass covered by mantle/pallium

c. Generally open type blood vascular system, except cephalopods

d. Eucoelomate with enterocoel coelom

(1) a & c

(2) a & d

(3) c & d

(4) All statements are correct

63. Quill feathers at the base of quill wings are called _____ and help in _____

(1) Barbules ; flying

(2) Rectrices ; insulation

(3) Remiges ; flying

(4) Rectrices ; covering body

64. Birds and mammals have many similarities between their blood vascular system but in birds blood circulation can be identified by

a. Four chambered heart

b. Only left systemic arch persists

c. Small, oval and nucleated RBC

d. Maximum RBC/mm^3 of blood

(1) Only b (2) b and c

(3) b, c and d (4) c and d

65. Which of the follwing can be taken as the distinct character of krait (the poisonous snake)?

(1) Third supralabial scale is largest

(2) Fourth infralabial scale is largest

(3) Single row of hexagonal ventrals

(4) Both (2) & (3)

66. Double vagina and uterus are characteristic of

(1) Egg laying mammals

(2) Eutherian mammals

(3) Marsupial mammals

(4) Placental mammals

67. Which of the following acts as the link between air bladder and internal ear in osteichthyes?

(1) Neuromast organ (2) Maltase cross

(3) Ampulla of Lorenzini (4) Weberian ossicles

68. Amphibia represents smallest vertebrate class with fresh water inhabitants and called dual life vertebrates, characterised by

(1) Reduced hepatic portal and developed renal portal

(2) Reduced renal portal and developed hepatic portal

(3) Both hepatic portal and renal portal system are well developed

(4) Both hepatic portal and renal portal system are absent

69. Features which make reptiles truly land vertebrates is/are

a. Development of ribs and scales
b. Development of amnion
c. Development of internal fertilisation
d. Monocondylic skull

(1) a, b and c (2) a and b
(3) b and c (4) a, b, c and d

70. Bird's lungs are provided with additional air sacs which are related with all of the following **except** one. Mark it

(1) Increase area for gaseous exchange
(2) Provide fresh air to lung both during inspiration and expiration
(3) Reduce body weight
(4) Provide internal cooling

71. Which of the statement regarding digestive tract and urinogenital tract related to prototherian, metatherian and eutherian is correct?

(1) In prototheria, a single aperture of digestive and urinogenital tract called cloaca
(2) In metatherian, separate anus and urinogenital aperture with separate sphincter
(3) In eutherian, separate anus and urinogenital aperture but with common sphincter
(4) In all of the above three anus and urinogenital apertures are separate with separate sphincter

72. Type of digestion that occurs in the coelentrates is

(1) First intra and then, extracellular digestion
(2) First extra and then, intracellular digestion
(3) Only extracellular digestion
(4) Only intracellular digestion

73. Which of the following character can't be related to phylum **Ctenophora**?

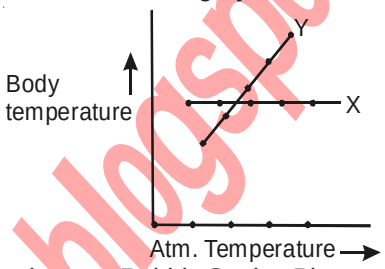
(1) Exclusively marine
(2) Well marked power of regeneration
(3) Well marked bioluminescence
(4) Asexual reproduction by budding

74. Find out the correct statement w.r.t. bony fishes

a. Mesonephric kidneys and mainly ammonotelic
b. Four pairs of gills, covered by operculum
c. Mouth is ventrally placed
d. Swim bladder, arising from dorsal wall of oesophagus

(1) a and c (2) a, b and d
(3) c and d (4) a, b, c and d

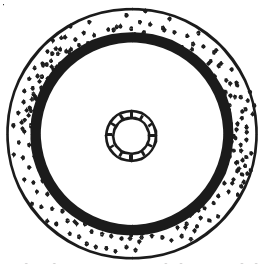
75. Given below are few animals which are categorised as X and Y in a given graph. Short list those animals which fall under the category of X.



Frog, Earthworm, Rabbit, Snake, Pigeon, Cow, Lizard, Tiger.

(1) Pigeon, rabbit, frog, cow
(2) Tiger, cow, earthworm, pigeon
(3) Lizard, snake, cow, tiger
(4) Rabbit, pigeon, cow, tiger

76. The figure represents the internal body plan of which phylum ?



(1) Platyhelminthes (2) Cnidaria
(3) Annelida (4) Echinodermata

77. The internal buds of freshwater sponges are otherwise called

(1) Choanocyte (2) Gemmule
(3) Osculum (4) Blastula

78. *Ascaris lumbricoid* shows

(1) Absence of sexual dimorphism but sexes are separate
(2) Digenetic endoparasite
(3) Body covered with cellular epithelium, having mononucleated condition
(4) Males are monorchic whereas females are didelphic

❑ ❑ ❑

ANSWERS

[PHYSICS]

Chapter 1.a) : Mathematical Tools

1. (2) 2. (1) 3. (3) 4. (3)

Chapter 1.b) : Units and Measurements

1. (3) 2. (2) 3. (2) 4. (1) 5. (1) 6. (4) 7. (3)
8. (2) 9. (1) 10. (3) 11. (1) 12. (3) 13. (4) 14. (4)
15. (4)

Chapter 2.a) :Motion in a Straight Line

1. (2) 2. (4) 3. (1) 4. (2) 5. (2) 6. (4) 7. (3)
8. (1) 9. (4) 10. (2) 11. (3) 12. (4) 13. (1) 14. (2)
15. (2) 16. (4) 17. (1) 18. (1) 19. (1) 20. (3) 21. (4)
22. (3) 23. (1) 24. (4)

Chapter 2.b) : Motion in a Plane

1. (3) 2. (2) 3. (2) 4. (1) 5. (1) 6. (4) 7. (2)
8. (2) 9. (1) 10. (4) 11. (3) 12. (2) 13. (2) 14. (1)
15. (1) 16. (3) 17. (3)

Chapter 3 : Laws of Motion(including Circular Motion)

1. (2) 2. (1) 3. (2) 4. (1) 5. (1) 6. (2) 7. (3)
8. (2) 9. (1) 10. (3) 11. (4) 12. (3) 13. (2) 14. (4)
15. (3) 16. (4) 17. (1) 18. (4) 19. (4) 20. (1) 21. (2)
22. (2) 23. (3) 24. (2) 25. (2) 26. (2) 27. (4) 28. (4)
29. (3) 30. (2) 31. (3) 32. (2) 33. (3) 34. (3) 35. (3)
36. (4) 37. (3) 38. (2) 39. (3) 40. (3) 41. (2) 42. (3)
43. (4)

Chapter 4 : Work, Energy and Power

1. (1) 2. (1) 3. (3) 4. (3) 5. (2) 6. (2) 7. (3)
8. (4) 9. (4) 10. (1) 11. (1) 12. (3) 13. (3) 14. (1)
15. (2) 16. (3) 17. (4) 18. (4) 19. (4) 20. (4) 21. (3)
22. (4) 23. (2) 24. (3) 25. (3) 26. (1)

[CHEMISTRY]

Chapter 1 : Some Basic Concepts of Chemistry

1. (4) 2. (4) 3. (2) 4. (3) 5. (2) 6. (4) 7. (4)
8. (3) 9. (2) 10. (2) 11. (2) 12. (4) 13. (2) 14. (2)
15. (3) 16. (3) 17. (2) 18. (2) 19. (1) 20. (3) 21. (3)
22. (1) 23. (1) 24. (2) 25. (2) 26. (2) 27. (3) 28. (2)
29. (1) 30. (4) 31. (2) 32. (3) 33. (2) 34. (4) 35. (3)
36. (1)

Chapter 2 : Structure of Atom

1.	(3)	2.	(2)	3.	(3)	4.	(1)	5.	(2)	6.	(2)	7.	(4)
8.	(1)	9.	(1)	10.	(2)	11.	(2)	12.	(4)	13.	(3)	14.	(1)
15.	(3)	16.	(2)	17.	(4)	18.	(1)	19.	(2)				

Chapter 3 : Classification of Elements and Periodicity

1.	(1)	2.	(2)	3.	(1)	4.	(4)	5.	(1)	6.	(3)	7.	(1)

Chapter 4 : Chemical bonding and Molecular Structure

1.	(2)	2.	(2)	3.	(4)	4.	(2)	5.	(1)	6.	(2)	7.	(4)
8.	(1)	9.	(3)	10.	(2)	11.	(1)	12.	(3)	13.	(4)	14.	(4)
15.	(4)	16.	(2)	17.	(3)	18.	(1)	19.	(4)				

Chapter 5 : States of matter Gases & Liquids

1.	(1)	2.	(2)	3.	(2)	4.	(3)	5.	(3)	6.	(3)	7.	(2)
8.	(2)	9.	(3)	10.	(4)	11.	(3)	12.	(3)	13.	(4)	14.	(1)
15.	(3)	16.	(2)	17.	(3)	18.	(2)	19.	(2)	20.	(1)	21.	(2)
22.	(2)	23.	(1)	24.	(3)	25.	(3)	26.	(3)	27.	(1)	28.	(1)
29.	(1)	30.	(1)	31.	(4)								

[BOTANY]

Chapter 1 : Living World

1.	(4)	2.	(1)	3.	(2)	4.	(3)	5.	(3)	6.	(3)	7.	(3)
8.	(1)	9.	(4)										

Chapter 2 : Biological Classification

1.	(1)	2.	(4)	3.	(3)	4.	(3)	5.	(3)	6.	(4)	7.	(3)
8.	(4)	9.	(3)	10.	(4)	11.	(2)	12.	(3)	13.	(3)	14.	(2)
15.	(2)	16.	(3)	17.	(2)	18.	(2)	19.	(1)	20.	(2)	21.	(2)
22.	(3)	23.	(3)	24.	(2)	25.	(2)	26.	(1)	27.	(3)	28.	(1)
29.	(1)	30.	(1)	31.	(2)	32.	(3)	33.	(3)	34.	(2)	35.	(2)
36.	(3)	37.	(2)	38.	(2)	39.	(1)	40.	(2)	41.	(2)	42.	(1)
43.	(4)	44.	(3)	45.	(3)	46.	(3)	47.	(1)	48.	(2)	49.	(4)
50.	(4)	51.	(3)	52.	(4)	53.	(3)	54.	(2)	55.	(2)	56.	(2)
57.	(1)	58.	(2)	59.	(2)	60.	(1)	61.	(2)	62.	(1)	63.	(2)
64.	(4)	65.	(2)	66.	(2)	67.	(2)	68.	(4)	69.	(4)	70.	(4)
71.	(4)	72.	(3)	73.	(4)	74.	(4)	75.	(4)	76.	(3)	77	(2)
78	(1)	79	(2)										

Chapter 3 : Plant Kingdom

1.	(2)	2.	(3)	3.	(3)	4.	(3)	5.	(2)	6.	(1)	7.	(2)
8.	(2)	9.	(2)	10.	(1)	11.	(3)	12.	(4)	13.	(1)	14.	(2)
15.	(3)	16.	(3)	17.	(2)	18.	(3)	19.	(4)	20.	(2)	21.	(1)
22.	(2)	23.	(2)	24.	(3)	25.	(2)	26.	(3)	27.	(4)	28.	(1)
29.	(4)	30.	(4)	31.	(1)	32.	(1)	33.	(4)	34.	(2)	35.	(3)

36.	(2)	37.	(1)	38.	(1)	39.	(4)	40.	(4)	41.	(4)	42.	(3)
43.	(3)	44.	(4)	45.	(2)	46.	(2)	47.	(2)	48.	(1)	49.	(3)
50.	(1)	51.	(3)	52.	(3)	53.	(4)	54.	(1)	55.	(1)	56.	(3)
57.	(3)	58.	(1)	59.	(2)	60.	(3)	61.	(2)	62.	(3)	63.	(4)
64.	(2)	65.	(1)	66.	(4)	67.	(2)	68.	(1)	69.	(3)	70.	(1)
71.	(3)	72.	(2)	73.	(1)	74.	(2)	75.	(1)	76	(2)	77	(2)
78	(3)												

[ZOOLOGY]

Chapter 1 : Animal Kingdom

1.	(3)	2.	(1)	3.	(3)	4.	(4)	5.	(4)	6.	(2)	7.	(4)
8.	(3)	9.	(3)	10.	(2)	11.	(3)	12.	(2)	13.	(4)	14.	(3)
15.	(3)	16.	(3)	17.	(2)	18.	(4)	19.	(3)	20.	(2)	21.	(3)
22.	(2)	23.	(2)	24.	(2)	25.	(4)	26.	(4)	27.	(2)	28.	(4)
29.	(4)	30.	(2)	31.	(3)	32.	(2)	33.	(2)	34.	(2)	35.	(2)
36.	(4)	37.	(4)	38.	(3)	39.	(2)	40.	(3)	41.	(1)	42.	(3)
43.	(4)	44.	(4)	45.	(3)	46.	(4)	47.	(1)	48.	(2)	49.	(2)
50.	(2)	51.	(3)	52.	(2)	53.	(3)	54.	(2)	55.	(3)	56	(3)
57.	(4)	58.	(3)	59.	(3)	60.	(2)	61.	(3)	62.	(2)	63.	(3)
64.	(4)	65.	(2)	66.	(3)	67.	(4)	68.	(3)	69.	(1)	70.	(1)
71.	(1)	72.	(2)	73.	(4)	74.	(2)	75.	(4)	76.	(2)	77.	(2)
78.	(4)												

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Booklet -2

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CONTENTS

2012-13

PHYSICS

[Chapter-5 : System of Particles and Rotational Motion]

1. A person of mass m stands at the centre of a table moment of intertia I and rotating with angular velocity ω. If the person moves distance 'a' from the centre along the diameter, what will be the new angular velocity of rotating table?

(1) $\frac{I\omega}{ma^2}$ (2) Remain same

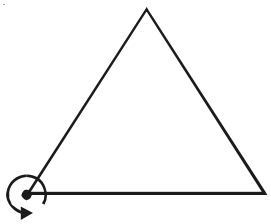
(3) $\frac{I\omega}{2ma^2}$ (4) $\frac{I\omega}{I+ma^2}$

2. A particle of mass 500 gm, having position vector $\vec{r} = (2\hat{i} + 6\hat{j})$ metre starts moving with speed 3 m/s parallel to positive x-axis. Its angular momentum about origin is

(1) $9\hat{k}$ J-s (2) $-9\hat{k}$ J-s

(3) $3\hat{k}$ J-s (4) $-3\hat{k}$ J-s

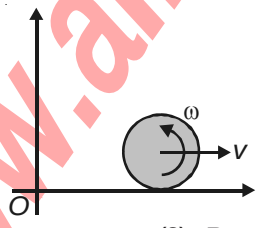
3. Three identical rods each of mass m and length ℓ are forming an equilateral triangle. The moment of inertia of rod about an axis through its one vertex and perpendicular to the plane is



(1) $\frac{m\ell^2}{3}$ (2) $\frac{m\ell^2}{12}$

(3) $\frac{3}{2}m\ell^2$ (4) $\frac{m\ell^2}{4}$

4. A disc of radius R is moving with velocity of centre of mass v and angular speed ω as shown in the figure. The angular momentum of disc about point O is



(1) Iω (2) Rmv

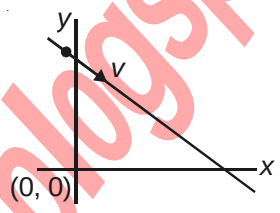
(3) Iω + Rmv (4) Iω – Rmv

5. In case of pure rolling of a disc on a rough ground. The ratio of speed at topmost point and at the centre of mass is

(1) 2 : 1 (2) 1 : 2

(3) 1 : 1 (4) $\sqrt{2}$: 1

6. The angular momentum of particle about origin moving with uniform velocity moving along straight line as shown in the figure is



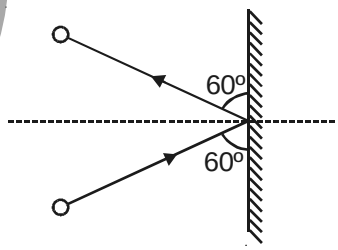
(1) Constant

(2) First increases then decreases

(3) First decreases then increases

(4) Decreases continuously

7. A ball of mass 1 kg moving with a velocity of 100 ms^{-1}, strikes a wall at an angle 60° (as shown in figure). If the ball rebounds with same speed, the impulse acted on it is



(1) 100 N-s (2) $100\sqrt{3}$ N-s

(3) 200 N-s (4) $200\sqrt{3}$ N-s

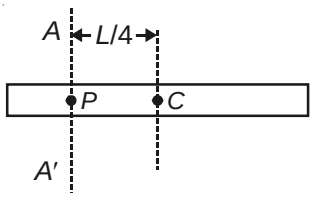
8. Moment of inertia of rod about an axis AA′ passing through point P according to diagram (mass of rod = M, length of rod = L) is

(1) $\frac{ML^2}{12}$

(2) $\frac{ML^2}{3}$

(3) $\frac{7ML^2}{48}$

(4) $\frac{5ML^2}{48}$



9. Which of the following statement is incorrect? (symbols have usual meanings)

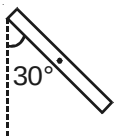
(1) K.E. of a point mass body in motion is always $\frac{1}{2}mv^2$

(2) K.E. of a rigid body in translatory motion is $\frac{1}{2}mv_{cm}^2$

(3) K.E. of a rigid body in pure rotatory motion is $\frac{1}{2}I\omega^2$

(4) K.E. of a point mass revolving about an axis is $\frac{1}{2}I\omega^2$ which is different from $\frac{1}{2}mv^2$

10. A rod of one metre is initially at rest and makes an angle 30° with vertical as shown in figure. The angular acceleration of rod, just after it is released, is



(1) $\frac{g}{4}$ (2) $\frac{3g}{2}$

(3) $\frac{3g}{4}$ (4) $\frac{g}{2}$

11. A solid cylinder of mass M and radius R rolls down an inclined plane of height h. The angular velocity of the cylinder when it reaches the bottom of the plane will be

(1) $\frac{1}{2R}\sqrt{gh}$ (2) $\frac{2}{R}\sqrt{gh}$

(3) $\frac{2}{R}\sqrt{\frac{gh}{3}}$ (4) $\frac{2}{R}\sqrt{\frac{gh}{2}}$

12. A disc, sphere, ring and hollow spherical shell all are rolling without slipping on a horizontal planes. The ratio of linear translational kinetic energy to rolling kinetic energy is minimum for

(1) Disc (2) Sphere

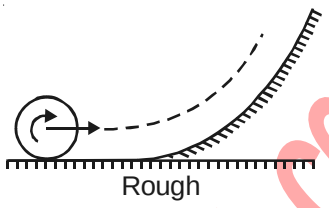
(3) Ring (4) Hollow spherical shell

13. Moment of inertia of a thin rod of length L mass M about its perpendicular bisector axis is I. If the rod is bend through 60º about midpoint on a plane perpendicular to the axis, then new moment of inertia of the rod will be

(1) I (2) $\frac{I}{2}$

(3) 3 I (4) $\frac{3I}{2}$

14. A solid sphere is rolling without slipping on a rough horizontal surface. The horizontal surface ends up as a rough inclined plane as shown. As the sphere rolls up on the plane, the force of friction on the sphere is



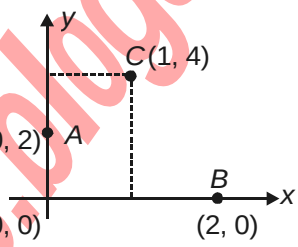
(1) Along the plane upward

(2) Along the plane downward

(3) Zero

(4) Along horizontal, backward

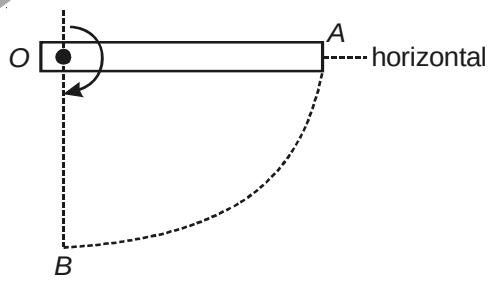
15. Three particles A, B and C each of mass 2 kg are kept in xy plane as shown in figure. The coordinates of their centre of mass are



(1) (1, 1) (2) (1, 2)

(3) $\left(\frac{1}{2}, 1\right)$ (4) $\left(\frac{1}{2}, \frac{3}{2}\right)$

16. A uniform thin rigid rod is free to rotate about the horizontal axis passing perpendicularly to its length through its one end. When released from rest from position OA, then during the journey from OA to OB position [$\omega \rightarrow$ angular speed]



(1) ω increases

(2) ω decreases

(3) ω remains constant

(4) ω may increase or decrease

17. A uniform thin circular ring of mass M and radius R is bend in 8 shaped planar loop. Assuming the two smaller loops to be identical, what is the moment of inertia of this system about an axis passing through their common point and perpendicular to their plane?

(1) $\frac{MR^2}{2}$ (2) $\frac{3}{4}$ MR^2

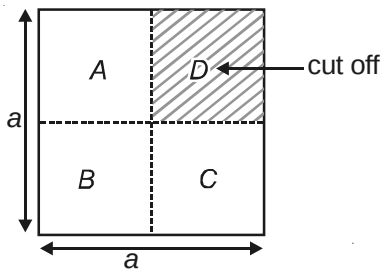
(3) $\frac{4}{3}$ MR^2 (4) 2 MR^2

18. A uniform circular ring is rolling on a horizontal surface without slipping. If its total kinetic energy is E, then its rotational and translational kinetic energies are respectively

(1) $\frac{E}{2}, \frac{E}{2}$ (2) $\frac{2E}{3}, \frac{E}{3}$

(3) $\frac{3E}{4}, \frac{E}{4}$ (4) $\frac{E}{3}, \frac{2E}{3}$

19. From a uniform square lamina a quarter lamina is cut off as shown in figure. Then the position of centre of mass of remaining portion with respect to original centre of mass lies in the region



(1) A (2) C

(3) B (4) D

20. Six identical rods each of mass m and length ℓ are arranged to form a regular hexagon. Then the moment of inertia of arrangement about axis passing through centre and perpendicular to the plane

(1) $5m\ell^2$ (2) $\frac{9}{2}m\ell^2$

(3) $2m\ell^2$ (4) $\frac{m\ell^2}{2}$

21. Two perfectly smooth (no friction) disc of moment of inertia I_1 and I_2 are rotating about their axis with angular velocity ω_1 and ω_2 in same sence. If they are placed in contact with each other so that their axes are common, then their new angular velocity will be

(1) $\frac{I_1\omega_1 + I_2\omega_2}{I_1 + I_2}$

(2) They will exchange their angular velocity

(3) There will be no change in their respective angular velocities as these are perfectly smooth

(4) They can't be placed in contact as they will push each other

22. Two discs made up of same sheet which is of uniform thickness. Masses of discs are in the ratio of 1 : 4. If particle on outer peripheri of both disc have same linear velocity when discs are in pure rotational motion about their axis then the ratio of their angular momentum will be

(1) 1 : 2 (2) 1 : 4

(3) 1 : 8 (4) 1 : 16

23. A uniform disc of mass M is rotating about its axis with angular velocity ω. Now four identical masses each $\frac{M}{4}$ are placed gently at the ends of two mutually perpendicular diameters of disc. The new angular velocity will be

(1) ω (2) $\frac{\omega}{2}$

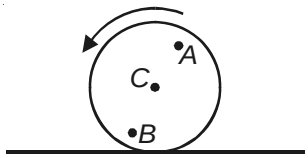
(3) $\frac{\omega}{3}$ (4) 2ω

24. A solid cylinder in rolling down on a rough inclined plane. Angle of inclination of plane is 30°. The acceleration of solid cylinder is

(1) g (2) gsin30°

(3) $\frac{g}{3}$ (4) g + gsin30°

25. A disc is rolling without slipping on horizontal surface as shown in figure. Point C is the centre of disc. Point A and B are equidistant from centre of disc. Let V_A, V_C and V_B are linear velocities of points A, B and C respectively. Then the relation between V_A, V_B and V_C is



(1) $V_A > V_B > V_C$ (2) $V_A > V_C > V_B$

(3) $V_B > V_C > V_A$ (4) $V_A < V_B < V_C$

26. Power of the body in rotational motion (symbols have their usual meaning)

(1) $\vec{\tau}.\vec{\omega}$ (2) $\tau^2\omega$

(3) $\vec{\tau}.\vec{a}$ (4) $\tau.a^2$

27. If two particles are moving in coplanar and concentric circular path with angular velocities $\overrightarrow{\omega_A}$ and $\overrightarrow{\omega_B}$, then relative angular velocity of B w.r.t. A when observer is at centre

(1) $\overrightarrow{\omega_A} - \overrightarrow{\omega_B}$ (2) $\overrightarrow{\omega_B} - \overrightarrow{\omega_A}$

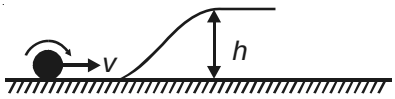
(3) $\overrightarrow{\omega_A} + \overrightarrow{\omega_B}$ (4) $\vec{\omega} + 2\overrightarrow{\omega_A}$

28. The instantaneous angular acceleration is defined as

(1) $\alpha = \lim_{\Delta t \to 0} \frac{\Delta\omega}{\Delta t}$ (2) $\frac{d^2\theta}{dt^2}$

(3) $\frac{d^2\omega}{dt^2}$ (4) Both (1) & (2)

29. A solid disc is rolling without slipping on a frictionless surface shown in figure with translational velocity v m/s. If it is just to climb the inclined frictionless surface, then v should be



(1) $\sqrt{2gh}$ (2) $\sqrt{\frac{4}{3}gh}$

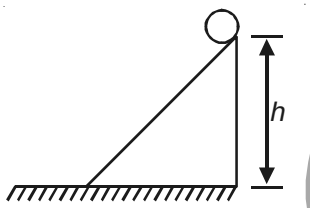
(3) $\sqrt{gh}$ (4) $\sqrt{\frac{1}{3}gh}$

30. The velocity of centre of mass of disc rolling on an inclined plane changed from v to 2v, then increase in its kinetic energy will be (m - mass of disc)

(1) $\frac{9}{4}mv^2$ (2) $\frac{mv^2}{2}$

(3) mv^2 (4) $3mv^2$

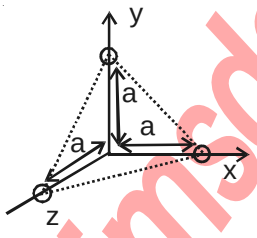
31. There is sufficient friction between the ring and incline so that when the ring released, moves under pure rolling. The velocity of centre of ring at bottom is



(1) $\sqrt{2gh}$ (2) $\sqrt{gh}$

(3) $\sqrt{\frac{1}{3}gh}$ (4) $\sqrt{\frac{2}{3}gh}$

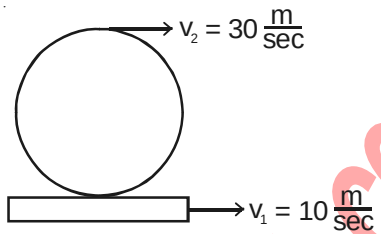
32. Three particles are placed at the corners of a triangle as shown in figure. Their centre of mass is at a position



(1) $\left(\frac{a}{3},\frac{a}{2},\frac{a}{2}\right)$ (2) $\left(\frac{a}{2},\frac{a}{2},\frac{a}{2}\right)$

(3) $\left(\frac{a}{3},\frac{a}{3},\frac{a}{3}\right)$ (4) (a, a, a)

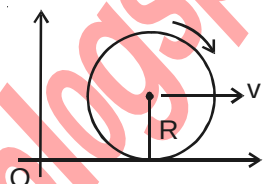
33. A disc is in pure rolling on the plank which is moving with 10 $\frac{m}{sec}$. as shown. The uppermost point of the disc has a speed of 30 $\frac{m}{sec}$. Radius of the disc is 1 m. Its angular speed is



(1) 30 rad/sec (2) 10 rad/sec

(3) 20 rad/sec (4) 40 rad/sec

34. In the shown figure, the disc is in pure rolling motion with velocity of centre of mass is v.

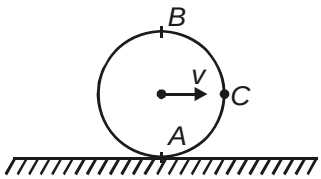


The angular momentum of the disc about origin

(1) $\frac{mvR}{2}$ (2) mvR

(3) $\frac{3}{2}$mvR (4) 2 mvR

35. A wheel is in uniform pure rolling along a level road. The speed of translational motion of the wheel axis is v. What is the speeds of the points A, B and C on the wheel rim relative to the road at the instant shown in the figure?



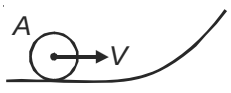
(1) $v_A = 0, v_B = 2v, v_C = v$

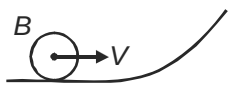
(2) $v_A = 0, v_B = 2v, v_C = \sqrt{2}v$

(3) $v_A = v, v_B = v, v_C = v$

(4) $v_A = \frac{v}{2}, v_B = 2v, v_C = v$

36. Two balls moving with same speed starts to move on a rough inclined plane. Ball A is solid and ball B is hollow. There is sufficient friction for pure rolling. If maximum height attained by balls A and B are h_1 and h_2 respectively, then which of the following relation is correct?

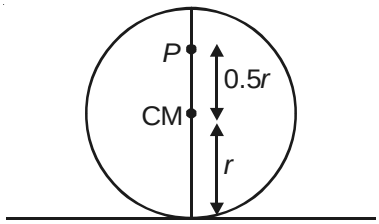




(1) $h_1 = h_2$ (2) $h_1 > h_2$

(3) $h_2 > h_1$ (4) $h_2 >> h_1$

37. A coin of radius r rolls without slipping on smooth horizontal floor. If velocity of centre of mass is 10 m/s, then linear velocity of point P is



(1) 15 ms^{-1} (2) 5 ms^{-1}

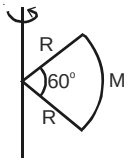
(3) 20 ms^{-1} (4) 10 ms^{-1}

38. The position vector of two particles of mass m_1=1kg, m_2=2kg are $\vec{r}_1=\left(\hat{i}+4\hat{j}+\hat{k}\right)m$, $\vec{r}_2=\left(\hat{i}+\hat{j}+\hat{k}\right)m$ respectively. The position vector of their centre of mass

(1) $\hat{i}+2\hat{j}+\hat{k}$ (2) $2\hat{i}+5\hat{j}+2\hat{k}$

(3) $\hat{i}+4\hat{j}+\hat{k}$ (4) $\hat{i}+\hat{j}+\hat{k}$

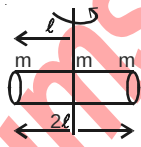
39. The figure is a part of disc. Mass of this part is M and radius is R. The moment of intertia about the given axis is



(1) $\frac{MR^2}{6}$ (2) $\frac{MR^2}{2}$

(3) $\frac{MR^2}{3}$ (4) $\frac{3MR^2}{4}$

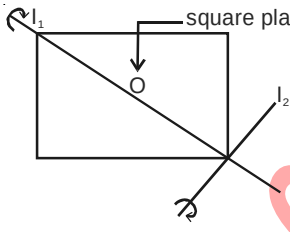
40. The moment of inertia of a uniform rod of mass m and length 2ℓ with two particles of mass m each at its ends. Find the MOI of the system about the shown axis



(1) $\frac{1}{3}ml^2$ (2) $\frac{2}{3}ml^2$

(3) $\frac{5}{3}ml^2$ (4) $\frac{7}{3}ml^2$

41. Let I_1 and I_2 be the moment of inertia of a uniform square plate about axes shown in the figure. Then the rate $I_1 : I_2$ is



(1) $1:\frac{1}{7}$ (2) $1:\frac{12}{7}$

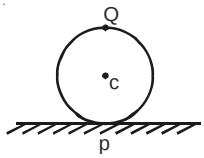
(3) $1:\frac{7}{12}$ (4) 1 : 7

42. The moment of inertia in terms of angular momentum (L) and kinetic energy (K) is

(1) $\frac{L^2}{K}$ (2) $\frac{L^2}{2K}$

(3) $\frac{L}{2K^2}$ (4) $\frac{L}{2K}$

43. A disc is rolling (without slipping) on a frictionless surface about its centre C and Q and P are two points equidistant from C. Let V_P, V_Q and V_C be the magnitudes of velocities of points P, Q and C respectively, then



(1) $V_Q > V_C > V_P$ (2) $V_Q < V_C < V_P$

(3) $V_Q = V_P$, $V_C = \frac{1}{2}V_P$ (4) $V_Q < V_C > V_P$

44. A rigid body rotates about a fixed axis with variable angular velocity given as(α-βt) at time t, where α and β are constants. The angle through which it rotates before it comes to rest is

(1) $\frac{\alpha^2}{2\beta}$ (2) $\frac{\alpha^2-\beta^2}{2\alpha}$

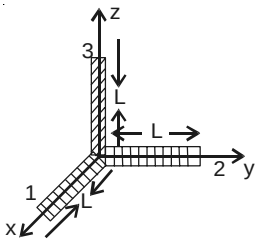
(3) $\frac{\alpha^2-\beta^2}{2\beta}$ (4) $\frac{\alpha(\alpha-\beta)}{2}$

45. The speed of a homogeneous solid sphere after rolling down an inclined plane of vertical height h from rest without sliding is

(1) $\sqrt{gh}$ (2) $\sqrt{\left(\frac{6}{5}\right)gh}$

(3) $\sqrt{\left(\frac{4}{3}\right)gh}$ (4) $\sqrt{\left(\frac{10}{7}\right)gh}$

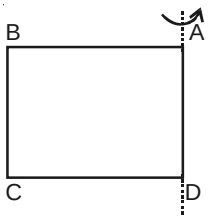
46. Three thin rods each of length L and mass M are placed along x, y and z-axes in such a way that one end of each of the rods is at the origin. The moment of inertia of this system about z-axis is



(1) $\frac{2ML^2}{3}$ (2) $\frac{4ML^2}{3}$

(3) $\frac{5ML^2}{3}$ (4) $\frac{ML^2}{3}$

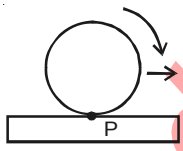
47. Four identical thin rods each having mass m and length ℓ are arranged in the form of square. Find out the moment of inertia of the system about an axis AD.



(1) $\frac{2m\ell^2}{3}$ (2) $\frac{m\ell^2}{3}$

(3) $\frac{5m\ell^2}{3}$ (4) $\frac{7m\ell^2}{5}$

48. The disc in the figure is in pure rolling, with respect to the plank which is moving with V. The velocity of point P on the disc with respect to ground is



(1) Zero (2) V

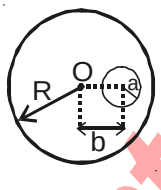
(3) 2V (4) $\frac{v}{2}$

49. The position of centre of mass of a system consisting of two particles of masses m_1 and m_2 seperated by distance L apart, from m_1 will

(1) $\frac{m_1L}{m_1+m_2}$ (2) $\frac{m_2L}{m_1+m_2}$

(3) $\frac{m_2}{m_1}$ (4) $\frac{L}{2}$

50. A hole of radius a is cut in a uniform circular plate of radius R as shown. Find out the distance of the centre of mass of the residual plate from the centre of the original plate is



(1) $\frac{ab}{R}$ (2) $\frac{a^2b}{b^2-a^2}$

(3) $\frac{a^2b}{R^2-b^2}$ (4) $\frac{a^2b}{R^2-a^2}$

51. A uniform rod of length 2L has a constant mass per unit length (μ). The moment of inertia of the rod about an axis which is a perpendicular be-sector of the rod is

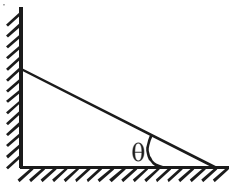
(1) $\frac{2}{3}\mu L^2$ (2) $\frac{2}{3}\mu L^3$

(3) $\frac{8}{3}\mu L^3$ (4) $\frac{4}{3}\mu L^3$

52. A uniform rod of length L and mass M is resting on a vertical wall and horizontal surface

The vertical wall is smooth and co-efficient of friction between the rod and horizontal surface is μ

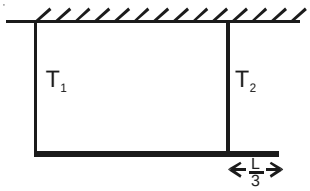
For equilibrium of rod, what is the minimum value of θ



(1) $\tan^{-1}\left(\frac{1}{\mu}\right)$ (2) $\tan^{-1}\left(\frac{2}{\mu}\right)$

(3) $\tan^{-1}\left(\frac{1}{2\mu}\right)$ (4) $\tan^{-1}\left(\frac{\mu}{2}\right)$

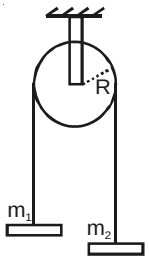
53. A uniform rod of length L is kept horizontal by two vertical strings as shown. If tensions in the left and right strings are T_1 and T_2 respectively then $\frac{T_1}{T_2}$ is equal to



(1) $\frac{1}{3}$ (2) $\frac{1}{6}$

(3) 3 (4) 6

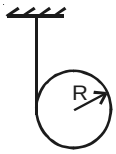
54. In the figure, $m_1 > m_2$. The connecting string is ideal and does not slip over pulley. Moment of inertia of pulley is I. Acceleration of the blocks has magnitude



(1) $\frac{(m_1-m_2)g}{m_1+m_2}$ (2) $\frac{(m_1-m_2)g}{m_1+m_2+\frac{I}{R^2}}$

(3) $\frac{\left(m_1-m_2+\frac{I}{R^2}\right)g}{\left(m_1+m_2+\frac{I}{R^2}\right)}$ (4) $\frac{(m_1-m_2)g}{\left(m_1+m_2-\frac{I}{R^2}\right)}$

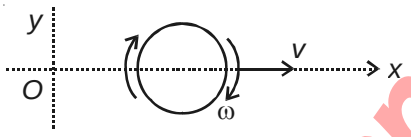
55. A string is wrapped over the edge of a uniform disc and free end is fixed with the ceiling. The disc moves down, unwinding the string. Then find out the downward acceleration of the disc.



(1) g (2) $\frac{g}{3}$

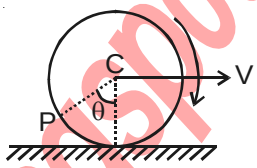
(3) $\frac{g}{2}$ (4) $\frac{2g}{3}$

56. The diagram shows the top view of a cricket ball moving in the right side along x-axis and spinning clockwise. The ball will



(1) Swing toward +ve y-axis
(2) Swing toward –ve y-axis
(3) Continue to move along x-axis
(4) Any of the above depending on the ratio v/ω

57. A disc is rolling on a horizontal surface with its linear speed v. Velocity of point P at the instant shown in figure is



(1) $2v\cos\left(\frac{\theta}{2}\right)$ (2) $2v\sin\left(\frac{\theta}{2}\right)$

(3) $v\cos\left(\frac{\theta}{2}\right)$ (4) $v\sin\left(\frac{\theta}{2}\right)$

58. A cubical block of mass M and edge 'a' slides down on an rough inclined plane of inclination θ with uniform velocity. The torque of friction force on the block about its centre has a magnitude of

(1) Zero (2) mg a sinθ

(3) $mg\frac{a}{2}\sin\theta$ (4) $mg\frac{a}{2}\cos\theta$

59. A particle of mass m is projected with a velocity $(a\vec{i}+b\vec{j})$ from ground. The angular momentum of particle about point of projection when particle is at topmost point

(1) $\frac{ma^2b}{2g}$ (2) $\frac{mab^2}{2g}$

(3) $\frac{2ma^2b}{g}$ (4) $\frac{mab^2}{g}$

[Chapter-6 : Gravitation]

1. If g is acceleration due to gravity and –gR is gravitation potential on the surface of earth [R is radius of the earth], then gravitational potential at the centre of the earth will be

(1) –gR (2) $\frac{g}{R}$

(3) –1.5 gR (4) $\frac{1.5g}{R}$

2. The angular momentum about the centre of earth of a satellite of mass m revolving around earth in a circular orbit of radius r will be (M → mass of the earth)

(1) Zero (2) $\sqrt{GMr}$

(3) $m\sqrt{GMr}$ (4) $m^2\sqrt{\frac{GM}{r}}$

3. If angular momentum of a satellite of mass m revolving around earth in a circular orbit of radius r is L, then its total energy is

(1) $\frac{L^2}{2m}$ (2) $-\frac{L^2}{2mr^2}$

(3) $-\frac{L^2}{2m^2r}$ (4) $-\frac{L^2}{mr}$

4. A satellite of mass m revolving around the earth in a circular orbit of radius 2R has to be shifted to another circular orbit of radius 4R. The energy required for this process will be (M → mass of earth, R → radius of the earth)

(1) $\frac{GMm}{8R}$ (2) $\frac{2GMm}{3R}$

(3) $\frac{GMm}{4R}$ (4) $\frac{GMm}{6R}$

5. Select the correct relation between areal velocity $\frac{d\vec{A}}{dt}$ and angular momentum $\vec{L}$ of a planet revolving around the sun

(1) $\frac{d\vec{A}}{dt}=\frac{\vec{L}}{4m}$ (2) $\frac{d\vec{A}}{dt}=\frac{2\vec{L}}{m}$

(3) $\frac{d\vec{A}}{dt}=\frac{\vec{L}}{m}$ (4) $\frac{d\vec{A}}{dt}=\frac{\vec{L}}{2m}$

6. If a satellite revolves around the earth in a circular orbit of radius r and density of earth is ρ, then its time period is directly proportional to

(1) $\frac{r^3}{\rho}$ (2) $r^{-3/2}\,\rho^{-1/2}$

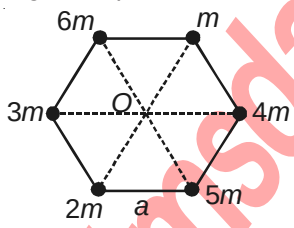
(3) $r^{3/2}\,\rho^{-1/2}$ (4) $r^{1/2}\,\rho^{1/2}$

7. If earth suddenly shrinks keeping mass constant and its volume becomes $\frac{1}{8}$ of its present volume, the acceleration due to gravity on the surface of earth will increase by

(1) 50% (2) 100%

(3) 200% (4) 300%

8. Six particles of different masses are placed at the vertices of a regular hexagon as shown in figure. The magnitude of gravitational intensity at centre O is (side of hexagon = a)



(1) Zero (2) $\frac{Gm}{a^2}$

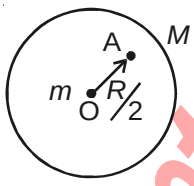
(3) $\frac{3Gm}{a^2}$ (4) $\frac{4Gm}{a^2}$

9. A body is dropped from a height equal to the radius of earth R. If acceleration due to gravity on the surface of earth is g and air resistance is neglected, then velocity with which it hits the ground is

(1) $\sqrt{2gR}$ (2) $\sqrt{gR}$

(3) $\sqrt{\frac{gR}{2}}$ (4) $\sqrt{\frac{2gR}{3}}$

10. Isolated uniform hollow sphere of mass M and radius R has a point mass m placed at its centre as shown in figure. Find out the work done in moving the point mass from the centre to a point A



(1) Gm M/R (2) 2 Gm M/R

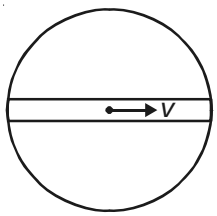
(3) –2 Gm M/R (4) Zero

11. A planet is moving in an elliptical orbit of eccentricity e around the sun. In the orbit if the maximum speed of the planet is v_1 and the minimum speed is v_2, then the ratio $\frac{v_1}{v_2}$ is

(1) e (2) $\left(\frac{1+e}{1-e}\right)$

(3) $\frac{e^2+1}{e^2-1}$ (4) $\frac{e+1}{e}$

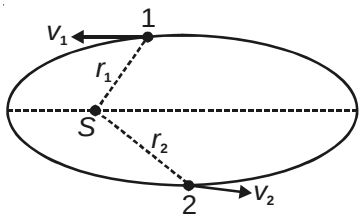
12. Suppose a narrow tunnel is dug along a diameter of earth. A particle kept at the centre of the tunnel is projected with speed v in such a way that the particle escapes earth's gravitational field. The minimum value of v should be



(1) $\sqrt{gR}$ (2) $\sqrt{2gR}$

(3) $\sqrt{3gR}$ (4) $\sqrt{\frac{gR}{2}}$

13. The following diagram shows the elliptical orbit of a planet moving around the sun. If r, v, L and K are the distance of planet from sun, speed, angular momentum and kinetic energy respectively. Then for the positions '1' and '2' of the planet which of the following is correct?



(1) $v_1r_2 = v_2r_1$ (2) $L_1 = L_2$

(3) $K_1 = K_2$ (4) All of these

14. If a man at the equator would weight $\left(\frac{3}{5}\right)^{th}$ of his weight at pole, then the angular speed of earth is

(1) $\sqrt{\frac{2}{5}\frac{g}{R}}$ (2) $\sqrt{\frac{g}{R}}$

(3) $\sqrt{\frac{R}{g}}$ (4) $\sqrt{\frac{2}{5}\frac{R}{g}}$

15. The gravitational field due to mass distribution is $E = \frac{A}{x^2}$ in x-direction. Here, A is constant. Taking the gravitational potential to be zero at infinity, potential at x is

(1) $\frac{2A}{x}$ (2) $\frac{2A}{x^3}$

(3) $\frac{A}{x}$ (4) $\frac{A}{2x^2}$

16. If a rocket is fired with a speed $v = 2\sqrt{gR}$ near the earth's surface, then its speed in the interstellar space is

(1) $14\sqrt{gR}$ (2) $\sqrt{2gR}$

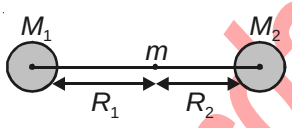
(3) $\sqrt{gR}$ (4) $\sqrt{4gR}$

17. With what kinetic energy a particle of mass m must be thrown vertically up from earth surface so that it rises upto a maximum height of h = R, where R is radius of earth? Acceleration due to gravity near earth surface is g

(1) 2 mgR (2) mgR

(3) 0.5 mgR (4) 0.25 mgR

18. A body of mass m is located in between two heavy body (planets) of masses M_1 and M_2 as shown in figure



Value of escape velocity for body (m) will be

(1) $\sqrt{\frac{2G(M_1R_2 + M_2R_1)}{R_1R_2}}$ (2) $\sqrt{\frac{2G(M_1R_1 + M_2R_2)}{R_1R_2}}$

(3) $\sqrt{\frac{2G(M_1 + M_2)}{R_1 + R_2}}$ (4) $\sqrt{\frac{2GM_1M_2}{R_1R_2}}$

19. The radius of a black hole is given by [where M is mass of black hole and c is speed of light in vacuum]

(1) $\frac{3GM}{2c^2}$ (2) $\frac{GM}{2c^2}$

(3) $\frac{GM}{c^2}$ (4) $\frac{2GM}{c^2}$

20. If the escape speed of an object of mass 2 kg is 20 km/s on the surface of a planet, then the gravitational potential energy of the object on the surface of planet is

(1) –200 MJ (2) –400 MJ

(3) –600 MJ (4) –800 MJ

21. A body of mass M is divided into two parts of mass m_1 and m_2 such that gravitational force between them for a given separation r is maximum. Ratio $\frac{m_1}{m_2}$ is equal to

(1) 1 : 2 (2) 2 : 3

(3) 4 : 5 (4) 1 : 1

22. A tunnel is dug in the earth which passes through the centre of the earth and crosses the earth. If a particle of mass m is dropped in the tunnel from the earth surface, then kinetic energy of the particle as it reaches the centre of the earth is (M = mass and R = radius of the earth)

(1) $\frac{GMm}{R}$ (2) $\frac{2GMm}{R}$

(3) $\frac{GMm}{2R}$ (4) $\frac{3GMm}{2R}$

23. If gravitational force between satellite and planet is directly proportional to r^n, where r is orbital radius of satellite, then the time period of satellite is directly proportional to

(1) r^{n-1} (2) $r^{\frac{1-n}{2}}$

(3) $r^{\frac{n}{2}}$ (4) $r^{\frac{3n}{2}}$

24. A planet revolves in an elliptical orbit around the sun. In which the semi-major and semi-minor axes have lengths a and b respectively. Then time period T is

(1) $T^2 \alpha \left(\frac{a+b}{2}\right)^3$ (2) $T^2 \alpha b^3$

(3) $T^2 \alpha a^3$ (4) $T^2 \alpha \left(\frac{a-b}{2}\right)^3$

25. A satellite which is geostationary in a particular orbit is taken to another orbit. It's distance from center of the earth in its new orbit is 2 times that of the earlier orbit. The time period in the new orbit is

(1) 4.8 hours (2) $48\sqrt{2}$ hrs

(3) 24 hrs (4) $24\sqrt{2}$ hrs

26. Two point masses m_1 and m_2 are initially rest at infinite distance apart. They start moving towards each other under their mutual gravitational forces. Their relative speed when they are at a distance d apart is

(1) $\sqrt{\frac{G(m_1+m_2)}{d}}$ (2) $\sqrt{\frac{2G(m_1+m_2)}{d}}$

(3) $\sqrt{\frac{2G(m_1m_2)}{d}}$ (4) $\sqrt{\frac{2Gd}{(m_1+m_2)}}$

27. A satellite of mass m initially at rest on the surface of the earth is to be launched into a circular orbit at a height equal to the radius R of the earth. The minimum energy required is : (M = mass of earth)

(1) $\frac{GMm}{2R}$ (2) $\frac{GMm}{R}$

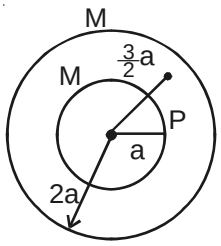
(3) $\frac{GMm}{4R}$ (4) $\frac{3}{4}\frac{GMm}{R}$

28. A tunnel is dug along a diameter of the earth. The gravitational force on a particle of mass m placed in the tunnel at a distance x from center is
(M_e = Mass of earth, R = radius of earth)

(1) $\frac{GM_em}{R^3}x$ (2) $\frac{GM_em}{R^2}\times x$

(3) $\frac{GM_emx^2}{R^3}$ (4) $\frac{GM_emR}{R^3}$

29. A uniform solid sphere of mass M and radius a is surround symmetrically by a uniform thin spherical shell of equal mass and radius 2a shown in figure. The gravitational field at a distance $\frac{3}{2}a$ from the centre is



(1) Zero (2) $\frac{25GM}{36a^2}$

(3) $\frac{4GM}{9a^2}$ (4) $\frac{GM}{4a^2}$

30. The period of revolution of a certain planet in a orbit of radius R is T. Its period of revolution in an orbit of radius 4R will be

(1) 2T (2) $2\sqrt{2}T$

(3) 4T (4) 8T

31. The self-gravitational potential energy of a uniform spherical of mass M and radius R is

(1) $-\frac{GM^2}{R}$ (2) $-\frac{GM^2}{2R}$

(3) $-\frac{3}{5}\frac{GM^2}{R}$ (4) $-\frac{GM^2}{4R}$

32. If a body be projected vertically upward from the surface of the earth so as to reach a height nR above the surface, the increase in its potential energy is

(1) (n)mgR (2) $\left(\frac{n-1}{n}\right)$mgR

(3) $\left(\frac{n}{n+1}\right)$mgR (4) (n+1)mgR

33. A spherically symmetric gravitational system of particles has a mass density $\rho = \begin{cases}\rho_o & \text{for } r \le R \\ 0 & \text{for } r > R\end{cases}$. Then choose the correct statement for E = gravitational field intensity

(1) for r > R, E = 0 (2) for r ≤ R, E ≠ 0

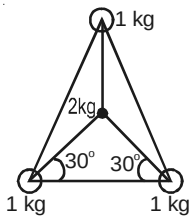
(3) for r ≤ R, E = 0 (4) E = 0, everywhere

34. Choose the correct relationship for a model in which a lighter particle is moving around a heavier particle only under the influence of gravitational field. Here K=kinetic energy, U=potential energy, E=total energy of the revolving particle

(1) $K = \frac{|U|}{2} = |E|$ (2) $\frac{K}{2} = |U| = |E|$

(3) $K = |U| = \left|\frac{E}{2}\right|$ (4) K=|U|=|E|

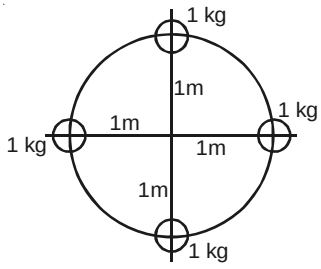
35. Three masses each of 1 kg are placed at the corners of an equilateral triangle of side 1m. The force on the mass of 2kg which is placed at the centre of the triangle (G = 6.67 × 10^{-11} Nm^2/kg)



(1) G(3) N (2) G N

(3) $\frac{\sqrt{3}}{2}$GN (4) Zero

36. The potential energy of the system as shown in figure



(1) $-G\left(2\sqrt{2}\right)J$ (2) $-G\left(2\sqrt{2}+1\right)J$

(3) $+G\left(2\sqrt{2}\right)J$ (4) $+G\left(2\sqrt{2}+1\right)J$

37. Two masses of 1kg and 2kg are separated by a distance of 100 m and released under the influence of mutual gravitational attractive force. They will meet at

(1) At a distance of 50m from 1 kg

(2) At a distance of 50m from 2 kg

(3) At a distance of 33.3m from 2 kg

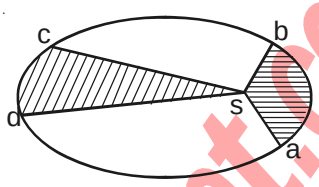
(4) At a distance of 33.3m from 1 kg

38. If the acceleration due to gravity at the surface of the earth is g, the work done in slowly lifting a body of mass m from the earth's surface to a height equal to the radius of earth is (R = radius of the earth)

(1) mgR (2) 2mgR

(3) $\frac{1}{4}$mgR (4) $\frac{1}{2}$mgR

39. Figure shows the elliptical path of a planet around the sun. The two shaded parts have equal area. If t_1 and t_2 be the time taken by the planet to go from a to b and from c to d respectively



(1) $t_1 < t_2$

(2) $t_1 = t_2$

(3) $t_1 > t_2$

(4) Insufficiant information to deduce the relation between t_1 and t_2

[Chapter-7 : Mechanical Properties of Solids]

1. A uniform wire fixed at one end has length ℓ. If it is stretched by applying an external force F on its other end due to which its length becomes ℓ', then work done by external force will be

(1) $F(\ell' - \ell)$ (2) $\frac{F\ell'}{\ell}$

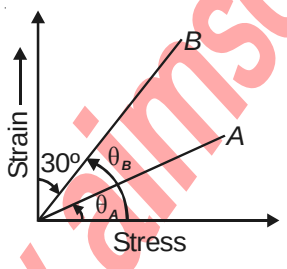
(3) $\frac{F\ell'}{2\ell}$ (4) $\frac{1}{2}F(\ell' - \ell)$

2. If a circular beam of radius r and length L is loaded by weight at middle due to which depression S is produced in it, then

(1) $S \propto r^3$ (2) $S \propto L^3$

(3) $S \propto \frac{1}{r^3}$ (4) $S \propto L^{-2}$

3. The stress strain curve for two wires A and B are shown in figure. If $\theta_B - \theta_A = 30^o$ and Y_A and Y_B are Young's moduli of wire A and B respectively, then



(1) $Y_A \cdot Y_B = 1$ (2) $Y_A < Y_B$

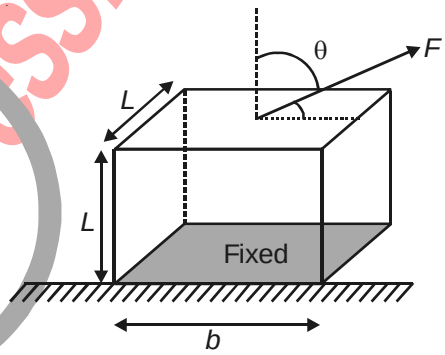
(3) $Y_A = 2Y_B$ (4) $Y_A = Y_B$

4. A long spring when stretched by 1 mm stores potential energy U. If it is further stretched by 4 mm, then change in its potential energy will be

(1) 4 U (2) 16 U

(3) 24 U (4) 25 U

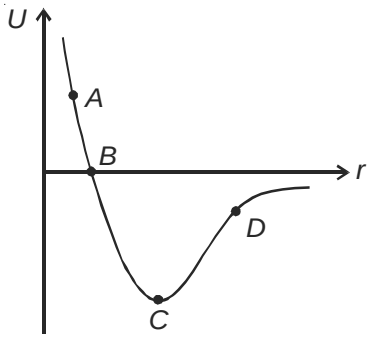
5. The tangential stress developed in block due to force F shown in figure is



(1) $\frac{F\cos\theta}{L^2}$ (2) $\frac{F\cos\theta}{Lb}$

(3) $\frac{F\sin\theta}{L^2}$ (4) $\frac{F\sin\theta}{Lb}$

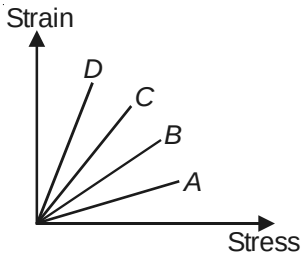
6. The variation of potential energy U between two atoms of a diatomic molecule with separation between atoms r is shown in figure. If F_A, F_B, F_C and F_D are magnitude of force between atoms corresponding to points A, B, C and D on curve, then



(1) $F_A < 0$ (2) $F_B = 0$

(3) $F_B > F_C$ (4) $F_C > F_D$

7. Stress-strain curve for four metals are shown in figure. The maximum young modulus of elasticity is for metal



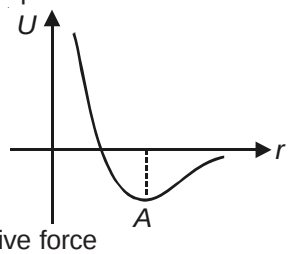
(1) A (2) B
(3) C (4) D

8. A given metal is drawn in four types of wires having different dimensions. If same load is hung from each wire, then, which of the following has minimum elongation? (L = length, D = diameter)

(1) L, D (2) $\frac{L}{2}, 2D$

(3) $2L, \frac{D}{2}$ (4) $\sqrt{2}L, \frac{D}{\sqrt{2}}$

9. Potential energy versus position curve is given for a molecule. What type of force is acting on the molecule at position A?



(1) Attractive force
(2) Repulsive force
(3) May be attractive or repulsive force
(4) At A force is zero

10. A wire of mass M and length l and area of cross section A is hanging vertically. What is the extention produced in the wire due to it's own weight?

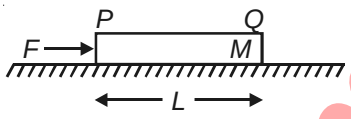
(1) $\frac{Mgl}{YA}$ (2) $\frac{Mgl}{3YA}$

(3) $\frac{Mgl}{2YA}$ (4) $\frac{Mgl}{4YA}$

11. The ratio of lengths of two steel rods P and Q is 2 : 3 and the ratio of their radii is 3 : 2, then the ratio of their Young's modulus is

(1) 2 : 3 (2) 4 : 9
(3) 8 : 27 (4) 1 : 1

12. A uniform beam PQ of mass M, cross-section A and length L is placed on a horizontal smooth surface (see diagram). A constant force F acts at one end and is uniformly distributed over the section. If Young's modulus of the beam material is Y, then the compression in the beam is



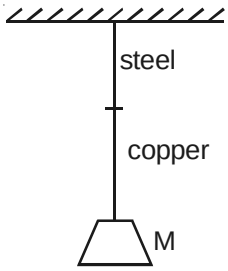
(1) $\frac{4FL}{YA}$ (2) $\frac{FL}{YA}$

(3) $\frac{FL}{2YA}$ (4) Zero

13. Under the application of a load, the volume of a wire remains constant. The value of the Poisson's ratio of the material of the wire is

(1) –1.0 (2) 0.5
(3) 0.2 (4) Zero

14. In figure the upper wire is made of steel and the lower of copper. The wires have equal cross section. The ratio of the longitudinal strains developed in copper and steel wires (Y of steel=2 × 10^{11} Nm^{-2}, Y of copper = 1.3 × 10^{11} Nm^{-2})



(1) 1.54 (2) 0.64
(3) 2.6 (4) Data insufficiant

15. One end of uniform bar of weight w_1 is suspended from the roof and a weight w_2 is suspended from the other end. The area of cross-section is A. What is the stress at the mid-point of the rod?

(1) $\frac{w_1 + w_2}{A}$ (2) $\frac{w_1 - w_2}{A}$

(3) $\frac{\left(\frac{w_1}{2}\right) + w_2}{A}$ (4) $\frac{\left(\frac{w_2}{2}\right) + w_1}{A}$

16. If ρ is the density of the material of a wire and σ the breaking stress, then the greatest length of the wire that can hang freely without breaking is

(1) $\frac{2\sigma}{\rho g}$ (2) $\frac{\rho}{\sigma g}$

(3) $\frac{\rho g}{2\sigma}$ (4) $\frac{\sigma}{\rho g}$

17. A rubber cord of length L and area of cross-section A is suspended from the ceiling of a room. What is the elongation in the cord due to the self weight if density of the rubber is ρ and Young's modulus is Y?

(1) $\frac{\rho g L^2}{Y}$ (2) $\frac{\rho g L^2}{2Y}$

(3) $\frac{\rho g L^2}{3Y}$ (4) $\frac{\rho g L^2}{4Y}$

18. A steel ring of radius r and cross-sectional area A is fitted on to a wooden disc of radius (R > r). If Young's modulus be Y, then the force with which the steel ring is expanded is

(1) $\frac{AYR}{r}$ (2) $\frac{AY(R-r)}{r}$

(3) $\frac{Y}{A}\frac{(R-r)}{r}$ (4) $\frac{Yr}{AR}$

19. When the tension in a metal wire is T_1, its length is l_1. When the tension is T_2, its length is l_2. The natural length of wire is

(1) $\frac{T_2}{T_1}(l_1+l_2)$ (2) $T_1l_1 + T_2l_2$

(3) $\frac{l_1T_2 - l_2T_1}{T_2 - T_1}$ (4) $\frac{l_1T_2 + l_2T_1}{T_2 + T_1}$

20. Young's modules of a wire of length L and radius r is Y. If the length is reduced to $\frac{L}{2}$ and radius to $\frac{r}{2}$, its young's modules will be

(1) $\frac{Y}{2}$ (2) Y

(3) 2Y (4) 4Y

21. In a wire stretched by a hanging weight from its end, the elastic potential energy per unit volume in terms of longitudinal strain E and modulus of elasticity Y is

(1) $\frac{YE^2}{2}$ (2) $\frac{YE}{2}$

(3) $\frac{YE^2}{A}$ (4) $\frac{Y^2E}{2}$

22. The young modulus of a wire is Y. If the energy per unit volume is E, then the strain will be

(1) $\sqrt{\frac{2E}{Y}}$

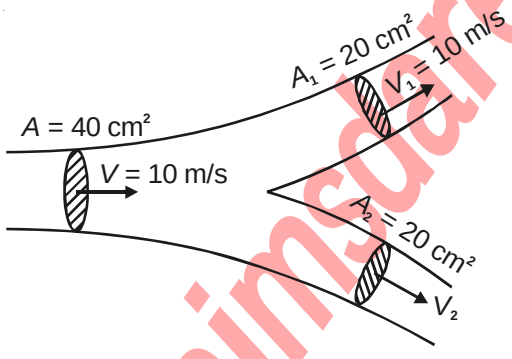
(2) $\sqrt{2EY}$

(3) EY

(4) $\frac{E}{Y}$

[Chapter-8 : Mechanical Properties of Fluids]

1. An incompressible liquid is flowing through a tube as shown in figure.



A, A_1 and A_2 are area of crossection of tube at different parts as shown and V, V_1 and V_2 are respective velocities of liquid at these points, then V_2 =

(1) 20 m/s (2) 10 m/s

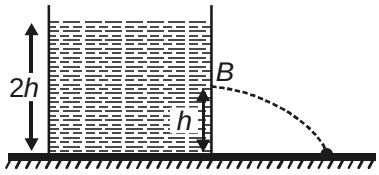
(3) 5 m/s (4) 15 m/s

2. A body of mass M and volume V is floating in a liquid of density σ. When an excess mass m is placed on the body, then it just sinks in the liquid. The value of excess mass is

(1) Vσ + M (2) Vσ – M

(3) M – Vσ (4) $\left(\frac{V\sigma + M}{M}\right)V\sigma$

3. The ratio of the velocity of a freely falling body after falling through h depth, to the velocity of efflux of the water from the orifice on the wall of beaker at point B is



(1) $1:\sqrt{2}$ (2) $\sqrt{2}:1$

(3) 1 : 1 (4) 4 : 1

4. If the soap solution has surface tension T and a bubble of diameter d is blown from it, then the work done to blow the bubble is

(1) $8\pi d^2T$ (2) $4\pi d^2T$

(3) πd^2T (4) $2\pi d^2T$

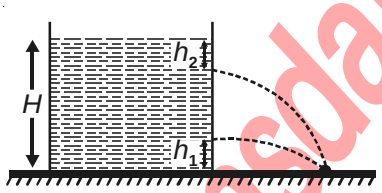
5. An ice cube is kept a gravity free room in vacuum. If the ice cube melts, then
   (1) It remains cubical
   (2) It spreads on the floor of room
   (3) It becomes spherical
   (4) If becomes oval

6. The top surface of an incompressible liquid is open to the atmosphere. The pressure at depth h_1 below the surface is P_1. Pressure P_2 at depth $h_2 = 2h_1$ compared with P_1 is
   (1) $P_2 > 2P_1$ (2) $P_2 = 2P_1$
   (3) $P_2 < 2P_1$ (4) $P_2 = P_1$

7. When a body of mass 10 kg is placed on a floating platform, then the platform sinks by 2 cm. If another body is placed on platform after removing the body then platform sinks by 5 cm, then the mass of the another body is
   (1) 250 kg (2) 25 kg
   (3) 10 kg (4) 20 kg

8. A swimmer of mass m rests on the top of a slab, having thickness h and density ρ_s. If the slab floats in water with its upper surface just awash, then the area of slab is (density of water = ρ_w)
   (1) $\frac{m}{h(\rho_w + \rho_s)}$ (2) $\frac{m}{h\rho_w}$
   (3) $\frac{m}{h(\rho_s - \rho_w)}$ (4) $\frac{m}{h(\rho_w - \rho_s)}$

9. Two orifice are made such that one at height h_1 from bottom and other at depth h_2 from free surface. If the horizontal range of the water from them are equal then what is the relation between h_1 and h_2?

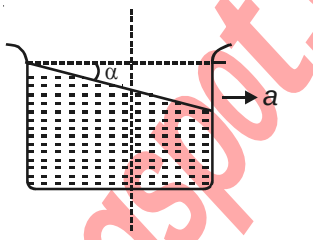


   (1) $h_1 = 2h_2$ (2) $h_1 = h_2$
   (3) $2h_1 = h_2$ (4) $h_1 + h_2 = H$

10. How does the critical velocity v of a liquid through a narrow tube depend on radius of the tube (r), density of liquid (ρ) and viscosity of liquid (η)?
   (1) $v \propto \frac{\rho}{\eta r}$ (2) $v \propto \frac{\rho\eta}{r}$
   (3) $v \propto \frac{\eta}{\rho r}$ (4) $v \propto \frac{\eta r}{\rho}$

11. Force required to pull a ring from surface of water is 1500 π dyne. What is radius of ring if (surface tension of water is 75 dyne/cm and mass of the ring is negligible)
   (1) 5 cm (2) 10 cm
   (3) 20 cm (4) 15 cm

12. A fluid container containing a liquid of density ρ is accelerating with acceleration 'a' toward east. If angle of inclination α of free surface is 37° then the value of 'a' will be

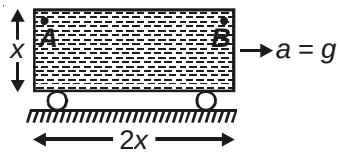


   (1) $\frac{3g}{5}$ (2) $\frac{4g}{3}$
   (3) $\frac{4g}{5}$ (4) $\frac{3g}{4}$

13. If equal masses of water and a liquid of relative density d are mixed together then mixture will have density of
   (1) $\frac{2d}{1+d}$ (2) $\frac{d}{1+d}$
   (3) $\frac{2(1+d)}{d}$ (4) $\frac{1+d}{2d}$

14. An incompressible and non viscous fluid flows through a horizontal pipe. At one point in the pipe the pressure in the fluid is p_1 and the fluid speed is v_1. At other point in the pipe the pressure is p_2 and the fluid speed is $2v_1$. What is the relation between p_1 and p_2?
   (1) $p_1 > p_2$ (2) $p_1 = 2p_2$
   (3) $p_1 = 4p_2$ (4) $p_1 < p_2$

15. A closed vessel shown below is completely filled with a liquid of density ρ. When the vessel is accelerated horizontally with constant acceleration g, what will be the pressure difference at the point A and B?



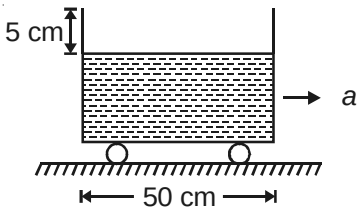
   (1) $2\rho gx$ (2) ρgx
   (3) $\frac{1}{2}\rho gx$ (4) Zero

16. A steel wire is suspended vertically from a rigid support. When loaded with a weight in air, it extends by x and when the weight is immersed completely in water, the extension is reduced to x′. The relative density of the material of the weight is

(1) $\frac{x}{x'}$ (2) $\frac{x'}{x}$

(3) $\frac{x}{x-x'}$ (4) $\frac{x+x'}{x}$

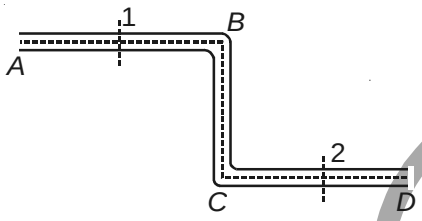
17. What can be the maximum horizontal acceleration of the vessel so that the liquid does not come out? (g = 10 m/s^2)



(1) 1 m/s^2 (2) 2 m/s^2

(3) 4 m/s^2 (4) 5 m/s^2

18. A pipe of uniform cross-section carries a non-viscous liquid in steady state. The part CD of the pipe is 20 cm below the level of the part AB



The velocities at the section 1 and 2 are related as

(1) $v_2 = v_1 + 20$ (2) $v_2 = v_1$

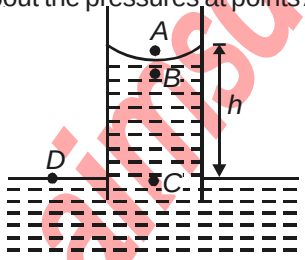
(3) $v_2 = v_1 - 20$ (4) $v_2 > v_1$

19. A rain drop falling with a terminal velocity v_0 splits into eight identical parts. The each part will fall finally with a constant velocity of

(1) $4v_0$ (2) $2v_0$

(3) $\frac{v_0}{2}$ (4) $\frac{v_0}{4}$

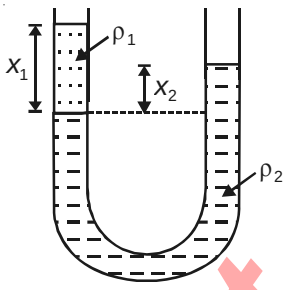
20. The following diagram shows a capillary tube in which water is risen upto height h. Select the correct alternative about the pressures at points A, B, C and D



(1) $p_A = p_B$ (2) $p_A = p_C$

(3) $p_A = p_B = p_C = p_D$ (4) $p_C > p_D$

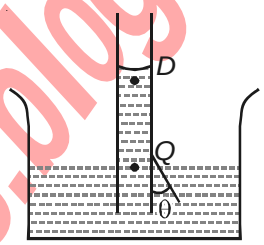
21. In the U-tube shown below two immiscible liquids have densities ρ_1 and ρ_2. Which of the following is correct?



(1) $x_1\rho_2 = x_2\rho_1$ (2) $x_1\rho_1 = x_2\rho_2$

(3) $x_1^2\rho_1 = x_2^2\rho_2$ (4) $x_1\rho_1^2 = x_2\rho_2^2$

22. Liquid reaches in equilibrium as shown in capillary tube of radius r. If surface tension is T, angle of contact is θ and density of liquid is ρ, then pressure difference between the point just below the meniscus D and Q is



(1) $\frac{2T\cos\theta}{r}$ (2) $\frac{T}{r\cos\theta}$

(3) $\frac{2T}{r\cos\theta}$ (4) $\frac{4T}{r}\cos\theta$

23. The density ρ of a sphere of bulk modulus B at depth y in the ocean is related to the density ρ_0 at surface by (σ_0 = density of water)

(1) $\rho = \rho_0\left(1-\frac{\sigma_0 gy}{B}\right)$ (2) $\rho = \rho_0\left(1+\frac{\sigma_0 gy}{B}\right)$

(3) $\rho = \rho_0\left(1+\frac{B}{\sigma_0 gy}\right)$ (4) $\rho = \rho_0\left(1-\frac{B}{\sigma_0 gy}\right)$

24. A piece of wax weight x g in air. A piece of metal is found to weight y g in water. It is tied to the wax and both together weight z g in water. Then specific gravity of wax is (z > y)

(1) $\frac{x}{y}$ (2) $\frac{y}{x}$

(3) $\frac{x}{x-(z-y)}$ (4) $\frac{x}{(x-z)}$

25. A beaker is filled with a liquid of density d upto a height h. If the beaker is at rest, then the mean pressure on the wall is

(1) Zero (2) hdg

(3) $\frac{hdg}{2}$ (4) 2hdg

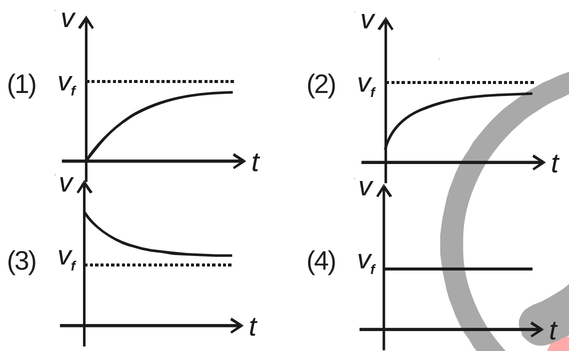
26. A concrete block with a cavity floats in water completely immersed. If relative density of concrete is 5 then find the ratio of the outer volume of the block and volume of the cavity

(1) 5/4 (2) 5/3
(3) 4/3 (4) 6/5

27. A cylindrical container filled with water upto the top is emptied in time t when a small hole is made at the bottom. If the container were filled upto half of the height when time taken to empty the container will be

(1) $\frac{t}{\sqrt{2}}$ (2) $\frac{t}{2}$
(3) $\sqrt{2}\,t$ (4) $\frac{t}{2\sqrt{2}}$

28. A steel ball is thrown downward with speed v_0 into water. The ball finally moves with speed $v_f < v_0$. The correct variation of the speed of the ball with time will be



29. A viscous liquid flows in a capillary at a rate of 10 cc per minute. If radius of the capillary is doubled and the other parameters remaining the same, rate of flow will become

(1) 160 cc/minute (2) 80 cc/minute
(3) 40 cc/minute (4) 20 cc/minute

30. Eight rain drops each of same size fall with terminal speed v_0. What will the terminal speed of the new drop formed when all the eight drops merge together?

(1) $2v_0$ (2) $4v_0$
(3) $6v_0$ (4) $8v_0$

31. A barometer kept in an elevator accelerating upward reads 76 cm. The air pressure in the elevator is

(1) 76 cm (2) < 76 cm
(3) > 76 cm (4) Zero

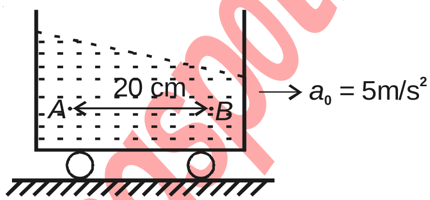
32. If two liquids of same masses but densities ρ_1 & ρ_2 respectively are mixed, then density of the mixture is given by

(1) $\frac{\rho_1+\rho_2}{2}$ (2) $\frac{\rho_1+\rho_2}{2\rho_1\rho_2}$
(3) $\frac{2\rho_1\rho_2}{\rho_1+\rho_2}$ (4) $\frac{\rho_1\rho_2}{\rho_1+\rho_2}$

33. Two stretched membranes of area 2 cm^2 and 3 cm^2 are placed in a liquid at the same depth. Ratio of hydrostatic pressure due to liquid column pressures on them

(1) 1 : 1 (2) 2 : 3
(3) 3 : 2 (4) $2^2 : 3^2$

34. The container of water (ρ = 1000 kg/m^3) shown in the diagram is moved horizontally with acceleration a_0. Find the pressure difference between the points A and B

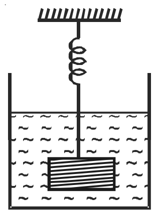


(1) 1000 Pa (2) 1500 Pa
(3) 2000 Pa (4) 2500 Pa

35. A cubical block floats in water with its 40% volume immersed in it. If container is placed in a lift which is accelerating in upward direction with acceleration g/4, then the percentage of volume of block outside the water will be

(1) 40% (2) 50%
(3) 60% (4) 30%

36. A heavy block of mass 4 kg is attached to a spring of spring constant k = 200 N/m and is completely dipped in water. If the extension in the spring is 2 cm then upthrust on the block by water is

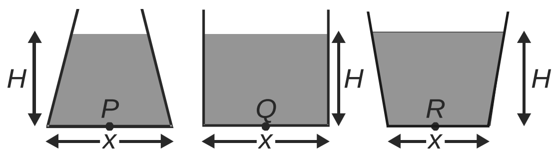


(1) 18 N (2) 36 N
(3) 40 N (4) 22.5 N

37. Work done in blowing a soap bubble of volume V is W. What will be the work done in blowing a soap bubble of volume 8V?

(1) 2 W (2) 4 W
(3) 8 W (4) 16 W

38. W_P, W_Q and W_R are the pressures of the same liquid at point P, Q and R respectively in different container as shown in the figure. The relation between them is



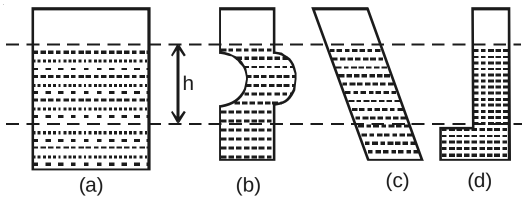
(1) $W_P > W_Q > W_R$ (2) $W_P < W_Q < W_R$
(3) $W_P = W_Q = W_R$ (4) $W_P = W_Q > W_R$

39. A solid of density D is floating in a liquid of density d. If v is volume of solid submerged, then total volume of solid is

(1) $\frac{D}{d}v$ (2) $\sqrt{\frac{D}{d}}v$

(3) $\frac{d}{D}v$ (4) $\frac{d+1}{D}v$

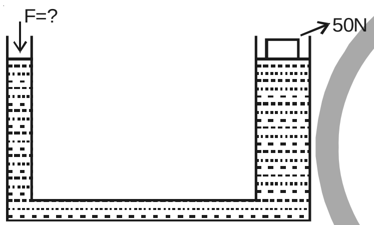
40. The figure shows four containers of olive oil. The order of pressure at the given height(h) is



(1) $P_A>P_B>P_C>P_d$ (2) $P_B>P_A>P_C>P_d$

(3) $P_A=P_B=P_C=P_d$ (4) $P_A=P_D=P_C>P_d$

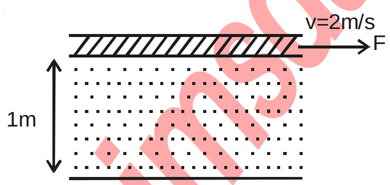
41. The area of cross section of two arms of a hydraulic press are 1cm^2 and 10cm^2 respectively. If a load of 50N is put on the wider side then force required to keep the load in equilibrium on the other side



(1) 50 N   (2) 5 N

(3) 500 N   (4) 55 N

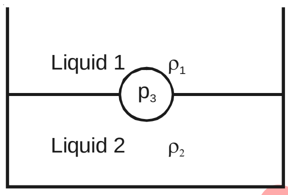
42. A plate of area 2m^2 is made to move horizontally with a speed of 2m/s by applying a horizontal tangential force over the free surface of a liquid. If depth is 1m and the liquid in contact with the bed is stationary. (η=0.01 poise). The tangential force



(1) 2×10^{-3} N   (2) 2×10^{-2} N

(3) 4×10^{-2} N   (4) 4×10^{-3} N

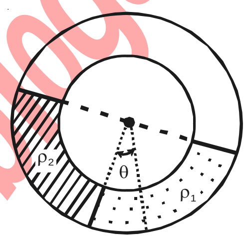
43. A jar is filled with two non mixing liquids 1 and 2 having densities ρ_1 and ρ_2 respectively. A solid ball, made of material of density ρ_3, is dropped in the jar. It comes equilibrium in the position shown in the figure which of the following is true for ρ_1, ρ_2, ρ_3



(1) $\rho_3<\rho_1<\rho_2$ (2) $\rho_2<\rho_3<\rho_1$

(3) $\rho_1<\rho_2<\rho_3$ (4) $\rho_1<\rho_3<\rho_2$

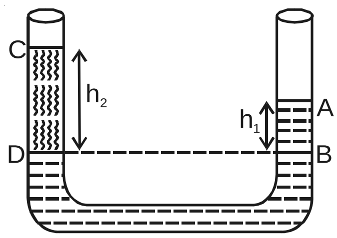
44. A small uniform tube is bent into a circle of radius r whose plane is vertical. Eqval volumes of two immiscible liquids whose demities are ρ_1 and ρ_2 ($\rho_1 > \rho_2$) fill half the circle. The angle between radius passing through interface and vertical axis is given by



(1) $\tan^{-1}\left(\frac{\rho_1}{\rho_2}\right)$ (2) $\tan^{-1}\left(\frac{\rho_2}{\rho_1}\right)$

(3) $\tan^{-1}\left(\frac{\rho_1-\rho_2}{\rho_1+\rho_2}\right)$ (4) $\tan^{-1}\left(\frac{\rho_1+\rho_2}{\rho_1-\rho_2}\right)$

45. In a U-tube, a column AB of water is balanced by column CD of paraffin. The relative density of paraffin is



(1) $\frac{h_2}{h_1}$ (2) $\frac{h_1}{h_2}$

(3) $\frac{h_2-h_1}{h_1}$ (4) $\frac{h_2}{h_1+h_2}$

46. An open vessel containing water is given a constant acceleration 'a' in the horizontal direction. Then the surface of water gets slopped with horizontal at an angle θ given by

(1) $\theta = \tan^{-1}(a/g)$ (2) $\theta = \tan^{-1}(g/a)$

(3) $\theta = \sin^{-1}(a/g)$ (4) $\theta = \cos^{-1}(g/a)$

CHEMISTRY

[Chapter-6 : Thermodynamics]

1. The intensive properties among the following is

(1) Normality (2) pH

(3) E_{cell} (4) All of these

2. ΔH may be equal to zero in

(1) Adiabatic process (2) Isothermal process

(3) Isochoric process (4) Irreversible process

3. The correct relation is

(1) $\Delta H_{hydration} = \Delta H_{solution}$(Anhyd. comp.) $- \Delta H_{solution}$ (hydrated comp.)

(2) $\Delta H_{hydration} = \Delta H_{solution}$(Anhyd. comp.) $+ \Delta H_{solution}$ (hydrated comp.)

(3) $\Delta H_{hydration} = \Delta H_{solution}$(Hydrated comp.) $- \Delta H_{solution}$ (Anhydrated comp.)

(4) $\Delta H_{hydration} = \Delta H_{solution}$(Anhyd. comp.) $- 2 \times \Delta H_{solution}$ (hydrated comp.)

4. The dissociation energy of methane and propane are x and y kJ/mol respectively. The bond energy of C—C bond would be

(1) $\left(\frac{y + 2x}{2}\right)$ kJ (2) $\left(\frac{y - x}{2}\right)$ kJ

(3) $\left(\frac{y - 2x}{2}\right)$ kJ (4) $\left(\frac{y + x}{2}\right)$ kJ

5. Entropy change (ΔS) for isochoric process is given by

(1) $\Delta S = 2.303\ nC_V \log \frac{T_2}{T_1}$

(2) $\Delta S = 2.303\ nC_V \log \frac{P_1}{P_2}$

(3) $\Delta S = 2.303\ nC_P \log \frac{T_2}{T_1}$

(4) $\Delta S = 2.303\ nC_P \log \frac{P_2}{P_1}$

6. If 'a' ml of an acid and 'b' ml of a base is mixed then increase in temperature by x°C what would be the increase in temperature when 2a ml of same acid and 2b ml of same base is mixed?

(1) 2x°C (2) 4x°C

(3) $\frac{x}{2}$ °C (4) x°C

7. If 1500 cal of heat is added to a system while the system does work equivalent to 2500 cal by expanding against the surrounding atmosphere. The change in internal energy of the system is

(1) – 1000 cal (2) 1000 cal

(3) 4000 cal (4) – 4000 cal

8. The enthalpy of solution of MSO_4 and $MSO_4.x\ H_2O$ are –p and q kJ respectively. The enthalpy of hydration of MSO_4 to $MSO_4.x\ H_2O$ will be

(1) – (p + q) kJ (2) (p + q) kJ

(3) (p – q) kJ (4) (q – p) kJ

9. Molar heat capacity for a gas at constant temperature and pressure is

(1) 3/2R

(2) 5/2R

(3) Depends on atomicity of gas

(4) Infinity (∞)

10. The magnitude of work done in an open vessel at 300 K, when 112 g zinc reacts with dil. HCl is

(1) 1022 cal (2) 642 cal

(3) 382 cal (4) 200 cal

11. What is enthalpy change of the following reaction?

$CH_2{=}CH_2 + H_2(g) \rightarrow CH_3{-}CH_3$

Given, C–H, C–C, C=C, H–H an 414, 347, 615 and 435 kJ $mole^{-1}$ respectively

(1) –100 kJ (2) –125 kJ

(3) –150 kJ (4) –175 kJ

12. Combustion of 4 g of methane produces 220 kJ heat. The enthalpy of combustion and calorific values of CH_4 in kJ are respectively

(1) 220 and 440 (2) 440 and 55

(3) 880 and 220 (4) 880 and 55

13. Standard enthalpies of formation of CO_2, H_2O and CH_4 are respectively, –398.8, –241.6 and –76.2 kJ mol^{-1}. The heat produced on combustion of 40 g CH_4 will be nearly

(1) 0.8×10^3 kJ (2) 1.6×10^3 kJ

(3) 2×10^3 kJ (4) 3.2×10^3 kJ

14. For the reaction $\frac{1}{8}S_{8(s)} + \frac{3}{2}O_{2(g)} \rightarrow SO_{3(g)}$, the difference of heat change at constant pressure and constant volume at 27°C will be

(1) +150 R (2) –150 R

(3) +450 R (4) –450 R

15. The incorrect statement among the following is
(1) For an ideal gas, the internal energy depends only on temperature and pressure
(2) For isothermal process, change in internal energy (ΔU) = 0
(3) In thermodynamic reversible process the driving force is infinitesimally greater than the opposing force
(4) 1 litre - atm = 101.3 J

16. If a system at 127°C emit 50 kJ, energy to atmosphere, which is at 27°C. The change in entropy of universe is
(1) $+\frac{1}{24}$kJ (2) $-\frac{1}{24}$kJ
(3) $-\frac{1}{8}$kJ (4) $+\frac{1}{6}$kJ

17. The heats of neutralization of four acids A, B, C, D are –13.7, –9.4, –11.2 and –12.4 kcal respectively. When they are neutralized by a common base. The acidic character obey the order
(1) A > B > C > D (2) A > D > C > B
(3) D > C > B > A (4) B > C > D > A

[Chapter-7 : Equilibrium]

1. Solutions A and B contain one and two moles of CH_3COONH_4 in one litre respectively. The hydrolysis will be
(1) More in A (2) More in B
(3) Same in A and B (4) Very little in A

2. For preparing a buffer solution of pH = 6 by mixing sodium acetate and acetic acid, the ratio of the concentration of salt and acid should be ($K_a = 10^{-5}$)
(1) 1 : 10 (2) 10 : 1
(3) 100 : 1 (4) 1 : 100

3. For a chemical reaction :
$3X(g) + Y(g) \rightleftharpoons X_3Y(g)$; ΔH = –11.2 kcal/mole.
The amount of X_3Y at equilibrium is affected by
(1) Temperature and pressure
(2) Pressure only
(3) Temperature only
(4) Temperature, pressure and catalyst

4. In a closed system
$A(s) \rightleftharpoons 2B(g) + 3C(g)$
If partial pressure of C is doubled, then partial pressure of B will be
(1) $2\sqrt{2}$ times the original value
(2) $\frac{1}{2}$ times the original value
(3) 2 times the original value
(4) $\frac{1}{2\sqrt{2}}$ times the original value

5. Consider the following equilibria at 300 K and 400 K with their K_{eq}.
I. $A(g) \rightleftharpoons 2B(g)$; $K_{eq}^{300\,K} = 10$, $K_{eq}^{400\,K} = 5$
II. $C(g) \rightleftharpoons D(g)$; $K_{eq} = 2$, $K_{eq} = 5$
Which of the following statement is correct?
(1) I is endothermic, II is exothermic
(2) I is exothermic, II is endothermic
(3) I and II both are endothermic
(4) I and II both are exothermic

6. Solubility of $BaSO_4$ in aq. solution is 1×10^{-5} M. Hence solubility in 0.1M $BaCl_2$ is
[K_{sp} $BaSO_4 = 4 \times 10^{-4}$]
(1) 1×10^{-5} (2) 1×10^{-10}
(3) 4×10^{-4} (4) 4×10^{-9}

7. The equilibrium constant K_c of the reaction
$A_2(g) + B_2(g) \rightleftharpoons 2AB(g)$ is 50. If 1 mole of A_2 and 1 mole of B_2 are mixed, the amount of AB at equilibrium would be
(1) 0.467 mol (2) 0.934 mol
(3) 1.55 mol (4) 1.866 mol

8. In which case change in pH is maximum?
(1) 1 ml of pH = 2 is diluted to 100 ml
(2) 0.01 mol of NaOH is added into 100 ml of 0.01 M NaOH solution
(3) 100 ml of H_2O is added to 900 ml of 10^{-6} M HCl
(4) 100 ml of pH = 2 is mixed with 100 ml of pH = 12

9. K_a of Acetic acid is 1.8×10^{-5}. What is $[H_3O^+]$ in a solution which is 0.01 M acetic acid and 0.005 M calcium acetate?
(1) 1.8×10^{-5} M (2) 3.6×10^{-5} M
(3) 0.9×10^{-5} M (4) 0.005 M

10. The partial pressure of NH_3 in the following equilibrium system will be
$NH_2COONH_4(s) \rightleftharpoons 2NH_3(g) + CO_2(g)$;
($K_p = 3.2 \times 10^{-5}$ atm^3)
(1) 2.0×10^{-2} atm (2) 4.0×10^{-2} atm
(3) 3.2×10^{-2} atm (4) 6.4×10^{-2} atm

11. For the equilibrium reaction $AB_2(g) \rightleftharpoons AB(g) + B(g)$ if the initial pressure of AB_2 is 500 torr and equilibrium pressure is 600 torr. The K_p in term of torr for the reaction will be

(1) 20 (2) 50

(3) 25 (4) 100

12. At temperature T K, PCl_5 is 50% dissociated at an equilibrium pressure of 4 atm. At what pressure it would dissociate to the extent of 80% at the same temperature?

(1) 0.05 atm (2) 0.60 atm

(3) 0.75 atm (4) 2.50 atm

13. For the equilibrium,

$CH_3CH_2CH_2CH_{3(g)} \rightleftharpoons$ $CH_3-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH_{3(g)}$

iso-butane

If the value of K_C is 3.0, the percentage by mass of iso-butane in the equilibrium mixture would be

(1) 75% (2) 90%

(3) 30% (4) 60%

14. The dissociation constant of a weak acid HA and weak base BOH are 2×10^{-5} and 5×10^{-6} respectively. The equilibrium constant for the neutralization reaction of the two is

(1) 1.0×10^{-4} (2) 1.0×10^{-10}

(3) 2.5×10^{-1} (4) 1.0×10^{4}

15. The pH of a solution obtained by mixing 100 ml of 0.2 M CH_3COOH with 100 ml of 0.2 M NaOH will be (pK_a for CH_3COOH = 4.74 and log 2 = 0.301)

(1) 4.74 (2) 8.87

(3) 9.10 (4) 8.57

16. In a reaction : $A(g) + 2B(g) \rightleftharpoons 2C(g)$ 2.0 mole of 'A', 3.0 mole of 'B' and 2.0 mole of 'C' are placed in a 2.0 L closed flask, if equilibrium concentration of 'C' is 0.5 mol L^{-1}, the equilibrium constant for the dissociation of C is

(1) 5.0 (2) 20.0

(3) 7.3 (4) 10.0

17. 1.0 mole of $AB_5(g)$ is placed in a closed container under 1 atm. and at 300 K. It is heated to 600 K when 20% by mass of it dissociates as

$AB_5(g) \rightleftharpoons AB(g) + 2B_2(g)$. The resultant pressure is

(1) 1.2 atm (2) 2.4 atm

(3) 2.8 atm (4) 1.4 atm

18. If K_1 and K_2 are respective equilibrium constant for the two reactions

$XeF_6(g) + H_2O(g) \rightleftharpoons XeOF_4(g) + 2HF(g)$

$XeO_4(g) + XeF_6(g) \rightleftharpoons XeOF_4(g) + XeO_3F_2(g)$

the equilibrium constant for the reaction

$XeO_4(g) + 2HF(g) \rightleftharpoons XeO_3F_2(g) + H_2O(g)$ will be

(1) $\frac{K_1}{K_2^2}$ (2) $K_1 \times K_2$

(3) $\frac{K_1}{K_2}$ (4) $\frac{K_2}{K_1}$

19. One mole of N_2 and 3 moles of H_2 are mixed in a litre flask. If 50% N_2 is converted into ammonia by the reaction $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$, then total number of moles of gases at equilibrium is

(1) 1.5 (2) 3.0

(3) 4.5 (4) 6.0

20. The equilibrium constant for the reaction,

$H_{2(g)} + I_{2(g)} \rightleftharpoons 2HI_{(g)}$

is 32 at a given temperature. The equilibrium concentration of I_2 and HI are 0.5×10^{-3} and 8×10^{-3} M respectively. The equilibrium concentration of H_2 is

(1) 1×10^{-3} M (2) 0.5×10^{-3} M

(3) 2×10^{-3} M (4) 4×10^{-3} M

21. The pH of a solution containing 0.1 mol of CH_3COOH, 0.2 mol of CH_3COONa and 0.05 mol of NaOH in 1 L mixture will be (pK_a for CH_3COOH = 4.74)$\log 5 \approx 0.7$

(1) 4.74 (2) 7.0

(3) 5.44 (4) 6.20

22. The dissociation constant of acetic acid is 1.8×10^{-5} and that of NH_4OH is 1.8×10^{-5} at 25°C. The aqueous solution of ammonium acetate is

(1) Acidic (2) Basic

(3) Neutral (4) Slightly acidic

23. If the K_b value in the hydrolysis reaction

$B^+ + H_2O \rightleftharpoons BOH + H^+$

is 1.0×10^{-6}, then the hydrolysis constant of the salt would be

(1) 1×10^{-6} (2) 1×10^{-7}

(3) 1×10^{-8} (4) 1×10^{-9}

24. The concentration of (H^+) and (OH^-) of a 0.1 M aqueous solution of 2% ionised weak acid at 25°C is

(1) 0.2×10^{-3} M and 5×10^{-11} M

(2) 1×10^{-3} M and 3×10^{-11} M

(3) 2×10^{-3} M and 5×10^{-12} M

(4) 3×10^{-2} M and 4×10^{-13} M

1. The oxidation number of S in H_2SO_5 and oxidation number of Cr in CrO_5 is
   (1) +6, +6 (2) +8, +10
   (3) –2, +6 (4) +8, +6

2. What conclusion about the compound Na_4XeO_6 can be drawn from the reaction?
   $XeO_6^{4-}(aq) + 2F^-(aq) + 6H^+(aq) \rightarrow XeO_2(g) + 3H_2O(l) + F_2(g)$
   (1) F_2 is stronger oxidising agent than Na_4XeO_6
   (2) Na_4XeO_6 is stronger oxidising agent than F_2
   (3) Both F_2 and Na_4XeO_6 are equally strong oxidising agents
   (4) Neither F_2 nor Na_4XeO_6 behaves as oxidising agent

3. The correct order of increasing oxidation number of iodine in the compounds is
   (1) HI < I_2 < ICl < HIO_2 < KIO_3
   (2) I_2 < ICl < HI < HIO_2 < KIO_3
   (3) ICl < HIO_2 < HI < KIO_3
   (4) HI < I_2 < ICl < KIO_3 < HIO_2

4. Which of the following are the examples of disproportionation reactions?
   (1) $[Ag(NH_3)_2]^+ + 2H^+ \rightarrow Ag^+ + 2NH_4^+$
   (2) $Cl_2 + 2OH^- \rightarrow Cl^- + ClO^- + H_2O$
   (3) $NaOH + HCl \rightarrow NaCl + H_2O$
   (4) $SnCl_2 + 2HgCl_2 \rightarrow SnCl_4 + Hg_2Cl_2$

5. The standard reduction potentials E^o for the half reactions are as
   $Zn \rightarrow Zn^{2+} + 2e^-$; $E^o = 0.76V$
   $Fe \rightarrow Fe^{2+} + 2e^-$; $E^o = 0.41V$
   The EMF for the cell reaction
   $Fe^{2+} + Zn \rightarrow Zn^{2+} + Fe$ is
   (1) – 0.35 V (2) 0.35 V
   (3) 1.17 V (4) – 1.17 V

6. $K_2Cr_2O_7 + 14HCl \rightarrow 2KCl + 2CrCl_3 + 7H_2O + 3Cl_2$
   In this reaction, equivalent weight of HCl becomes
   (1) 36.5 (2) 71
   (3) 85 (4) Can't be predicted

7. The oxidation number of Cr in K_3CrO_8 is
   (1) +13 (2) +7
   (3) +6 (4) +5

8. Which of the following type of reaction is not always redox reaction?
   (1) Combination reaction
   (2) Displacement reaction
   (3) Decomposition reaction
   (4) All of these

9. A gas X at 1 atm is bubbled through a solution containing a mixture of 1 M Y^- and 1 M Z^- at 25°C. If the reduction potential of Z > Y > X then
   (1) Y will oxidise X and not Z
   (2) Y will oxidise Z and not X
   (3) Y will oxidise both X & Z
   (4) Y will reduce both X and Z

10. The species oxidised and reduced respectively in the reaction $2ClO_3^- + SO_2 + H^+ \rightarrow 2ClO_2 + HSO_4^-$ are
    (1) SO_2 and ClO_3^- (2) ClO_3^- and SO_2
    (3) SO_2 and H^+ (4) ClO_3^- and H^+

11. What is the equivalent weight of I_2 when it is converted into IO_4^-?
    (1) $\frac{\text{Molecular weight}}{2}$ (2) $\frac{\text{Molecular weight}}{7}$
    (3) $\frac{\text{Molecular weight}}{5}$ (4) $\frac{\text{Molecular weight}}{14}$

12. The highest known positive oxidation state of oxygen is
    (1) +6 (2) +4
    (3) +2 (4) +1

13. The oxidation number of two nitrogen atoms in NH_4NO_3 are
    (1) +3 and –3 (2) +5 and –3
    (3) +3 and +3 (4) –3 and –3

14. The equivalent weight of $Na_2S_2O_3$ in the reaction $2Na_2S_2O_3 + I_2 \rightarrow 2NaI + Na_2S_4O_6$ is (M is molecular weight of $Na_2S_2O_3$)
    (1) $\frac{M}{4}$ (2) $\frac{M}{3}$
    (3) $\frac{M}{2}$ (4) M

15. Which of the following reaction is intramolecular redox reaction?
    (1) $Cl_2 + H_2O \rightarrow HCl + HOCl$
    (2) $2Cu^+ \rightarrow Cu + Cu^{+2}$
    (3) $Cu + 2H_2SO_4 \rightarrow CuSO_4 + SO_2 + 2H_2O$
    (4) $2KClO_3 \rightarrow 2KCl + 3O_2$

[Chapter-9 : Hydrogen]

1. Which of the following is not true?
   (1) Hardness of water depends on its behaviour towards soap
   (2) The temporary hardness of water is due to the presence of Ca and Mg bicarbonates
   (3) Permanent hardness is due to the presence of soluble Ca and Mg sulphates and chlorides
   (4) Permanent hardness can be removed by boiling the water
2. One ml of H_2O_2 solution gives 10 ml of O_2 at STP on complete decomposition. It is
   (1) 1 vol. H_2O_2 (2) 10 vol. H_2O_2
   (3) 30 vol. H_2O_2 (4) 20 vol. H_2O_2
3. $H_2O_2 \rightarrow 2H^+ + O_2 + 2e^-$; $E^o = -0.68$ V
   The above equation represents which of the following behaviour of H_2O_2?
   (1) Reducing (2) Oxidising
   (3) Acidic (4) Catalytic
4. In which of the following reaction H_2O_2 neither acts as oxidising agent nor reducing agent?
   (1) $Na_2CO_3 + H_2O_2 \rightarrow$
   (2) $PbS + H_2O_2 \rightarrow$
   (3) $Cr_2O_7^{2-} + H^+ + H_2O_2 \rightarrow$
   (4) $KI + H_2O_2 \rightarrow$
5. Isotope of hydrogen having highest melting point is
   (1) Protium
   (2) Deuterium
   (3) Tritium
   (4) All have same melting point
6. $2NaZ + Ca^{2+} \longrightarrow CaZ_2 + 2Na^+$
   Above reaction is involved in removal of hardness by
   (1) Calgon's method
   (2) Ion exchange method
   (3) Synthetic resin method
   (4) Clark method
7. Last traces of water from H_2O_2, to get pure H_2O_2 is removed by
   (1) Distillation under reduced pressure
   (2) Dehydration in vacuum desiccator
   (3) Freezing
   (4) All of these are possible

[Chapter-10 : s-Block Elements]

1. Which of the following is not a characteristic of electron rich hydrides?
   (1) Elements of group 15 -17 form such hydrides
   (2) Some electrons are present as lone pairs on highly electronegative atom
   (3) The type of hydrides may have unusual high boiling points
   (4) They have expanded octet
2. The incorrect order
   (1) $Li^+ > Na^+ > K^+ > Rb^+$ (hydration)
   (2) Li < Na < K < Rb (ionisation energy)
   (3) Li < K < Na < Rb (density)
   (4) Li < Na < K < Rb (atomic radius)
3. The blue colour of solution of sodium metal in liquid ammonia is due to
   (1) Ammoniated cation (2) Ammoniated electron
   (3) Ammoniated sodium (4) All of these
4. Which of the following alkaline earth metal does not give flame colouration?
   (1) Li (2) Mg
   (3) Ca (4) Ba
5. Incorrect order is
   (1) Be < Mg < Ca < Sr < Ba (electropositive character)
   (2) $Mg^{2+} < Ca^{2+} < Ba^{2+}$ (hydration)
   (3) $Be(OH)_2 < Mg(OH)_2 < Ca(OH)_2$ (basic strength)
   (4) Be > Mg > Ca > Sr (ionisation energy)
6. Ingredients of portland cement are
   (1) Dicalcium silicate, tricalcium silicate, tricalcium aluminate
   (2) Dialuminium silicate, trialuminium silicate, dicalcium silicate
   (3) Dicalcium silicate, tricalcium aluminate, zinc sulphate
   (4) Gypsum, limestone, iron oxide
7. Incorrect statement is
   (1) The electropositive character of alkali metals decreases with increase in atomic number
   (2) Lithium is a hard metal and cannot be cut with a knife
   (3) Alkali metals are strong reducing agents
   (4) Flame colouration is shown by all alkali metals
8. If NaOH is added to an aqueous solution of $ZnSO_4$ white ppt. appears and on adding excess NaOH, the precipitate dissolves due to formation of complex. In solution zinc is in the
   (1) Cationic part of complex
   (2) Anionic part of complex
   (3) Both in cationic and anionic part of complex
   (4) Solution as free Zn^{2+}

9. Considering greater polarisation of Cl^- in LiCl compared to that in NaCl, which of the following statement is wrong?
   (1) LiCl has lower melting point than NaCl
   (2) LiCl dissolves more in organic solvent than NaCl
   (3) LiCl is more covalent than NaCl
   (4) Aqueous LiCl would be less conducting than aqueous NaCl

10. Which compound will show the highest lattice energy?
   (1) RbF (2) CsF
   (3) NaF (4) KF

11. Pick up the wrong statement
   (1) Be like Al dissolve in alkalies
   (2) Oxides of Be and Al are amphoteric
   (3) Beryllium chloride is covalent like aluminium chloride
   (4) Be is more abundant in nature than

12. In oxygen masks for emergency breathing, source of oxygen used is
   (1) Li_2O (2) Na_2O_2
   (3) KO_2 (4) Sr_2O

13. Which of the following is not possible?
   (1) $LiCl \cdot 8H_2O$ (2) $MgCl_2 \cdot 6H_2O$
   (3) $[BeF_4]^{2-}$ (4) $[Al(OH)_4]^-$

14. Correct sequence of density of alkali metal is
   (1) Li < Na < K < Cs (2) Cs < Li > K > Na
   (3) Li < K < Na < Cs (4) Li > Na > K > Cs

15. At absolute zero
   (1) Only para hydrogen exists
   (2) Only ortho hydrogen exists
   (3) Both are present in equal amount
   (4) Ortho present in more amount

16. Bleaching powder on long standing converted into
   (1) $CaCl_2$ and CaO (2) $Ca(ClO_3)_2$ and $CaCl_2$
   (3) $CaCO_3$ and $CaCl_2$ (4) $CaCl_2$ and $CaSO_4$

[Chapter-11 : Some p-Block Elements]

1. The correct order is
   (1) B < Al < Ga (atomic radii)
   (2) B > Al < Ga (ionisation energy)
   (3) B > Al > Ga (metallic character)
   (4) B > Al > Ga (density)

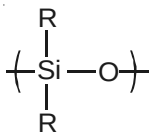
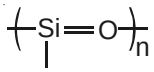
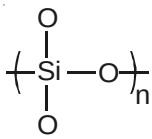
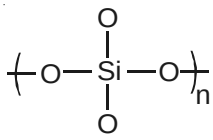
2. Standard electrode potential of Al^{3+}/Al is –1.66 V and that of Tl^{3+}/Tl is 1.26 V correct statement on the basis of above data is
   (1) Tl^{3+} is unstable in solution
   (2) Aluminium metal has high tendency to form Al^{3+} ions
   (3) Tl^{3+} is a powerful oxidising agent
   (4) All of these

3. Diborane cannot be prepared by
   (1) $BF_3 + LiAlH_4 \longrightarrow$
   (2) $NaBH_4 + I_2 \longrightarrow$
   (3) $BF_3 + NaH \xrightarrow{450}$
   (4) By heating boron in N_2 followed by hydrolysis

4. How many banana bonds are present in diborane?
   (1) One (2) Two
   (3) Three (4) Four

5. Which element of group 14 cannot decompose steam?
   (1) Sn (2) Si
   (3) C (4) Pb

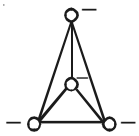
6. Incorrect statement about fullerenes is
   (1) Fullerenes are made by strong heating of graphite in an electric arc
   (2) Fullerens are the most stable allotrope of carbon
   (3) C_{60} contains 20 six membered ring
   (4) All the carbon atoms are sp^2 hybridised in fullerenes

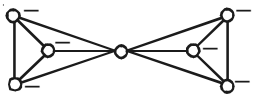
7. The repeating units of silicones are
   (1) 
   (2) 
   (3) 
   (4) 

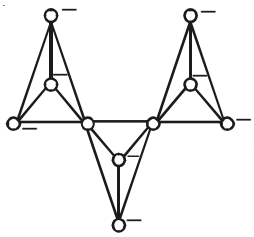
8. On strong heating boric acid yields
   (1) B (2) B_2H_6
   (3) B_2O_3 (4) BO_2

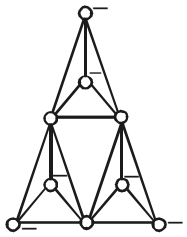
9. The correct acidic nature order is
   (1) $BF_3 > BCl_3 > BBr_3 > BI_3$
   (2) $BCl_3 > BF_3 > BBr_3 > BI_3$
   (3) $BI_3 > BBr_3 > BCl_3 > BF_3$
   (4) $BBr_3 > BI_3 > BCl_3 > BF_3$

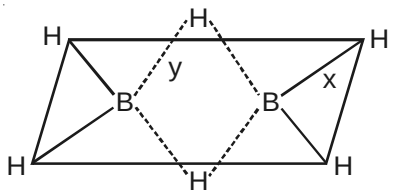
10. Which of the following structure is anion of ortho silicate?

(1) 

(2) 

(3) 

(4) 

11. 

Bond length B – H correctly represented as

(1) x = y (2) x > y

(3) x < y (4) x >> y

12. When Borax is heated in a Bunsen burner flame with CoO on a loop of wire, a _____ coloured $Co(BO_2)_2$ bead is formed

(1) Blue (2) Green

(3) Violet (4) Brown

13. Boric acid is a _____, _____ acid

(1) Strong, monobasic (2) Strong, tribasic

(3) Weak, monobasic (4) Weak, tribasic

14. Producer gas is

(1) $CO + CO_2$ (2) $CO + N_2$

(3) $CO_2 + H_2$ (4) $CO + H_2$

15. Silica can be attacked by

(1) HCl (2) HF

(3) F_2 (4) H_2

16. Number of B – H and B – N – B bonds in borazine respectively is

(1) 4, 4 (2) 3, 3

(3) 6, 2 (4) 6, 3

17. Corundum is

(1) SiC

(2) $Al_2O_3 \cdot 2H_2O$

(3) Al_2O_3

(4) Clay

18. Trisilyl amine is

(1) Pyramidal in shape

(2) Tetrahedral in shape

(3) Trigonal planar in shape

(4) Trigonal bipyramidal in shape

BOTANY

[Chapter - 4 : Morphology of Flowering Plants]

1. Match the following

	Column I	Column II
a.	Marginal placentation	(i) Cucurbitaceae
b.	Axile placentation	(ii) Leguminosae
c.	Basal placentation	(iii) Liliaceae
d.	Parietal placentation	(iv) Poaceae

(1) a(iv), b(iii), c(ii), d(i)

(2) a(i), b(ii), c(iii), d(iv)

(3) a(iii), b(ii), c(i), d(iv)

(4) a(ii), b(iii), c(iv), d(i)

2. What type of tree habit is seen in *Dalbergia*?

(1) Caudex (2) Excurrent

(3) Columnar (4) Deliquescent

3. Disc-stem is the characteristic feature of

(1) Culms (2) Reduced stems

(3) Twiners (4) Lianas

4. Rachis bears a number of lateral leaflets. It is

(1) Simple leaf

(2) Palmately compound leaf

(3) Multifoliate compound leaf

(4) Pinnately compound leaf

5. Which of the following special type of inflorescence is/are derived from cymose inflorescence?

(1) Hypanthodium

(2) Capitate

(3) Cyathium

(4) More than one option is correct

6. In spikelet, flowers are present in axil of

(1) Spathe (2) Involucre

(3) Petaloid bract (4) Lemma

7. In china rose, cotton and lady's finger mode of arrangement of petals is

(1) Valvate (2) Twisted

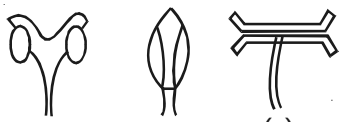
(3) Imbricate (4) Vexillary

8. Versatile type of attachment of anther to the filament is basically
(1) Adnate type
(2) Dorsifixed type
(3) Basifixed type
(4) More than one are correct

9. In syconus type of fruit, small fruitlet (may or may not be formed by female flower) is
(1) Drupe (2) Berry
(3) Achene (4) Regma

10. Aggregate fruits develop from
(1) Polycarpellary syncarpous ovary
(2) Polycarpellary apocarpous ovary
(3) Monocarpellary flower
(4) Complete inflorescence

11. Which of the following condition/s of attachment between anther lobes and filament is/are most advanced ?



(1) a (2) a and b
(3) b (4) c

12. According to the histogen theory extrasteler and steler part is mainly formed respectively by the
(1) Periblem & plerome (2) Plerome & periblem
(3) Both from periblem (4) Both from plerome

13. Short horizontal branch producing a cluster of leaves above, the cluster of roots below is
(1) Runner (2) Sucker
(3) Offset (4) Stolon

14. Male flower is represented by a single stamen in
(1) Cyathium inflorescence
(2) Verticillaster inflorescence
(3) Hypanthodium inflorescence
(4) Corymb inflorescence

15. The floral formula of solanaceae is
(1) $\oplus\ ♀\ K_{(5)}\overset{\frown}{C_{(5)}A_5}\ \underline{G_{(2)}}$
(2) $\%\ ♀\ P_{2\text{ or }3(\text{lodicules})}\ A_{3\text{ or }6\text{ or }\infty}\ \underline{G_1}$
(3) $\%\ ♀\ K_{(5)}\ C_{1+2+(2)}\ A_{1+(9)}\ \underline{G_1}$
(4) $\oplus\ ♀\ \overset{\frown}{P_{3+3}\ A_{3+3}}\ \underline{G_{(3)}}$

16. Syngenesious condition of the stamen refers to
(1) Stamens are free
(2) Anthers are united but filaments are free
(3) Anthers as well as filaments of stamens are united throughout their whole length
(4) When filaments are united in two bundles but anthers are free

17. Which structure is not present in maize seed?
(1) Shield shaped cotyledon
(2) Aleurone layer
(3) Epiblast
(4) Ex-albuminous condition

18. In _____ and _____, the lateral branches originate from the basal and underground portion of the main stem, grow horizontally beneath the soil and then come out obliquely upward giving rise to leafy shoots
(1) Mint, *Chrysanthemum*
(2) *Pistia, Eichhornia*
(3) Mint, Jasmine
(4) Grass, Strawberry

19. Select **incorrect** match
(1) Anthophore - *Silene*
(2) Androphore - *Passiflora*
(3) Gynophore - *Capparis*
(4) Carpophore - Cucurbits

20. Each successive pair of leaves stands at right angles to the next one in
(1) Alternate phyllotaxy (2) Whorled phyllotaxy
(3) Opposite phyllotaxy (4) Spiral phyllotaxy

21. Glumes (modified bracts) are special feature of flowers in family
(1) Cruciferae (2) Malvaceae
(3) Liliaceae (4) Poaceae

22. Racemose inflorescence is an indeterminate inflorescence which shows indefinite growth and bears a number of flowers due to the presence of
(1) Terminal flower
(2) Inactive apical bud
(3) Active growing point
(4) More than one option is correct

23. $\overset{\frown}{C_{(5)}\ A_{(5)}}$ condition is concerned with the members of
(1) Solanaceae (2) Liliaceae
(3) Compositae (4) Brassicaceae

24. Which of the following plants show the fusion of filaments in androecium?
(1) Sunflower (2) *Cucurbita*
(3) Mustard (4) Potato

25. Which one of the floral formula is represented by *Smilax* family?
(1) $\text{Br}\ \%\ ♀\ P_{3+3}\ A_{3+3}\ \underline{G_3}$
(2) $\oplus\ ♀\ K_{(5)}\ C_{(5)}\ A_5\ \underline{G_{(2)}}$
(3) $\text{Br}\ \%\ ♀\ P_3\ \text{lodicules}\ A_6\ \underline{G_1}$
(4) $\text{Br}\oplus\ ♀\ \overset{\frown}{P_{3+3}\ A_{3+3}}\ \underline{G_{(3)}}$

26. Corm is a short, thick, swollen, spherical or subspherical underground and
(1) Horizontal structure
(2) Vertical structure
(3) Green structure
(4) Perennial structure present in Onion

27. Cladode is different from phylloclade in absence of
(1) Spines and branches of unlimited growth
(2) Internode
(3) Chlorophyll
(4) Limited growth

28. Apple and pear fruits are
(1) Eucarpic type
(2) With edible part as fleshy mesocarp
(3) Parthenocarpic type
(4) Pseudocarpic type

29. Mark the **incorrect** statement (w.r.t stem)
(1) Underground modifications act as organ of perennation to tide over conditions unfavourable for growth
(2) Axillary buds develop into thorns, not stem tendrils
(3) Modified aerial stem in *Opuntia* contains chlorophyll
(4) It conducts water, minerals and photosynthates

30. Phyllode of Australian *Acacia* and Phylloclade of *Opuntia*
(1) Are non-green structures
(2) Are sickle shaped structures
(3) Contain spines
(4) Are modification of stems

31. In racemose branching
(1) Terminal bud as well as lateral branches have limited growth
(2) Branches develop from the axillary buds in acropetal succession
(3) Terminal bud remains inactive
(4) Main axis shows limited growth

32. If posterior petal is overlapping the margins of lateral petals. The lateral petals are in turn overlapping the two anterior petals. This aestivation is called as
(1) Vexillary (2) Contorted
(3) Ascending imbricate (4) Valvate

33. Tulip, *Gloriosa, Aloe,* and *Asparagus* are concerned with
(1) $\underline{G}\,1$ (2) $\underline{G}\,(3)$
(3) $\overline{G}\,(2)$ (4) $\underline{G}\,(2)$

34. Which of the following type of corolla and androecium are present in the plant having replum or false septa in ovary?
(1) $C_{1+2+(2)}$ (2) $C_{x4}\,A_{2+4}$
(3) $C_{(5)}\,A_0$ (4) $\overset{\frown}{C_{(5)}\;A_5}$

35. Most common and advanced type placentation are found in the family _____ and _____ respectively
(1) Asteraceae, Solanaceae
(2) Solanaceae, Liliaceae
(3) Liliaceae, Asteraceae
(4) Poaceae, Malvaceae

36. Which of the following inflorescence is a spike with fleshy axis and having both male and female flowers?
(1) Catkin (2) Spadix
(3) Umbel (4) Corymb

37. Basipetal type of flower development & centrifugal opening of flowers are concerned with _____
(1) Raceme (2) Head
(3) Cymose (4) Spike

38. Pappus is the modification of _____ which helps in _____
(1) Bract, autochory (2) Calyx, zoochory
(3) Calyx, anemochory (4) Pericarp, hydrochory

39. In polygamous condition
(1) Male, female and bisexual flowers are present on different plants
(2) Intersexual and male flowers are present on same plant
(3) Intersexual and female flowers are present on same plant
(4) Male, female and bisexual flowers are present on the same plant

40. Read the following statements carefully
(a) One internode long horizontal nonarched stem branch
(b) The branch creeps below the soil surface and grows obliquely upward and produce new shoot
(c) It first grows obliquely upward and then bends down to touch the ground surface
Which of the above statement is concerned with stolon?
(1) a, b and c (2) b and c
(3) Only c (4) a and b

41. How many chromosomes are present in the epithelium layer of barley seed if aleurone layer having 12 chromosomes?
(1) 12 (2) 8
(3) 24 (4) 18

42. Mark the **incorrect** statement
(1) Caruncle is helpful in seed germination
(2) Most of the dicot seeds are non-endospermic
(3) Always 1 cotyledon is present in seed of spermatophytes
(4) Ex-albuminous seeds are present in sem and cucumber

43. Palmately compound leaves can be differentiated from pinnately compound leaves due to
(1) Presence of petiole
(2) Absence of rachis
(3) Presence of leaflets
(4) Absence of buds in the axil of leaflets

44. A_{2+2} and A_{2+4} condition respectively represent
(1) Monoadelphous and didynamous androecium
(2) Polyadelphous and diadelphous androecium
(3) Didynamous and tetradynamous androecium
(4) Tetradynamous and diadelphous androecium

45. Gynobasic type of style is present in _____
(1) *Ocimum* (2) China rose
(3) Mango (4) *Petunia*

46. Match the following

Common Name	**Botanical Name**
(a) Ashwagandha	(i) *Abrus pecatorius*
(b) Jowar	(ii) *Solanum melongina*
(c) Ratti	(iii) *Withania somnifera*
(d) Brinjal	(iv) *Sorghum vulgare*

(1) a(ii), b(i), c(iii), d(iv) (2) a(iii), b(iv), c(i), d(ii)
(3) a(iv), b(ii), c(iii), d(i) (4) a(i), b(iii), c(ii), d(iv)

47. Mark the **correct** one w.r.t. bulbils
(1) Fleshy bud not performing vegetative reproduction
(2) Non-fleshy buds performing vegetative reproduction
(3) Fall from the plant and germinate into new plant
(4) Absent in *Agave*

48. Rhizome is an underground, generally fleshy stem which forms aerial shoots every year during favourable season. It
(1) Lacks axillary buds
(2) Is not horizontal in *Saccharum*
(3) Bears dry cataphylls
(4) Lacks node and internode

49. Proteinaceous layer around endospermic seed is
(1) Seen in dicots (2) Aleurone layer
(3) Epithelial layer (4) Piliferous layer

50. Epiphytes are able to stick to the branches of their supporting plant by
(1) Hygroscopic roots
(2) Spongy velamen tissue
(3) Clinging roots
(4) Absorbing roots

51. Basal placentation develops in
(1) Multilocular ovary
(2) Unilocular ovary with single ovule
(3) Trilocular superior ovary only
(4) Unilocular ovary having ovule on central axis

52. Which of the following are monocarpic plants?
(1) *Capparis*, *Rosa* (2) *Agave*, Bamboo
(3) Bamboo, *Pinus* (4) *Pinus*, *Casuarina*

53. In some plants, growing in swampy areas, many roots come out of the ground and grow vertically upwards. These roots help to get oxygen for respiration. These plants are
(1) *Rhizophora,* Orchids
(2) Orchids, *Jussiaea*
(3) *Bombax*, *Salvinia*
(4) *Rhizophora*, *Sonneratia*

54. In which of the following plants, the modified stem carry out the process of photosynthesis?
(1) *Opuntia, Agave* (2) *Euphorbia*, Lily
(3) *Michelia*, *Crocus* (4) *Opuntia*, *Euphorbia*

55. Venation in leaves of Bamboo and grass is
(1) Unicostate parallel venation
(2) Multicostate, Convergent type of parallel venation
(3) Palmate, divergent type parallel venation
(4) Multicostate, divergent type parallel venation

56. A whorl of more than two leaves at each node is found in
(1) *Nerium*, *Psidium* (2) *Alstonia*, *Calotropis*
(3) *Ocimum*, *Alstonia* (4) *Alstonia*, *Nerium*

57. Select the **correct** statement/s (w.r.t. racemose type of inflorescence)
(i) Main axis terminates into flower
(ii) The development of flowers is acropetal
(iii) The opening of flowers is centripetal
(1) Both (i) and (iii) (2) Both (ii) and (iii)
(3) Both (i) and (ii) (4) All are correct

58. Match the following

Column I (Cohesion of Stamens)	**Column II (Example)**
a. Monadelphous	(i) Lemon
b. Diadelphous	(ii) Sunflower
c. Polyadelphous	(iii) Bean
d. Syngenesious	(iv) Cotton

(1) a(i), b(ii), c(iii), d(iv) (2) a(iv), b(iii), c(ii), d(i)
(3) a(iii), b(iv), c(i), d(ii) (4) a(iv), b(iii), c(i), d(ii)

59. Syngenesious and synandrous condition of stamens (cohesion) are characteristically found in families ____ respectively
(1) Malvaceae and Cucurbitaceae
(2) Compositae and Malvaceae
(3) Cucurbitaceae and Compositae
(4) Compositae and Cucurbitaceae

60. In succulent/fleshy fruits
(1) Undifferentiated pericarp in attached with seed coat
(2) Edible part is never pericarp
(3) Pericarp become fleshy
(4) Pericarp is dry and membranous

61. Edible part of jack fruit is
(1) Fleshy axis, bracts, perianth and seeds
(2) Fleshy receptacle or thalamus
(3) Fleshy axis, cotyledons and pericarp
(4) Succulent perianth and fleshy axis

62. The white spongy structure in castor seed formed by proliferation of outer integument is called
(1) Endosperm (2) Caruncle
(3) Tigellum (4) Hilum

63. Which is not a character associated with stilt root?
(1) Develop from basal node of main stem in grasses
(2) Provide support to the plant like pillars
(3) Develop obliquely at an angle to the stem in *Pandanus*
(4) Have multiple root cap in screwpine

64. Match the following

	Column - I	**Column - II**
a.	Phylloclade	(i) Photosynthetic modified branch
b.	Corm	(ii) One internode long runner
c.	Cladode	(iii) Indefinite photosynthetic stem
d.	Offset	(iv) Vertical underground stem

(1) a(iv), b(ii), c(iii), d(i)
(2) a(iii), b(iv), c(i), d(ii)
(3) a(ii), b(i), c(iii), d(iv)
(4) a(iii), b(ii), c(i), d(iv)

65. All given statements are correct regarding modified subaerial stems, **except**
(1) Suckers never comes out of soil after growing obliquely upward
(2) Offset bears a tuft of leaves above and a tuft of roots below
(3) Stolons are arch forming long lateral branches
(4) Runners have long internodes and roots at nodes

66. Maximum growth and water absorption occur in which regions of the root?
(1) Meristematic, elongation zone
(2) Elongation, root hair zone
(3) Maturation, meristematic zone
(4) Elongation, apical zone

67. Basipetal type of flower development & centrifugal opening of flowers are concerned with _____
(1) Raceme (2) Head
(3) Cymose (4) Spike

68. When ovules are borne on central axis and septa is absent, the type of placentation is
(1) Free central (2) Basal placentation
(3) Axile (4) Parietal

69. Which of the following feature is not associated with root?
(1) Presence of adventitious buds
(2) Balancing organs like root pockets in hydrophytes
(3) Root hair, developing from small sized cells are known as trichoblast
(4) Irrepairable root cap

70. Complete fusion of fruit wall and spermoderm is associated with
a. Graminaceous fruit
b. Fruit of a dicotyledonous family
c. Fertilised unilocular, monocarpellary ovary
d. Fruit having bristly appendages for dispersal
Which of the above statements are **correct**?
(1) a & b (2) b & c
(3) a & c (4) c & d

71. The unbranched stem of bamboo plant
(1) Gives a jointed appearance
(2) Has solid internodes
(3) Has hollow nodes
(4) Is called as scape

72. 'Scape' is an aerial leafless shoot which bear flowers in
(1) Onion (2) *Trapa*
(3) Jack-fruit (4) *Pothos*

73. Bud is condensed immature or embryonic shoot having a growing point surrounded by immature leaves. Which of the following is adventitious bud?
(1) Axillary bud in Begonia
(2) Extra axillary bud in *Ipomoea batata*
(3) Foliar bud in *Bryophyllum*
(4) Extra axillary bud in jack fruit

74. Which of the following is not a modified underground stem for food storage?
(1) Bulbils in *Agave*
(2) Rhizome in ginger
(3) Tuber in *Helianthus tuberosus*
(4) Corm in *Amorphophallus*

75. Phylloclade is
(1) Modification of axillary bud
(2) Green flattened modified stem
(3) One internode long stem
(4) Modified petiole

1. When a cell of parenchyma enters in cell division cycle, the process is termed as
   (1) Maturation (2) Differentiation
   (3) Dedifferentiation (4) Redifferentiation
2. Meristem responsible for increase in the length of stems of grasses is
   (1) Intercalary meristem
   (2) Wound cambium
   (3) Primordial meristem
   (4) Intrafascicular cambium
3. Which of the following is **correct** w.r.t. dicot leaf
   (1) Mesophyll cells are not differentiated
   (2) Mostly the stomata are on lower surface
   (3) Protoxylem is toward lower epidermis
   (4) Vascular bundles are open
4. Which of the following is not related with dicot stem?
   (1) Endodermis is single layered
   (2) Medullary rays are absent
   (3) Presence of hard bast
   (4) Pith is made up of parenchymatous cells situated in the centre of stem
5. Which one of the following is not an example of lateral meristem?
   (1) Wound cambium
   (2) Calyptrogen
   (3) Phellogen
   (4) Interfascicular cambium
6. Cambium (vascular)
   (1) Is absent in dicot leaf
   (2) Is present in monocot stem
   (3) Never develops in dicot stem
   (4) Is present in all leaves
7. Extrastelar secondary growth in dicot stem is due to
   (1) Activity of a primary meristem
   (2) Activity of an intercalary meristem
   (3) Activity of a secondary meristem
   (4) Activity of a meristem arising from pericycle
8. Bark
   (1) Is part of cork
   (2) Is absent in *Betula*
   (3) Is composed of only dead cells
   (4) Includes phloem and cork
9. P-protein found in central part of lumen of sieve tube is associated with
   (1) Translocation of sugar
   (2) Callose formation
   (3) Formation of companion cell
   (4) Tylose formation
10. Wood in angiosperms differs from that of gymnosperms in being
    (1) Homoxylous
    (2) Non-porous
    (3) Heteroxylous
    (4) Homoxylous and polyxylic
11. Pith is absent in
    (1) Monocot root (2) Dicot stem
    (3) Monocot stem (4) All eusteles
12. Which is **not true** for heart wood?
    (1) They have tyloses
    (2) They are rich in extractives
    (3) They are of commercial value
    (4) They are not resistant to water and pests
13. Conjoint, collateral, endarch and closed bundles are characteristic of
    (1) Monocot root (2) Dicot stem
    (3) Dicot root (4) Monocot stem
14. Which of these is an example of non porous wood?
    (1) *Salix* (2) *Populus*
    (3) *Pinus* (4) *Dalbergia*
15. Collenchyma is mainly found in the
    (1) Hypodermis of dicot stem
    (2) Hypodermis of dicot root
    (3) Hypodermis of monocot stem
    (4) More than one option is correct
16. Stinging hairs having poisonous irritating secretions are found on complete surface of _____ to protect itself against herbivory
    (1) *Citrus* (2) *Plumbago*
    (3) *Nepenthes* (4) *Urtica*
17. Quiescent centre or waiting meristem can divide
    (1) Throughout the life span of plant
    (2) Only during flowering shoot formation
    (3) When shoot apex get utilized completely
    (4) When root apical meristem is somehow injured
18. Callose plug is formed in the
    (1) Companion cells of tropical plants
    (2) Vessels of temperate plants
    (3) Sieve tube of tropical plants only
    (4) Sieve tube of temperate plants

19. Vessels differ from tracheids in
(1) Function
(2) Presence of lumen
(3) Distribution in plants and number of cells
(4) Having lignified wall

20. Medullary rays are
(1) Non vascular areas in monocot stem for lateral conduction
(2) Vascular areas in dicot stem for lateral conduction
(3) Non vascular areas for lateral conduction
(4) Non vascular areas in dicot stem for vertical conduction

21. Bicollateral vascular bundles are found in
(1) Cucurbitaceae and Solanaceae
(2) Poaceae and Solanaceae
(3) Cucurbitaceae and Liliaceae
(4) Convolvulaceae and Brassicaceae

22. Metaxylem is directed towards the centre in
(1) Root (2) Stem
(3) Leaf (4) Petiole

23. Find odd one w.r.t. vessels
(1) Tetracentraceae (2) Anacardiaceae
(3) Winteraceae (4) Trochodendraceae

24. Plants having articulated laticifers are
(1) *Euphorbia* and *Ficus*
(2) *Calotropis* and *Nerium*
(3) *Nerium* and *Vinca*
(4) *Hevea* and *Manihot*

25. In monocot stem, schizolysigenous water cavity is present in
(1) Epidermis
(2) Ground tissue
(3) Vascular bundles, above metaxylem
(4) Vascular bundles, below protoxylem

26. The stomatal apparatus consists of
(1) Stomatal aperture + epidermal cells
(2) Stomatal aperture + guard cells
(3) Stomatal aperture + guard cells + subsidiary cells
(4) Stomatal aperture + epithem + complementary cells

27. The position of oldest heart wood in mature dicot stem is
(1) Just below the vascular cambium
(2) Just above the vascular cambium
(3) Just outside the pith
(4) Away from vascular cambium and lies in middle

28. Vessels of same size are uniformly distributed throughout the growth in
(1) *Quercus* (2) *Morus*
(3) *Betula* (4) Oak tree

29. Proplastids are present instead of plastids in which plant tissue?
(1) Parenchyma
(2) Collenchyma
(3) Meristem
(4) Chlorenchyma

30. Plant tissue with maximum refractive index shows
(1) Pectocellulosic cell wall
(2) Lignified cell wall
(3) Conspicuous intercellular space
(4) Ability to divide and grow

31. Secondary meristems are found in
(1) All group of plants
(2) All phanerogams
(3) All angiosperms
(4) Gymnosperms and dicots

32. Find **correct** match between Column-I & Column-II

Column-I	**Column-II**
a. Interfascicular cambium	(i) Secondary cortex
b. Phellogen	(ii) Grit cells
c. Brachysclereids	(iii) p-protein
d. Leptome	(iv) Medullary ray cells

(1) a(iii), b(i), c(ii), d(iv) (2) a(iv), b(i), c(ii), d(iii)
(3) a(i), b(iv), c(iii), d(ii) (4) a(iv), b(ii), c(i), d(iii)

33. The metabolic functions of mature sieve tube are controlled by
(1) Its own nucleus
(2) The nucleus of companion cells
(3) The nucleus of albuminous cells
(4) The nucleus of phloem parenchyma

34. Trichomes are epidermal hairs of
(1) Root
(2) Stem
(3) Leaf
(4) More than one option is correct

35. In dicot stem, stele consists of
(1) Hypodermis + cortex + endodermis
(2) Endodermis + pericycle + pith
(3) Pericycle + pith + pith rays
(4) Pericycle + vascular bundles + pith

36. Intraxylary phloem originates from
(1) Procambium
(2) Interfascicular cambium
(3) Cork cambium
(4) Phelloderm

37. Palisade parenchyma in dorsiventral leaf is
(1) Placed abaxially
(2) Oval cells with fewer chloroplast
(3) Made up of oval or round cells with intercellular spaces
(4) Made up of closely arranged column shaped cells

38. Type of vascular bundle in *Yucca* is
(1) Bicollateral (2) Collateral open
(3) Amphicribal (4) Amphivasal

39. Duramen is
(1) Functional wood
(2) Light coloured
(3) Less durable
(4) Tracheary elements with deposition of tannins and resins

40. Which one of the following pair of tissues is formed as a result of redifferentiation?
(1) Interfascicular cambium and duramen
(2) Phellogen and phellem
(3) Annual rings and phelloderm
(4) Vascular cambium and cork cambium

41. Caruncle is present in the seeds of
(1) *Cocos nucifera* (2) *Piper nigrum*
(3) *Triticum aestivum* (4) *Ricinus communis*

42. Select **odd** one out w.r.t. axile placentation
(1) Develops in bi-multicarpellary, syncarpous ovary
(2) Ovules are present on central axis
(3) May be unilocular or multilocular
(4) Number of locules correspond to the number of carpels

43. Match the following w.r.t. types of fruit

	Column I		**Column II**
a.	Coconut	(i)	Mulberry
b.	Pomegranate	(ii)	Balausta
c.	Fennel	(iii)	Drupe
d.	Sorosis	(iv)	Cremocarp

(1) a(iii), b(ii), c(iv), d(i) (2) a(ii), b(iii), c(iv), d(i)
(3) a(iii), b(ii), c(i), d(iv) (4) a(iv), b(ii), c(i), d(iii)

44. Cork cambium formed in dicot stem during secondary growth is secondary meristem, because
(1) It is formed in stelar region
(2) Adds secondary tissues on its both sides
(3) It develops from primary permanent tissue
(4) It can redifferentiate to form secondary permanent tissue

45. Collenchyma is characterised by all, except
(1) Have high refractive index
(2) Are the only living mechanical tissue
(3) Possess high amount of pectin
(4) Not found in monocot root and dicot stem

46. Vessels are characteristically present in members of
(1) Gnetaceae (2) Tetracentraceae
(3) Winteraceae (4) Trochodendraceae

47. Vascular bundles in dicot leaf
(1) Are closed
(2) Have xylem towards adaxial side of leaf
(3) Are conjoint and collateral but not surrounded by bundle sheath
(4) More than one options are correct

48. Pericycle cells just opposite to the protoxylem are involved in formation of
(1) Lateral roots
(2) Whole of cork cambium in monocot stem
(3) Whole of cambium in dicot root
(4) Cambium ring in dicot stem

49. Monocot stem differs from dicot stem in
(1) Presence of intrafascicular cambium
(2) Absence of V or Y shaped xylem
(3) Presence of schizolysigenous water cavity
(4) Having eustele

50. Mark the **correct** one (w.r.t. meristematic tissue)
(1) Cells are isodiametric with intercellular spaces
(2) Have well differentiated plastids
(3) Are metabolically inactive and have low nucleocytoplasmic ratio
(4) Do not have ergastic substances and thick wall

51. Monocot root has all the structures internally, **except**
(1) Well developed medulla
(2) Sclerenchymatous pericycle
(3) Polyarch condition in vascular region
(4) Uncutinised piliferous layer with root hairs

52. Which of these may not be included in epidermal tissue system?
(1) Bulliform cells in grasses
(2) Cystolith containing cells
(3) Stomatal apparatus
(4) Casparain strips

53. A group of newly formed cells which becomes structurally and functionally specialized and loose the ability to divide are called
(1) Permanent tissue
(2) Meristematic tissue
(3) Redifferentiated cells
(4) Both (1) & (3) are correct

54. Which one of the following statements about parenchyma is **incorrect**?
(1) It forms the major part of the primary plant body
(2) The cells are generally anisodiametric
(3) May be closely packed or have intercellular spaces
(4) It performs various functions like photosynthesis, storage, secretion

55. If secondary xylem of a dicot tree in 2001 had 54 growth rings at the base of its stem then according to dendrochronology what will be the age of this tree by the year 2015?
(1) 64 years (2) 68 years
(3) 60 years (4) 62 years

56. Meristem which forms the primary vascular tissue is
(1) Dermatogen (2) Procambium
(3) Vascular cambium (4) Ground meristem

57. Presence of conjunctive tissue, tetrarch condition of vascular bundles and presence of casparian strips are observable features in the section of
(1) Dicot stem (2) Monocot stem
(3) Dicot root (4) Monocot root

58. Which one of the following is **not correct** w.r.t. the spring wood?
(1) It is lighter in colour and has higher density
(2) It is having larger number of xylary elements
(3) It possess vessels with wider cavities
(4) It is formed due to slow activity of cambium

59. Following are the features related to secondary growth in dicot root, **except**
(1) Cells of conjunctive tissue below phloem bundles become meristematic by dedifferentiation
(2) The cells of pericycle lying opposite to protoxylem become meristematic by differentiation
(3) The cambium formed in root is completely a secondary meristem
(4) The number of cambial strips is equal to the number of phloem bundles

60. Choose the **incorrect** match
(1) Bifacial leaf – Dicot leaf
(2) Hypostomatic leaf – Monocot leaf only
(3) Dorsiventral leaf – *Nerium*
(4) Multiple leaf epidermis – Banyan

61. Which the of the following meristems helps in the formation of stele of stem?
(1) Dermatogen (2) Periblem
(3) Plerome (4) Protoderm

62. The chief water conducting elements in gymnosperms and angiosperms respectively are
(1) Vessels, Tracheids
(2) Companion cell, tracheids
(3) Tracheids, vessels
(4) Trachea, vessels

63. Jute obtained from *Corchorus capsularis* is a
(1) Collenchymatous xylem fibre
(2) Parenchymatous xylem fibre
(3) Sclerenchymatous xylem fibre
(4) Sclerenchymatous phloem fibre

64. Anatomically root differs from stem in
(1) Presence of centrifugal xylem & radial V. Bs.
(2) Absence of cortex and pith
(3) Having phloem parenchyma and vessels in xylems
(4) Presence of radial vascular bundles

65. The epidermal tissue has all of the following functions **except**
(1) Help in checking excessive loss of water
(2) Stomata present on the leaves help in transpiration only
(3) The trichomes help in protection of plant
(4) The trichomes help in the reduction of water loss and dispersal of seeds, fruits

66. Pits represent unthickened areas present in the secondary wall. The thickening which is absent at pit bearing area is
(1) Pectin (2) Lignin
(3) Cellulose (4) Hemicellulose

67. Xylem parenchyma cells
(1) Make tylose in sieve tubes
(2) Can store fat and tannins
(3) Are living and thick walled
(4) Always show apotracheal condition

68. Following are the features related to secondary growth in dicot root, **except**
(1) Cells of conjunctive tissue below phloem bundles become meristematic by dedifferentiation
(2) The cells of pericycle lying opposite to protoxylem become meristematic by differentiation
(3) The cambium formed in root is completely a secondary meristem
(4) The number of cambial strips is equal to the number of phloem bundles

69. Which part of the wood is more durable and resistant to the attack of the micro-organisms and insects?
(1) Alburnum (2) Heart wood
(3) Sap wood (4) Soft wood

70. Period between the appearance of two successive leaf primordia is
(1) Plastochron (2) Chromagen
(3) Promeristem (4) Prosenchyma

71. Choose the **odd** one out w.r.t. secondary meristem
(1) Lateral in position
(2) Increase girth of organs
(3) Possess elongated cells
(4) Do not possess vacuole

72. Maturation of xylem is centrifugal in
(1) Monocot root (2) Dicot stem
(3) Dicot root (4) Dicot leaf

73. Sieve tube elements
(1) Possess lignified wall
(2) Are associated transversely with ontogenically similar cells
(3) Possess P-proteins in sieve pores
(4) Shows senescence of protoplast at the mature stages

74. Choose the **odd** one w.r.t. transverse section of monocot root
(1) Formation of protective exoderm in outer cortex
(2) Polyarch xylem
(3) Distinguished phloem parenchyma
(4) Thickening of conjunctive tissue at later stages

75. Select **incorrect** statement w.r.t. secondary phloem
(1) Restricted to stems and roots of perennial dicots and gymnosperms
(2) Phloem fibres are fewer
(3) It is more abundant with regular arrangement
(4) Is the product of lateral meristem

76. Intrusion of parenchymatous cells into tracheary elements during heart wood formation
(1) Facilitates the water transport
(2) Is seen only in outer part of wood
(3) Gives the wood darker appearance
(4) Forms tylose plugs

77. Choose the **incorrect** statement w.r.t. collenchyma
a. Cell wall thickenings can be present continuously or in patches
b. May contain chloroplast
c. Associated with fruit wall of nuts
d. Provides support to delicate plant parts like petiole of a leaf and floral parts
e. Shows high refractive index
(1) Both b & c (2) a & d only
(3) c & e only (4) Only c

78. Choose **odd** one out w.r.t. function of endodermis
(1) Prevents passage of air and water when casparіated
(2) Dead, metabolically inactive cells
(3) Perform storage of food as starch sheath
(4) Acts as biological checkpost

79. Which one of the following pair of conducting tissue is derived from same mother cells?
(1) Companion cells and sieve tube
(2) Albuminous cells and sieve cells
(3) Sieve tube and bast fibre
(4) Phloem parenchyma and companion cells

80. Maturation of xylem is centripetal in
(1) Monocot root (2) Dicot stem
(3) Dicot leaf (4) Monocot stem

81. In dorsiventral leaf
(1) Vascular bundles does not show variation in size
(2) Adaxially placed mesophyll cells are arranged vertically and parallely
(3) Large, empty, colourless epidermal cells are present
(4) Vascular bundles are surrounded by thick walled bundle cap

82. Vascular cambium of dicot root in stelar region originate
(1) Through dedifferentiation of secondary permanent tissue
(2) Partly from a portion of pericycle just above the metaxylem
(3) Completely from pericycle
(4) Partly from tissue located just below the phloem bundles

83. Meristem formed at young stages of plant but show its functionality in later stages of plant development
(1) Is formed through the process of dedifferentiation
(2) Produces primary tissues
(3) Brings about increase in girth of plant
(4) Is called cork cambium

84. Choose the **odd** one out w.r.t. product obtained from heart wood
(1) Haematoxylin (2) Brasilin
(3) Santalin (4) Cork

85. In some species companion cells have numerous cell wall ingrowths, but are poor in plasmodesmatal connections. These companion cells are
(1) Transfer cells
(2) Intermediary cells
(3) Ordinary companion cells
(4) Albuminous cells

86. Find **correct** match

	Column-I		**Column-II**
a.	Idioblast	(i)	Pectocellulose
b.	Collenchyma	(ii)	Ergastic substances
c.	Brachysclereids	(iii)	Stone cells
d.	Osteosclereids	(iv)	Prop cells

(1) a(ii), b(i), c(iii), d(iv) (2) a(ii), b(i), c(iv), d(iii)
(3) a(iii), b(iv), c(ii), d(i) (4) a(iv), b(iii), c(ii), d(i)

87. When vessels of same size are uniformly distributed throughout the secondary growth then the wood is
(1) Ring porous wood
(2) Diffuse porous wood
(3) Homoxylous wood
(4) Non-porous, soft wood

88. Plants having V or Y shaped vessels arrangement in their vascular bundles show one of the following feature *i.e.*
(1) Undifferentiated sclerenchymatous ground tissues from hypodermis to centre of stem
(2) Conjoint, collateral, endarch and open vascular bundles
(3) Scattered vascular bundles throughout the ground tissue
(4) Presence of phloem parenchyma

89. Cells that help in the rolling of leaves in some grasses are associated with
(1) Epidermal tissue system
(2) Ground tissue system
(3) Fundamental tissue system
(4) Conducting tissue system

90. Which of the following tissue or meristem is primary in origin but secondary in function?
(1) Interfascicular cambium
(2) Intrafascicular cambium
(3) Vascular cambium
(4) Cork cambium

[Chapter - 6 : The Cell : The Unit of Life]

1. Which of the following is incorrect statement?
(1) ATPase activity is present in dynein protein
(2) Histone proteins are lysine and arginine rich
(3) A pair of centrioles is called diplosome
(4) Grana are present in chloroplast of algae and bundle sheath chloroplast of C_4 plants

2. The total number of protofilaments in all the A subfibrils of a centriole is
(1) 13 (2) 117
(3) 147 (4) 39

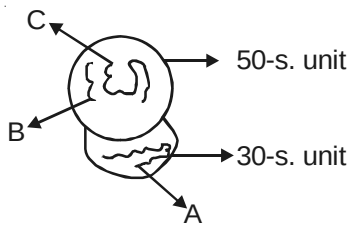
3. Sarcoplasmic reticulum store _____ which are required for _____
(1) Ca^{++}, nerve impulse conduction
(2) Mg^{++}, detoxification
(3) Ca^{++}, muscle contraction
(4) Mg^{++}, ionic balance

4. Match the items in column I with column II and choose the **Correct** answer.

Column I	**Column II**
a. Sap vacuole	1. contains digestive enzyme
b. Contractile vacuole	2. stores metabolic gases
c. Food vacuole	3. osmoregulation
d. Air vacuole	4. stores lipids
e. Sphaerosome	5. stores and concentrates mineral salts and nutrients

(1) a–5, b–3, c–1, d–2, e–4
(2) a–2, b–3, c–4, d–5, e–1
(3) a–5, b–3, c–2, d–4, e–1
(4) a–4, b–1, c–3, d–5, e–2

5. In a prokaryotic ribosome as shown below, identify A, B and C are



(1) 16S rRNA, 5S rRNA, 23S rRNA
(2) 18S rRNA, 5.8S rRNA, 28S rRNA
(3) 185 rRNA, 5S rRNA, 23S rRNA
(4) 16S rRNA, 5.8S rRNA, 23S rRNA

6. Choose the **incorrect** match
(1) Membrane of RBC – 60% protein
(2) Axoneme of flagella – 9 + 0 structure
(3) Oleosomes – Synthesis of fats
(4) Jenus green B – Mitochondria

7. Select **incorrect** statement for 70 S ribosome
   (1) r-RNA / protein ratio is 60 : 40
   (2) Its subunit is 30 S and 50 S
   (3) 16 S RNA is a part of 30 S subunit
   (4) Are attached to ER by ribophorin
8. Endoplasmic reticulum, apart from giving mechanical support to cytoplasmic matrix, also performs a number of functions like
   (1) Synthesis of serum proteins
   (2) Synthesis of lipids, toxification of drugs
   (3) Associated with muscle contraction by release and uptake of Mn^{2+} ion
   (4) Both (1) & (3) are correct
9. Which of the following statement is not concerned with fluid mosaic model of plasma membrane?
   (1) Phospholipid forming a water resistant barrier
   (2) Glycocalyx at inner surface
   (3) Mosaic pattern of proteins
   (4) More extrinsic protein at inner surface
10. Eukaryotic cells have a well organised nucleus and
   a. Both 70S and 80S types of ribosomes
   b. Flagella associated with 9 + 2 organisation
   c. Shows cytoplasmic streaming
   d. Their DNA is complexed with histones to constitute the chromatin
   (1) All are correct
   (2) Only a is incorrect
   (3) Only c and d are correct
   (4) Both b and c are wrong
11. Find out the component of plasma membrane which helps in cell to cell recognition
   (1) Cholesterol (2) Glycocalyx
   (3) Intrinsic proteins (4) Cephalin
12. Choose the **odd** one out w.r.t. SER
   (1) Lipid and sterol synthesis
   (2) Glycogenolysis
   (3) Detoxification of toxic substances
   (4) Nissl's granule in nerves
13. Select an **incorrect** match w.r.t. depositions
   (1) Silica - Grass leaves
   (2) Calcium - *Chara*
   (3) Suberin - Cork cells
   (4) Lignin - Secondary phloem
14. All given statements stand true for plasma membrane, **except**
   (1) Lipids are asymmetric and amphipathic
   (2) Lipids show flip-flop movement
   (3) Oligosaccharides are absent on inner surface of membrane
   (4) The amount and types of extrinsic proteins is same on both surfaces of membrane
15. Triglyceride metabolism to convert fats into energy sources is helped by glyoxylate cycle. The organelle responsible for this is found in
   (1) Castor seeds (2) Maize seeds
   (3) Wheat seeds (4) Pea seeds
16. Each centriole has a cart wheel organisation having a whorl of tubulin fibrils at periphery. These peripheral fibrils are composed of
   (1) 27 microtubules (2) 9 microtubules
   (3) 18 microtubules (4) 11 microtubules
17. Find out all the proteins composing a eukaryotic flagella
   (1) Flagellin, tubulin, dyenin
   (2) Tubulin, nexin, dyenin and flagellin
   (3) Dyenin, tubulin and nexin
   (4) Nexin, tubulin and flagellin
18. Chloroplast resembles with mitochondria in
   (1) Presence of porins in outer membrane
   (2) Having circular DNA and 70S ribosomes
   (3) Presence of ETS and cardiolipin in inner membrane
   (4) More than one option is correct
19. Find the **correct** statement w.r.t. bacterial cell structure
   (1) Chromatophores in green bacteria are covered by non-unit, non-lipid and protein membrane having chlorphyll and phycobilins
   (2) In some bacteria sterols are replaced by hopanoids which act as membrane stabilizers
   (3) DNA is exclusively coiled and looped with the help of polyamines and histones
   (4) Bacterial ribosomes contain, 23S 18S and 5S rRNA along with 21 and 34 proteins in small and larger subunits respectively.
20. Find **correct** statement
   (1) Ratio of proteins and lipids in RBC membrane is 40 : 52
   (2) More extrinsic proteins are found on outer side of RBC membrane
   (3) Peripheral protein spectrin is found towards cytosolic face of RBC membrane
   (4) RBC membrane is impermeable to gases
21. Choose **incorrect** statement w.r.t. mitochondria
   (1) Associated with oxidative phosphorylation
   (2) DNA is double stranded and circular
   (3) Sperm contributes no mitochondria to zygote
   (4) It has ribosomes similar to cytoplasm

22. Eukaryotic flagella have
(1) 18 subfibrils in centriole
(2) Nexin protein in A – B linker
(3) ATPase activity in tubulins
(4) Nine triplets in central axoneme

23. Polytene chromosomes
(1) Have a common centromere called chromocentre
(2) Shows somatic pairing during diplotene stage
(3) Have lateral loops on axial DNA
(4) Do not have ring like structures

24. Which is **not true** for secondary cell wall?
(1) Laid inner to primary wall
(2) Has low hemicellulose and protein than primary wall
(3) It grows by intussusception
(4) May have bordered pits

25. Basal granule in eukaryotic flagella
(1) Has '9 + 2' organisation
(2) Is composed of 27 subfibrils of tubulin
(3) Has ATPase activity in dynein protein
(4) Is surrounded by plasma membrane

26. Which of the following statement is **correct**?
a. Flagella have 9 + 2 arrangement of microtubules
b. Centrioles have 9 + 0 arrangement of microtubules
c. Structure of kinetosome and centriole is same
(1) Only a, b are correct
(2) a, b, c are correct
(3) Only b, c are correct
(4) a, c are incorrect

27. Which one of the following feature is **incorrect** w.r.t. fluid mosaic model of plasma membrane?
(1) Membrane bears non-polar hydrophobic tails of phospholipids pointed outwards
(2) Phospholipid molecules provide fluidity
(3) Intrinsic proteins constitute major part of total proteins
(4) Proteins provide mosaicness to the membrane

28. The demolition squad of the cell does not perform one of the following functions
(1) Helps in intracellular digestion
(2) Removes wastes from the cell by acting as scavenger
(3) Disappearance of tail in tadpole larva
(4) Provides catalase to decompose H_2O_2

29. Match the following

Column I	Column II
a. Regulator of cell cycle	(i) Peroxisome
b. Traffic inspector of cell	(ii) Lysosome
c. Autophagy	(iii) Golgi Bodies
d. Detoxification	(iv) Centriole

(1) a(iii), b(iv), c(ii), d(i) (2) a(iv), b(iii), c(ii), d(i)
(3) a(iii), b(iv), c(i), d(ii) (4) a(iv), b(iii), c(i), d(ii)

30. Eukaryotic cell differs from prokaryotic cell in having
(1) Murein
(2) Pili
(3) Cytoplasmic streaming
(4) Ribosomes

31. Which of the following is incorrectly matched?
(1) Golgibodies – Secretion of proteins
(2) Lysosomes – Beever
(3) Peroxisomes – Photorespiration
(4) Secondary wall – Accretion

32. Which of the following statement is incorrect?
(1) Plasma membrane is asymmetrical because the membrane associated lipids are asymmetric
(2) Fluid mosaic model of biomembranes is the latest and most widely accepted model
(3) Facilitated transport across plasma membrane does not respond to protein inhibitors
(4) Cell wall functions as apoplast

[Chapter 7 : The Cell Cycle and Cell Division]

1. Chromosome condensation during cell division is mainly due to
(1) Synthesis of cyclins
(2) Positive charge in histone protein and negative charge in DNA
(3) Destruction of most proteins
(4) Formation of recombination nodule and synaptonemal complex

2. Synaptonemal complex
(1) Appears in zygotene and disappear in pachytene
(2) Appears in pachytene and disappears in diplotene
(3) Appears in zygotene and disappears in diplotene
(4) Appears in leptotene and disappears in pachytene

3. In Intranuclear mitosis
(1) Nuclear membrane is ruptured
(2) Nuclear membrane persists
(3) Spindle formation is absent
(4) More than one option is correct

4. Congression is
   (1) Centripetal movement of chromosomes
   (2) Arrangement of chromosomes in ball like structure in anaphase
   (3) Anaphasic movement of chromosomes
   (4) Condensation of chromosomes

5. Match the following

	Column I		Column II
a.	Tetravalent stage	(i)	Diplotene
b.	Appearance of chiasmata	(ii)	Leptotene
c.	Synapsis	(iii)	Pachytene
d.	Bouquet stage	(iv)	Zygotene

   (1) a(iii), b(i), c(iv), d(ii) (2) a(i), b(ii), c(iii), d(iv)
   (3) a(ii), b(iv), c(i), d(iii) (4) a(iv), b(ii), c(i), d(iii)

6. During Meiosis-I the nuclear membrane and nucleolus degenerates during
   (1) Diakinesis (2) Leptonema
   (3) Metaphase-I (4) Zygotene

7. A cell with chromosome number = 10 after completion of Meiosis-I, would be having how much of chromosome number in its parent cell and its daughter cells after meiosis-II respectively
   (1) 10 & 10 (2) 20 & 20
   (3) 20 & 10 (4) 10 & 20

8. One of the following statements is **wrong**
   (1) G_1 phase is also known as restriction phase
   (2) DNA replication takes place in S-phase
   (3) G_2 phase is premitotic phase
   (4) G_2 phase is known as decision phase for cell division

9. How many meiotic divisions are required to produce 32 seeds in *Cyperus* plant?
   (1) 40 (2) 32
   (3) 64 (4) 16

10. How many mitotic divisions are required to produce 100 cells?
   (1) 99 (2) 50
   (3) 10 (4) 25

11. Select an **incorrect** statement w.r.t. metaphase
   (1) Spindle fibres are attached to small disc shaped structures at the surface of centromeres called kinetochores
   (2) The plane of alignment of the homologous pair of chromosomes at metaphase is referred to as the metaphasic plate
   (3) Chromosome appears to be made up of two sister chromatids
   (4) The size of chromosomes can be studied in this phase

12. Cells in _____ remain metabolically active but no longer proliferate unless called on to do so, depending on the requirement of the organism
   (1) G_1 phase
   (2) G_0 stage
   (3) Quiescent stage
   (4) More than one option is correct

13. Terminal meiosis occurs in cells of organism showing
   (1) Diplontic life cycle
   (2) Haplontic life cycle
   (3) Diplohaplontic life cycle
   (4) Haplodiplontic life cycle

14. How many meiotic division will it take to produce 227 seeds in Cyperaceae?
   (1) 284 (2) 227
   (3) 454 (4) 114

15. Select **correct** option for diplotene stage out of the following statements
   a. Synapsis
   b. Distinct chromomeres
   c. Desynapsis
   d. Appearance of recombination nodules
   e. Starting of terminalization
   f. Dissolution of synaptonemal complex
   g. Distinct chiasmata
   (1) c, e, f & g (2) c, d, e & f
   (3) d, e, f & g (4) c, d, f & g

16. All given statements are incorrect, **except**
   (1) Content value of DNA will be half of the G_1 value at one pole of anaphase-I
   (2) Congression occurs in metaphase
   (3) Centromere splits in both anaphase and anaphase-I
   (4) Cytokinesis is successive or simultaneous type in plants following cell furrow method

17. Match the following

	Column-I		Column-II
a.	Leptonema	(i)	Dictyotene
b.	Zygonema	(ii)	Tetrad
c.	Pachynema	(iii)	Pairing of chromosome
d.	Diplonema	(iv)	Bouquet formation

   (1) a(iv), b(iii), c(ii), d(i) (2) a(iii), b(ii), c(i), d(iv)
   (3) a(iii), b(iv), c(i), d(ii) (4) a(i), b(iv), c(ii), d(iii)

18. Find the **correct** statement in relation to meiosis-I
(1) Disappearance of nucleolus occurs in pachytene
(2) Condensation of chromatin starts in diplotene
(3) Each metaphasic plate possesses half the total number of chromosomes
(4) Division of centromere occurs in anaphase-I

19. Which of the following events are concerned with the G_1-phase?
(i) Synthesis of tubulin
(ii) Decision of cell cycle
(iii) Maximum growth
(iv) Synthesis of histones
(v) Synthesis of all types of RNA
(1) (ii), (iii), (v) (2) (i), (ii), (v)
(3) (ii), (iii), (iv) (4) (iii), (iv), (v)

20. Meiosis involves/characterized by
(1) Pairing of non-homologous chromosomes and recombination between them
(2) Formation of chiasmata
(3) Its absence in humans
(4) No centromeric division

21. If the amount of DNA in a sperm is 3 picogram, then amount of DNA in a stem cell in G_2 stage will be ___ picogram
(1) 3 (2) 6
(3) 9 (4) 12

22. Mark the **correct** one (w.r.t. mitotic anaphase)
(1) Splitting of centromere
(2) Complete disintegration of nuclear membrane
(3) Initiation of assembly of mitotic spindle
(4) Initiation of condensation of chromosomal material

23. An activated complex essential to regulate the events of M-phase is
(1) Cyclin (2) CDK
(3) Exonuclease (4) MPF

24. Eumitosis is
(1) Mitosis without asters formation
(2) Mitosis with disappearance of nuclear membrane
(3) Intranuclear mitosis
(4) Anastral mitosis

25. If the DNA content of a haploid cell is 2 picogram, then the DNA content in its mother cell at G_2 phase will be
(1) 2 picogram (2) 1 picogram
(3) 4 picogram (4) 8 picogram

26. An event not associated with anaphase I of meiosis is
(1) Polar movement of chromosome
(2) Formation of synaptonemal complex
(3) Appearance of interzonal fibre
(4) Repolymerisation of continuous spindle fibres

[Chapter 8 : Transport in Plants]

1. Guttation suggests that
(1) Plant is transpiring rapidly
(2) There is water logging around roots
(3) Rate of absorption is greater than rate of transpiration
(4) There is absorption lag in plants

2. Sucrose enters a phloem sieve tube cell from mesophyll cell because of
(1) A process regulated by auxin
(2) Osmosis
(3) Water potential
(4) Active transport

3. Which of the following statement is not related with aquaporins?
a. These water channels occur in both plants and animals
b. They speed up osmosis
c. They change the direction of water movement
(1) a and b (2) a and c
(3) b and c (4) c only

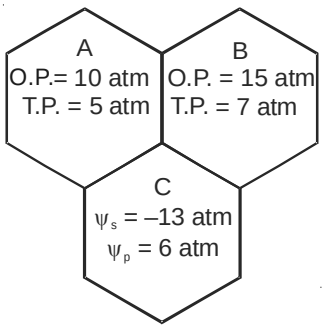
4. Addition of solutes in a solution
(1) Increases its Ψ_w
(2) Decreases its osmotic pressure
(3) Decreases its Ψ_s
(4) Decreases its DPD

5. Water absorption is mostly _____ and mineral absorption is mostly _____
(1) Passive, passive (2) Active, active
(3) Passive, active (4) Active, passive

6. Movement of sap in phloem and xylem are respectively
(1) Bidirectional and unidirectional
(2) Unidirectional and bidirectional
(3) Unidirectional in both
(4) Bidirectional in both

7. Select **correct** statement w.r.t. osmotic pressure
   (a) Temperature increases O.P.
   (b) Maximum value is recorded in halophytes
   (c) Water moves from low O.P. to high O.P.
   (d) 0.1 (M) sucrose has more O.P. then 0.1 (M) NaCl
   (1) Only (a) and (b) are correct
   (2) Only (b) and (c) are correct
   (3) Only (c) and (d) are correct
   (4) (a), (b) and (c) are correct

8. What is the direction of water movement in the diagram?



   (1) C ← A → B (2) A → C ← B
   (3) A ← C → B (4) A ← B → C

9 Most common sugar transported from leaves to storage or sink region is sucrose because
   (1) It is non-reducing
   (2) It does not alter the osmotic concentration
   (3) It is chemically unstable
   (4) More than one options are correct

10. As a result of increased endosmosis of water in a cell the diffusion pressure of the cell will
   (1) Increase (2) Decrease
   (3) Remain same (4) Be zero

11. When a molecule moves across a membrane independent of other molecule, the process is
   (1) Symport (2) Cotransport
   (3) Antiport (4) Uniport

12. Property related to facilitated diffusion and active transport but not to simple diffusion, are
   a. Require special membrane proteins
   b. Highly selective
   c. Transport saturate
   d. Response to protein inhibitors
   (1) a and b (2) a and c
   (3) b and c (4) All of these

13. Water moves from
   (1) Low DPD to high DPD
   (2) High ψ to low ψ
   (3) Less –ve to more –ve ψ
   (4) All of these are correct

14. Loss of or excretion of water in form of liquid droplets from leaves of Garden nasturtium
   (1) Is bleeding
   (2) Occur due to local pressure in phloem
   (3) Occur through pore below which epithem are present
   (4) Is measured by tensiometer

15. Transpiration is considered as a compromise to accomplish photosynthesis. This statement is supported by all **except**
   (1) Requirement of two are opposite
   (2) Photosynthesis require a supply of CO_2 which enter plant when stomata are open which also result in water loss
   (3) Stomata and cuticle have evolved in response to one or both of them
   (4) Transpiration ratio is very low in plants

16. Translocation of sugar in plants is not a purely physical process as described by Munch because
   (1) Cytokinins and auxins affect the rate of transport
   (2) Some amount of sugar is utilised during its transport
   (3) Phloem loading and unloading both utilise energy
   (4) More than one option is correct

17. Find **incorrect** statement w.r.t. plasmolysis
   (1) At first stage of plasmolysis cell is called flaccid and osmotic concentration of cell interior is equivalent to that of external solution
   (2) It can be demonstrated with 10% solution of potassium nitrate in *Spirogyra*
   (3) Used to remove weeds
   (4) Prolonged plasmolysis is reversible even after an interval

18. Mechanism of phloem translocation, which was put forward by Munch
   a. Is cytoplasmic streaming
   b. Is transcellular streaming
   c. Is pressure flow hypothesis
   d. Explains movement from low turgor pressure area to higher turgor pressure area
   (1) a and d (2) b and d
   (3) c only (4) c and d

19. In herbaceous shade loving plants 50% of the transpiration is
   (1) Bark
   (2) Lenticular
   (3) Cuticular
   (4) More than one option is correct

20. Guttation is favoured by
(1) High water absorption and high transpiration
(2) High transpiration and high RH
(3) Low water absorption and low transpiration
(4) High water absorption and low transpiration

21. Blue light causes maximum transpiration because it activates
(1) PEPCO (2) PEP synthetase
(3) Rubisco (4) Pyruvic kinase22.

Which of following is / are example(s) of semipermeable membrane?
(1) Plasmalemma and tonoplast
(2) Egg membrane and cellulose cell wall
(3) Cellulose cell wall and animal bladder
(4) Parchment membrane and animal bladder

23. Which of the following represent a plasmolysed cell?
(1) $\psi_S = -16, \psi_P = 8$ bars
(2) $\psi_S = -16, \psi_P = 2$ bars
(3) $\psi_S = -10, \psi_P = -2$ bars
(4) $\psi_S = -12, \psi_P = 2$ bars

24. Protein pumps help in
(1) Absorption of hydrophilic particles down to concentration gradient
(2) Absorption of hydrophilic particles against the concentration gradient
(3) Facilitated diffusion
(4) Passive absorption

25. Casparian strips interrupt
(1) Apoplastic path (2) Symplastic path
(3) Mycorrhizal absorption (4) Plasmodesmata

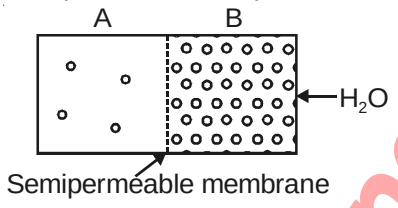
26. What will happen to a flaccid plant cell if it is kept in higher water potential?
(1) Endosmosis and ψ_w in cell will increase
(2) Endosmosis and ψ_w in cell will decrease
(3) Exosmosis and ψ_w in cell will increase
(4) Exosmosis and ψ_w in cell will decrease

27. Large protein molecules embedded in the outer membrane of chloroplast, mitochondria and some bacteria which play a important role in facilitated diffusion are
(1) Receptor proteins (2) Aquaporins
(3) Porins (4) Glycophorin

28. When additional pressure more than osmotic pressure is applied to prevent the flow of water into the solution. It is called
(1) Reverse osmosis (2) Facilitated diffusion
(3) Mass flow (4) Simple diffusion

29. Positive pressure that develops in xylem sap of the root of some plants is
(1) Responsible for mineral absorption
(2) Root pressure and passive
(3) Root pressure and active
(4) Responsible for ascent of sap in higher plants

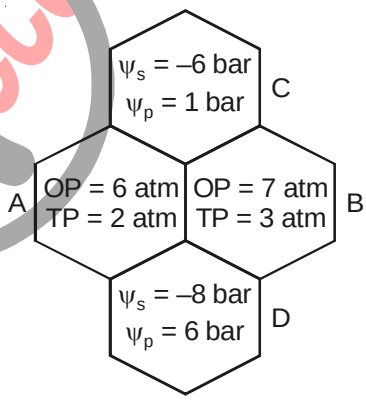
30. Find the correct statement w.r.t. diagram below, when pure water is separated in two chambers A & B

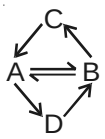


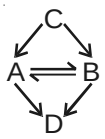
(1) Movement of water is A → B only
(2) Movement of water is B → A only
(3) Movement of water is bidirectional
(4) No movement of water takes place

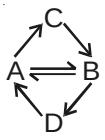
31. According to potassium pump theory of stomatal movement, opening of stomata is favoured by
(1) High starch, low CO_2, high pH and phosphorylase
(2) High sugar, low CO_2, CK and phosphatase
(3) PEPcase, blue light, CK and ATP
(4) High malic acid, PEPco and ABA

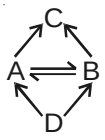
32. Find the direction of movement of water in given presentation of cells



(1) 

(2) 

(3) 

(4) 

33. According to active K^+ transport theory of Levitt
(1) Starch is completely oxidised into PEP in guard cells
(2) Potassium malate will result in decreased OP of guard cells
(3) K^+ ion movement outside the guard cells is always active process
(4) Malic acid dissociates into malate ions and H^+ in the guard cells

34. Choose **incorrect** statement w.r.t. pressure flow hypothesis of phloem transport
(1) Loading and unloading of sugar in phloem utilises ATP
(2) Sugar moves from source to sink along the pressure gradient
(3) Deficiency of boron decreases rate of transport
(4) Direction of sugar translocation is only unidirectional

35. Find out the incorrect match

	Column-I	Column-II
(1)	Stomatal opening	Influx of K^+ ion in G.C
(2)	Heat of wetting	Imbibition
(3)	Translocation of sugar	Physical process
(4)	Transpiration	Unavoidable process

36. Passive water absorption increases
(1) At high root-shoot ratio
(2) In highly concentrated soil solution
(3) When soil has less available water
(4) In water logging conditions

37. Read the following statements regarding stomatal movements
a. Full moon light is sufficient to keep stomata open in some plants
b. Blue light is more effective during transpiration whereas red light lead to stomatal closure
c. Q_{10} for stomatal opening is two
d. High CO_2 concentration decreases pH which makes ABA functional, that leads to stomatal closure
(1) a, b and c are correct (2) a, c and d are correct
(3) b, c and d are correct (4) a, b and d are correct

38. If a pressure greater than atmospheric pressure is applied to a solution, its water potential
(1) Increases
(2) Decreases
(3) Remains the same
(4) First increases then decreases

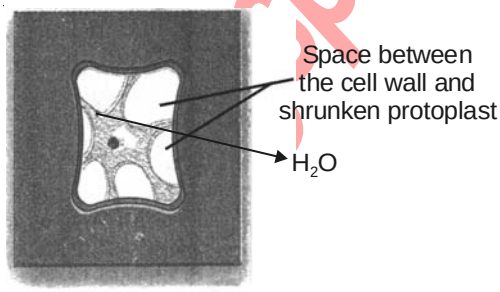
39. Which of the following is true for a fully flaccid cell?
(1) DPD = OP (2) OP = TP
(3) WP = –ve (4) DPD = 0

40. Picric acid is used to confirm that ascent of sap takes place
(1) Due to the activity occurring in roots
(2) Due to high DPD in mesophyll cells
(3) Even when living parenchymatous cells are killed
(4) Due to a positive hydrostatic pressure

41. In imbibition
(1) Volume of a system decreases
(2) Heat of wetting is absorbed
(3) Imbibant swells and imbibate is mobilised
(4) More than one option is correct

42. The transpiration driven ascent of xylem sap depends mainly on the following physical properties of water, **except**
(1) Mutual attraction between water molecules
(2) Attraction of water molecules to polar surface of tracheary elements
(3) Surface tension
(4) High osmotic pressure created by pumping of salts inside the xylem elements

43. What is present inside the space shown in the given diagram?



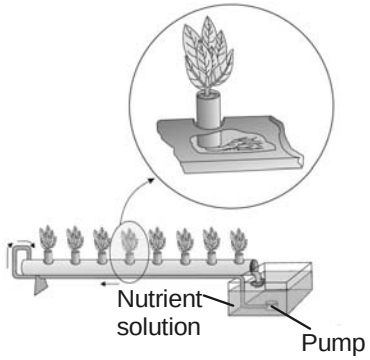
Plamolysed cell

(1) Solute only (2) Solvent only
(3) Solute and water (4) Air

44. Movement of a molecule across a typical plant cell (about 50 µm) takes approximately
(1) 1 hour (2) 2.5 seconds
(3) 30 seconds (4) 1 minute

45. Mark the correct one (w.r.t mass flow movement)
(1) All substances move independently depending on their concentration gradients
(2) Not due to the pressure difference between the two points
(3) Similar to ATP dependent diffusion
(4) All substances swept along at the same place
Mineral nutrition

46. Choose correct option for following technique of plant production



(1) This concept was first given by Julius von Sachs
(2) Successfully used for commercial production of vegetables
(3) Involves culturing of plants in soil free, defined mineral solution
(4) More than one option is correct

ZOOLOGY

[Chapter-2 : Structural Organization in Animals]

1. Eustachian tube, epiglottis and pinna of ear is formed by
   (1) Hyaline cartilage (2) White fibro cartilage
   (3) Elastic cartilage (4) Calcified cartilage
2. Which of the plasma protein act as acid base buffer?
   (1) Serum albumin (2) Serum globulin
   (3) Prothrombin (4) Fibrinogen
3. Earthworm can move with the help of
   (1) Longitudinal and circular muscle only
   (2) Chitinous setae only
   (3) Chitinous setae and coelomic fluid act as hydro skeleton
   (4) All of these
4. Troponin is a protein that
   (1) Contains numerous molecules of ADP
   (2) Has a high affinity for calcium ions
   (3) Forms the binding site for the myosin heads when they attach to actin
   (4) Is bound to myosin to form a complex that is normally inhibited in the resting muscle fiber
5. Each maxillary palp of cockroach is _____
   (1) Three segmented (2) Five segmented
   (3) Seven segmented (4) Not segmented
6. Duodenum receives bile from gall bladder and pancreatic juices from pancreas through
   (1) Separate bile and pancreatic duct
   (2) Common hepato-pancreatic duct
   (3) Ampulla of vater
   (4) Stenson's duct
7. Following structure are present in frog **except**
   (1) Renal portal (2) Salivary gland
   (3) Thyroid gland (4) Sinuauricular node
8. Which of the following is incorrect w.r.t. to junction and its function?
   (1) Tight junction – Promotes leaking of substances across a tissue
   (2) Adhering junction – Keep neighbouring cells together
   (3) Gap junction – Connecting the cytoplasm of adjoining cells for rapid transfer of ions and small molecules
   (4) Gap junction – Facilitates the cells to communicate with each other
9. Which of the following is true regarding the Bidder's canal in frog?
   (1) Transverse canal and carry sperms and urine, both
   (2) Transverse canal and carry sperms only urine
   (3) Longitudnal canal and carry sperms and urine, both
   (4) Longitudinal canal and carry sperms only
10. During muscle contraction the correct sequence of events is :
   (a) By utilising the energy from hydrolysis of ATP myosin head binds to exposed active site of actin forming the cross-bridge
   (b) Binding of Ca^{++} with troponin of actin filaments and thereby remove the masking of active sites for myosin
   (c) Releasing the ADP and P_i from myosin it goes back to relaxed state
   (d) Release of acetylcholine at neuromuscular junction which generates action potential in the sarcolemma
   (1) c, b, d, a (2) b, d, a, c
   (3) d, b, a, c (4) a, b, c, d
11. 'S' shaped chitnous setae arranged in a row embedded in the epidermal pits in the middle of each segment of *Pheretima* **except**
   (1) First segment
   (2) First and last segment
   (3) Clitellum segment
   (4) First, fourteen to sixteen and last segment
12. If dorsal pore of earthworm is blocked, which of the following function is affected first?
   (1) Digestion
   (2) Blood circulation
   (3) Gaseous exchange
   (4) Removal of excretory waste
13. In Cockroach (Periplaneta) attachment of head with rest part of the longitudinal body axis is termed as
   (1) Prognathus (2) Epiagnathus
   (3) Hypoagnathus (4) Agnathus
14. Which of the following is/are associated with heart of frog?
   (1) Sinus venosus (2) Pylangium
   (3) Synangium (4) All of these

15. Principal cells of connective tissue are
(1) Fibroblasts (2) Mast cells
(3) Adipocytes (4) Histiocytes

16. Blood drawn from a blood vessel can be kept uncoagulated by adding a pinch of sodium oxalate to it. Oxalate precipitate which of the clotting factor?
(1) Factor II (2) Factor III
(3) Factor IV (4) Factor VIII

17. Which of the following muscle shows autorhthymicity?
(1) Striped (2) Unstriped
(3) Cardiac (4) Both 2 and 3

18. Match the terms in column I with column II

Column I	Column II
a. Bidder's canal	(i) Ovary
b. Jacobson's organ	(ii) Kidney
c. Optic lobes	(iii) Mid brain
d. Mesovarium	(iv) Olfaction
	(v) Testes

(1) a(v), b(iii), c(ii), d(i) (2) a(ii), b(iv), c(iii), d(v)
(3) a(ii), b(iv), c(iii), d(i) (4) a(v), b(iv), c(iii), d(i)

19. Internally mesenteron is covered by very thin and transparent peritrophic membrane formed of chitin and protein, secreted by gizzard. It serves
(1) As a secretory membrane, as it secrete digestive enzymes
(2) To protect the wall of midgut from abrasion due to friction of food particles, permeable to digested food and enzymes
(3) As filtering membrane, to filter the larger food particles
(4) Act as absorptive membrane

20. Following features are associated with blood vascular system of cockroach **except** one. Mark the except one
(1) Heart of cockroach is tubular, dorsally placed and with thirteen chambers
(2) Open type of blood circulation, body cavity is filled by blood called haemocoel
(3) Blood cells of cockroach are haemocytes some are phagocytic nature
(4) Visceral organs are located in haemocoel are not in direct contact with blood

21. Growth of cartilage is
(1) Unidirectional
(2) Bidirectional
(3) Multidirectional
(4) Non-directional, as there is no growth

22. Which of the following statement is true ?
(1) Nervous tissue is located only in the brain and spinal cord
(2) Neurons are capable of mitosis to accomodate increased learning
(3) Most bones in the body begin as fibrocartilage and then ossify to bone
(4) Mast cells that produce the anti coagulant heparin are dispersed throughout loose connective tissue

23. Nucleus pulposus is supposed to be remnant of notochord present in
(1) In the centre of each vertebra
(2) Centre of intervertebral disc
(3) Between alementary canal and dorsal hollow nerve cord
(4) In the ligamentum flava

24. Which structure of the cockroach is functionally analogus to liver of vertebrates?
(1) Urate cells (2) Oenocytes
(3) Chloragogen cell (4) Trophocytes

25. Which feature is not valid w.r.t. the tracheal system of respiration in cockroach?
(1) There are 8 pairs of abdominal spiracles
(2) There are 2 pairs of thoracic spiracles
(3) Expiration in cockroach is an active process
(4) The last 2 pairs of spiracles of the abdomen region are always open

26. Which of the following is the largest sinus in *Periplaneta*?
(1) Pericardial sinus (2) Perivisceral sinus
(3) Perineural sinus (4) Sternal sinus

27. Which of the following is **not** a **correct** description of the peritrophic membrane?
(1) Made up of protein
(2) Secreted by gizzard
(3) Protects the wall of midgut from abrasive food
(4) It does not allow any enzyme to pass through

28. Krause's membrane forms
(1) T-tubule (2) Z-line
(3) M-line (4) M-zone

29. Mark the **incorrect** statement
(1) Brush-bordered epithelium is found in proximal part of uriniferous tubule
(2) Epithelial tissue is the fundamental animal tissue
(3) Stereocilia are present in vas deferens
(4) Salivary glands are holocrine glands

30. In polycythemia, the adverse effects occur due to
(1) Decreased blood volume
(2) Increased circulation time
(3) Increased viscosity of blood
(4) Increased availability of oxygen

31. The resorption of bone during remodelling is done by
(1) Osteoclast (2) Osteocyte
(3) Osteoprogenator (4) Osteoblast

32. A pair of first maxillae are located on each side of mouth next to mandibles. Their maxillary palp is _____
(1) Three segmented (2) Five segmented
(3) Seven segmented (4) Not segmented

33. Ligaments join bones to bones and allow its stretching. It is made up of
(1) White fibrous connective tissue only
(2) Yellow fibrous connective tissue only
(3) Yellow and white fibrous connective tissue
(4) Dense irregular connective tissue

34. Haematocrit value is
(1) The rate of sedimentation of erythrocytes
(2) The relative volume of erythrocytes in the centrifuge tube, as a percentage of the total blood volume
(3) The percentage of haemoglobin in 100 ml of blood
(4) The percentage of haemoglobin in single RBC

35. Brunner's gland is
(1) Simple coiled tubular gland
(2) Simple branched tubular gland
(3) Compound tubular gland
(4) Compound tubulo-acinar gland

36. Which of the following character is not related with smooth muscle fibres?
(1) Spindle shaped (2) Multinucleated
(3) Light and dark bands absent
(4) Fibres unbranched

37. In brain and spinal cord myelin sheaths around the axon is formed by
(1) Neurilemma (2) Schwann cells
(3) Oligodendrocytes (4) All of these

38. In cockroach sperms are glued together in the form of bundles called spermatophores. These are pear shaped capsule having a three layered wall in which middle layer is secreted by
(1) Utricular gland (2) Ejaculatory duct
(3) Phallic gland (4) Seminal vesicle

39. Which of the following condition of blood group will not cause a serious problem during second pregnancy?
(1) If father's blood is Rh^+ and mother's blood Rh^-
(2) If mother's blood is Rh^- and foetus blood is Rh^+
(3) If father's blood is Rh^- and mother's blood is Rh^+
(4) Both (1) & (2)

40. In which of the following glands, the secretion is discharged by simple diffusion, so that there is no loss of cells or their parts?
(1) Merocrine gland (2) Holocrine gland
(3) Apocrine gland (4) Heterocrine gland

41. Which of the following mammalian tissue forms peritoneum of coelom?
(1) Pseudostratified epithelium
(2) Cuboidal epithelium
(3) Squamous epithelium
(4) Glandular epithelium

42. Which of the following bone is formed by transformation of dermis of skin and is layed over the already present cartilage?
(1) Clavicle (2) Patella
(3) Humerus (4) Femur

43. Which of the following structure helps in excretion in male cockroach?
(1) Phallic gland (2) Conglobate gland
(3) Uricose gland (4) Collaterial gland

44. Find the **incorrect** match w.r.t. bone disorder and their symptom
(1) Osteomyelitis - Inflammation of bone marrow
(2) Osteomyelodysplasia - Enlargement of the bone marrow cavities
(3) Paget's disease - Irregular thickening and softening of bone
(4) Osteoporosis - Thickening of bone because of excessive deposition of calcium phosphate

45. Brown colour of fat in brown adipose connective tissue is due to
(1) Copper containing cytochrome pigment
(2) Iron containing cytochrome pigment
(3) Zinc containing cytochrome pigment
(4) Silver containing cytochrome pigment

46. Brood pouch in female *Periplaneta* is formed by the contribution of
(1) 7th sternum + 8th & 9th tergum
(2) 7th + 8th sternum + 9th tergum
(3) 7th, 8th, 9th sternum
(4) 7th sternum + 8th & 9th sternum

47. Trehalose is the non reducing sugar found in the
(1) Oenocytes of cockroach
(2) Coelomic fluid of earthworm
(3) Haemolymph of cockroach
(4) Heart of frog

48. Ependyma cells lining ventricles of brain are
(1) Squamous cell (2) Columnar cell
(3) Cuboidal cell (4) Pseudostratified

49. Which of the following is precursor of blood platelets?
(1) Megakaryocyte (2) Normoblast
(3) Reticulocyte (4) Myeloblast

50. Haversian system is found in
(1) Compact bone (2) Spongy bone
(3) Cancellous bone (4) Trabeculae

51. Which of the following is odd one w.r.t origin?
(1) Neurons (2) Astrocytes
(3) Oligodendrocytes (4) Microglial cells

52. In cockroach, larval and nymphal characters are maintained by
(1) Ecdysone (2) Salivary gland
(3) Juvenile hormone (4) Conglobate gland

53. During hibernation frog respires through
(1) Skin
(2) Lung
(3) Buccopharyngeal cavity
(4) All of these

54. Tadpole larva of frog can be made to grow into giant sized tadpole, if they are
(1) Administered with antithyroid substance like thiourea
(2) Administered with large amount of thyroxine
(3) Reared on glucose rich diet
(4) Reared on protein rich diet

55. Find the odd one with respect to type of movement
(1) Leucocytes (2) Macrophages
(3) Phagocytes (4) Sperms in humans

56. The muscle that extends the forearm is
(1) Biceps (2) Triceps
(3) Masseter (4) Latissimus dorsi

57. Which type of the following cells are involved in the formation of myelin sheath in PNS?
(1) Astrocytes (2) Neurolemmocytes
(3) Oligodendrocytes (4) Microglia cells

58. Maximum regeneration power is found in which tissue?
(1) Nervous Tissue (2) Epithelial Tissue
(3) Connective Tissue (4) Muscular Tissue

59. Tendon is an example of
(1) Areolar tissue
(2) Adipose tissue
(3) Dense regular connective tissue
(4) Dense irregular connective tissue

60. Intercalacted disc is the characteristic of
(1) Smooth muscle (2) Skeletal muscle
(3) Cardiac muscle (4) All of these

61. Most abundant cation in protoplasm is
(1) Na^+ (2) K^+
(3) Ca^{++} (4) Mg^{++}

62. Phagocytic cells of connective tissue are
(1) Fibroblast cells (2) Histiocyte cells
(3) Mast cells (4) Adipose cells

63. Umblical cord consists of
(1) Areolar connective tissue
(2) Mucoid connective tissue
(3) Reticular connective tissue
(4) Adipose connective tissue

64. True vocal cords are made up of
(1) Areolar connective tissue
(2) White Fibrous connective tissue
(3) Yellow Fibrous connective tissue
(4) Adipose connective tissue

65. Which of the following is an example of flat bone?
(1) Vertebrae (2) Femur
(3) Sternum (4) Carpals

66. Amphicoelous vertebrae is found in
(1) 8^{th} vertebra of frog (2) 9^{th} vertebra of frog
(3) Cartilaginous fishes (4) Both (1) & (3)

67. Gap junctions
(a) Connect the sarcotubular system to individual skeletal muscle cells
(b) Are absent in cardiac muscle
(c) Are present and provide the pathway for rapid spread of excitation from one cardiac muscle fiber to another
(d) Are present but of little functional importance in cardiac muscle
Which is/are correct ?
(1) a and b (2) only b
(3) only c (4) a, c & d

68. The functions of tropomyosin in skeletal muscle include
(1) Sliding on actin to produce shortening
(2) Releasing Ca^{++} after initiation of contraction
(3) Acting as a 'relaxing protein' at rest by covering up the sites where myosin binds to actin
(4) Both (1) and (3)

69. Cockroach can move on smooth surface with the help of adhesive structure like
(1) Claw (2) Arolium
(3) Plantulae (4) Both (2) & (3)

1. During the formation of polysaccharides molecule of water is released at each condensation
$n(C_6H_{12}O_6)$ ® Polysaccharide
If n = 50, what would be the number of C, H and O in the polysaccharide formed?
(1) $C_{300}\ H_{500}\ O_{250}$ (2) $C_{300}\ H_{502}\ O_{251}$
(3) $C_{300}\ H_{600}\ O_{300}$ (4) $C_{300}\ H_{504}\ O_{252}$

2. Tick mark the **incorrect** match
(1) Cellulose Nitrate : Used in propellant explosives
(2) Cellulose Acetate : Used in fabrics
(3) Cellulose Xanthate : Used in preparation of jelly
(4) Carboxymethyl Cellulose : Added to ice-creams cosmetics and medicine

3. The presence of a non-competitive inhibitor
(1) Leads to both an increase in the V_{max} of a reaction and an increase in the K_m
(2) Leads to a decrease in the observed V_{max}
(3) Leads to decrease in K_m and V_{max}
(4) Leads to increase in K_m without affecting V_{max}

4. When a combination of pulses and cereals is consumed, all essential amino acids are adequately supplied. Cereal and millet proteins are deficient in _____ and _____ amino acids
(1) Methionine and cysteine
(2) Methionine and lysine
(3) Lysine and Tryptophan
(4) Tyrosine and Tryptophan

5. Enzymes, vitamins and hormones are common in
(1) Being proteinaceous
(2) Regulating metabolism
(3) Being synthesised in the body of the organism
(4) Being used to catalyse metabolic processes

6. Proteases can act on a variety of proteins. The K_m value of the protease will _____
(1) Not vary with the type of protein
(2) Vary with the type of protein
(3) Decrease with the type of protein
(4) Increase with type of protein

7. The co-enzyme NAD has how many phosphate groups and nucleotides, respectively?
(1) One and one (2) Two and one
(3) One and Two (4) Two and two

8. The catalytic efficiency of two different enzymes is compared by their
(1) Product
(2) Molecular size
(3) K_m value
(4) Optimum pH on which it acts

9. Exoskeleton of arthropods have a complex polysaccharides called chitin. These complex polysaccharides are _____ . They have building blocks as _____
(1) Homopolymers, N-acetyl glucosamine
(2) Heteropolymer, N-acetyl galactosamine
(3) Heteropolymer, N-acetylglucosamine
(4) Homopolymer, N-acetylgalactosamine

10. In a killed animal, glycogen of liver disintegrates enzymatically to form
(1) Lactose
(2) Fructose
(3) Glucose
(4) Lactic acid

11. Which of the following disaccharide will yield only α-glucose on hydrolysis?
(1) Lactose (2) Maltose
(3) Sucrose (4) Cellobiose

12. Histidine decarboxylase which cleaves C–C bond in histidine to form carbon dioxide and histamine belongs to which category of enzymes?
(1) Transferase (2) Hydrolase
(3) Lyase (4) Oxidoreductase

13. In World war-II, nerve gas was used to kill human beings by irreversibly inhibiting _____ enzyme. This is an example of _____ inhibition
(1) Cytochrome oxidase, non-competitive
(2) Phosphofructokinase, allosteric
(3) Acetylcholinesterase, non-competitive
(4) Hexokinase, allosteric

14. Observe the relationship between the first two words and fill in a suitable word in the fourth place
(a) Aminoacids : Protein :: Nucleotides : _____
(b) Plants : Starch :: Mammals : _____
(c) α-Helix : Protein :: Double Helix : _____
Which of the following is correct sequence?
(1) DNA, glucose, Nucleic acid
(2) Nucleic acids, Glycogen, DNA
(3) RNA, Amylose, Nucleic acids
(4) Nucleic acid, Amylopectin, DNA

15. All the following statement about cellulose are correct but one is wrong which one is wrong?
(1) Cellulose is a homopolymer
(2) It is the most abundant organic molecule in the biosphere

(3) It is branched polymer of β-glucose
(4) It has β-1-4 glycosidic bonds

16. Which of the following is an example of competitive inhibition?
(1) Inhibition of hexokinase by glucose-6-phosphate
(2) Inhibition of cytochrome oxidase, by cyanide
(3) Inhibition of succinic dehydrogenase by malonate
(4) Inhibition of phosphofructokinase by ATP

17. In both cells and extra-cellular fluids dibasic phosphate (HPO_4^{2-}) and monobasic phosphate ($H_2PO_4^-$) neutralise
(1) Strong acids and bases respectively
(2) Strong bases and acids respectively
(3) Strong acids only
(4) Strong bases only

18. Glucosamine is present in the structure of
(1) Fungal Cellulose (2) Hyaluronic acid
(3) Chondroitin sulfate (4) All of these

19. Which of the following is not associated with phosphate group?
(1) Guanylic acid (2) Uridylic acid
(3) Cytidine (4) Cytidylic acid

20. The sequence of amino acid *i.e.*, the positional information in a protein is included under
(1) Quarternary structure (2) Secondary structure
(3) 3-D-view (4) Primary structure

21. The type of bonding present in case of chitin is
(1) α 1-4 (2) β 1-2
(3) β 1-4 (4) α 1-6

22. Vitamin E or tocopherols belong to group
(1) Quarternary protein
(2) Heteropolysaccharide
(3) Derivative of monosaccharide
(4) Terpenes

23. GLUT-4, a protein, which
(1) Acts as hormone
(2) Acts as an enzyme
(3) Enables glucose transport into cells
(4) Is present in intercellular spaces

24. Find out the correct statement
(1) 3° structure is absolutely necessary for the many biological activities of proteins
(2) Most of blood proteins are acidic
(3) Glycogen has α, 1 - 4 as well as α, 1 - 6 glycosidic bonds
(4) All of these

25. Nature of artificial silk is
(1) Proteins (2) Polysaccharide
(3) Lipoprotein (4) Fat

26. LDH which catalyses pyruvate to lactate is an example of
(1) Antienzyme (2) Isoenzyme
(3) Co-enzyme (4) Apoenzyme

27. Which one of the following is **correct** for raffinose w.r.t. their sugar components?
(1) Glucose-galactose-mannose
(2) Galactose-glucose-fructose
(3) Galactose-trehalose-fructose
(4) Mannose-glucose-fructose

28. Type/s of glycosidic bond/s found in amylopectin is/are
(1) α(1 – 4) (2) β(1 – 4)
(3) α(1 – 4) & α(1 – 6) (4) α(1 – 4) & β(1 – 6)

29. Cytidine monophosphate (CMP) is same as
(1) Ribose + Cytosine + Phosphate
(2) Cytidylic acid
(3) Deoxyribose + Cytosine + Phosphate
(4) Both (1) & (2)

30. Which of the following storage protein is prolamine not coagulated on heating, soluble in 70 – 80% alcohol present in maize?
(1) Oryzenin (2) Glutelin
(3) Glutenin (4) Zein

31. Which of the following statements is not true for Km value/Michaelis-Menten constant?
(1) Its a substrate concentration at which enzyme linked reaction reaches $\frac{1}{2}$ of its maximum velocity
(2) Allosteric enzymes does not follow Km
(3) Km value will differ for enzyme protease which acts on different proteins
(4) Lower Km value indicates lower substrate affinity of enzyme

32. Which of the following is **incorrect** match about the enzymes and reaction catalysed?
(1) Maltose $\xrightarrow{\text{Maltase}}$ glucose + glucose
(2) Lactose $\xrightarrow{\text{Lactase}}$ fructose + galactose
(3) Sucrose $\xrightarrow{\text{Invertase}}$ glucose + fructose
(4) Dipeptides $\xrightarrow{\text{Dipeptidase}}$ amino acids

33. Adenylic acid is
(1) Riboside
(2) Ribotide
(3) Ribose + phosphate + base
(4) Both (2) & (3)

34. Which of the following is not essential for normal biosynthesis of thyroid hormones?
(1) Iodine (2) Protein synthesis
(3) Thyroglobulin (4) Ferritin

35. All of the following mucopolysaccharides are obtained from marine brown and red algae except
(1) Agar (2) Alginic acid
(3) Carragenin (4) Chondroitin sulphate

36. Which of the following statement is/are not correct w.r.t. RNA?
a. RNA is always single stranded
b. RNA does not follow Chargaff's rules
c. t-RNA is smallest type of RNA and found in cytoplasm
d. RNA contains adenine, guanine, cytosine and thymine instead of uracil
(1) a & b (2) a & d
(3) a, b & d (4) a, b & c

37. An inhibitor I binds either with free enzyme or the ES complex and prevents the reaction. Thus in presence of I
(1) K_m value increases
(2) V_{max} remains unaffected
(3) V_{max} of the reaction increases
(4) V_{max} of the reaction decreases

38. Allosteric modulation is due to the inhibition of enzyme by
(1) Co-enzyme
(2) Substrate concentration
(3) Products of reaction
(4) Enzyme concentration

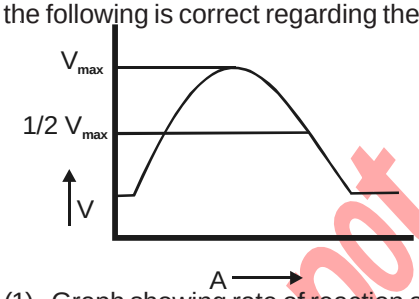
39. Cotton fibre and paper are chemically made up of
(1) Chitin containing N-acetylglucosamine
(2) Phospholipid
(3) Cellulose
(4) Glycine and glutathione

40. Which drug (steroid) is obtained from yam plant for formation of antifertility pills?
(1) Digitalis (2) Strophanthin
(3) Diosgenin (4) Sitosterol

41. Type of secondary structure shown by keratin protein of hair, nails and horns
(1) β pleated-parallel (2) β pleated-antiparallel
(3) α helix (4) Triple helix

42. The amino acid which gives rise to plant hormone indole - 3 - acetic acid and nicotinamide is
(1) Tyrosine
(2) Tryptophan
(3) Methionine
(4) Glycine

43. Consider the following graph showing the rate of reaction of an enzyme catalysed reaction. Which of the following is correct regarding the graph ?



(1) Graph showing rate of reaction at different concentration of H^+
(2) Graph showing rate of reaction at different temperature
(3) Graph showing rate of reaction at different substrate concentration
(4) Both (1) and (2)

44. The enzyme 'phosphoglyceromutase' which catalyzes conversion of 3-phosphoglycerate to 2-phosphoglycerate belongs to the
(1) Class I (2) Class II
(3) Class IV (4) Class V

45. Which of the following includes enzymes of succus entericus only?
(1) Trypsinogen, enterokinase, carboxypeptidase
(2) Enterokinase, rennin, DNAase
(3) Maltase, aminopeptidase, nucleotidase
(4) DNAase, procarboxypeptidase, elastase

46. Most abundant unsaturated fatty acid is
(1) Palmitic acid
(2) Oleic acid
(3) Arachidonic acid
(4) Linolenic acid

47. Raffinose is a trisaccharide having
(1) 2 glucose and 1 fructose
(2) 1 glucose, 1 fructose and 1 lactose
(3) 1 glucose, 1 fructose and 1 galactose
(4) 2 galactose and 1 fructose

48. In feed back inhibition, a metabolic pathway is switched off by
(1) Lack of a substrate
(2) Competitive inhibition
(3) Accumulation of end product
(4) A rise in temperature

49. Which of the following protein does not show α-helix structure?
(1) Fibroin of silk (2) Keratin of hair
(3) Fibrin (4) Both (1) & (3)

50. Cheese is a
(1) Denatured fat
(2) Branched polysaccharide
(3) Unbranched polysaccharide
(4) Denatured protein

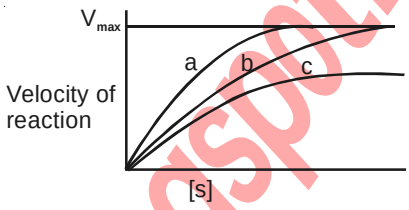
51. Which of the following statement is **incorrect** for B-form DNA?
(1) It is dsDNA
(2) Both strands are antiparallel and complimentary to each other
(3) It is right handed DNA, in which both strands are held together with phospho diester bond
(4) More sequence with G – C is more stable or has high melting area

52. Choose correct combination of proteins and related functions
a. Collagen - Intercellular ground substance
b. GLUT-4 - Enables glucose transport into cells
c. Trypsin - Digestion of proteins
d. Antibody - γ-immunoglobulin fight against infections agents
(1) a correct (2) a & b correct
(3) a, b & c correct (4) a, b, c & d correct

53. Which of the following is the most abundant protein in whole of the biosphere?
(1) Collagen (2) RUBISCO
(3) Myoglobin (4) Hemoglobin

54. Raffinose is a trisaccharide having
(1) 2 glucose and 1 fructose
(2) 1 glucose, 1 fructose and 1 lactose
(3) 1 glucose, 1 fructose and 1 galactose
(4) 2 galactose and 1 fructose

55. The figure given below shows three velocity-substrate-concentration curves for an enzyme reaction. What do the curves a, b and c depict respectively ?



(1) a. Normal enzyme reaction
b. Competitive inhibition
c. Noncompetitive inhibition
(2) a. Competitive inhibition
b. Noncompetitive inhibition
c. Normal enzyme reaction
(3) a. Normal enzyme reaction
b. Uncompetitive enzyme reaction
c. Noncompetitive enzyme reaction
(4) a. Uncompetitive enzyme reaction
b. Noncompetitive enzyme reaction
c. Normal enzyme reaction

56. Most abundant RNA is
(1) m-RNA (2) r-RNA
(3) t-RNA (4) All of these

[Chapter - 4 : Digestion and Absorption]

1. Consider the following four statements (i - iv) about the function of stomach
i. Absorption of water, simple sugars and alcohol
ii. Digestion of protein (collagen)
iii. Absorption of vitamin B_{12}
iv. Maltose of bolus is digested into glucose and finally, absorbed.
Which two of the above functions of stomach are true?
(1) i and iii (2) i, ii and iii
(3) iii and iv (4) ii and iii

2. There are four different hormones, their sources and actions are given in following table. Select the correct one

	Hormones	Sources	Action
(1)	Secretin	Duodenum	Stimulate the gastric mobility
(2)	GIP	Duodenum	Inhibition of gastric activity
(3)	Gastrin	Stomach & Jejunum	Receptors like CCK
(4)	CCK	Duodenum	Close the sphincter of Boyden

3. Which of the following is incorrect about the characteristic of marasmus?
(1) It occurs in infant under one year of age
(2) Ribs are prominent
(3) Subcataneous fat is normal
(4) It is caused by deficiency of carbohydrate along with protein

4. After digestion the passively absorbable substance is
(1) Glucose (2) Galactose
(3) Fructose (4) Amino acids

5. Colon is characterised by
(1) Presence of taeniae coli but absence of haustra
(2) Presence of vermiform appendix but absence of taeniae coli
(3) Presence of taeniae coli and haustra
(4) Presence of haustra but absence of epiploic appendages

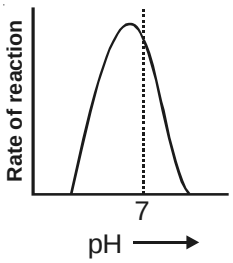
6. A person suffering from achlorhydria will subsequently suffer from
(1) Haemorrhoids (2) Pernicious anaemia
(3) Microcytic anaemia (4) Indigestion of protein

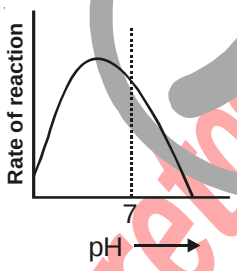
7. Consider the following statements concerning tongue
   (a) It is freely movable muscular voluntary organ.
   (b) It is attached with anterior floor of oral cavity.
   (c) Its attachment is supported by frenulum.
   (d) All papillae bear taste buds.
   Which of the above statements are correct?
   (1) (a), (b) and (c) are correct
   (2) (a), (b) and (d) are correct
   (3) (a) and (c) are correct
   (4) (b), (c) and (d) are correct

8. Select the correct combination w.r.t. organs, tissue layer and their respective glands
   (1) Stomach → Submucosa → Digestive glands
   (2) Duodenum → Submucosa → Brunner's gland
   (3) Jejunum → Mucosa → Brunner's gland
   (4) Ileum → Fibrosa → Argentaffin cells

9. If there is over activity of vagus nerve then _____
   (1) Protein digestion is affected
   (2) Gastric secretion will decrease
   (3) Peristalic movements of stomach will decrease
   (4) Gastric ulcer can occur

10. Which of the following graph depicts the rate of enzymatic activity and pH for salivary amylase?

(1)


(2)


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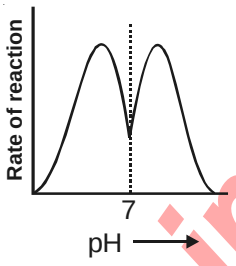
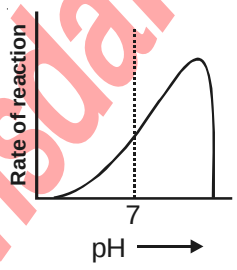


(4)


11. Which of the following hormones can reduce gastric motility?
   (1) Enterogastrone (2) Secretin
   (3) GIP (4) All of these

12. In constipation, the faeces are retained within the colon as the bowel movement occur irregularly. This can be treated by taking
   (1) Distilled water (2) Fat rich food
   (3) Magnesium salt (4) Salty water

13. Auerbach plexuses is present
   (1) Between longitudinal and circular muscles is muscularis externa
   (2) Between circular and oblique muscles in sub-mucosa
   (3) In muscularis mucosa
   (4) In sub-mucosa

14. Which layer of the human tooth links it with peridontal layer of alveolar socket?
   (1) Dentine (2) Dental pulp
   (3) Cementum (4) Enamel

15. Which of the following enzyme is involved in the digestion of the protein-keratin?
   (1) Pepsin
   (2) Trypsin
   (3) Chymotrypsin
   (4) It cannot be digested in human body

16. If the vagus nerve is cut which of the following function/s is/are affected in alimentary canal?
   (1) Secretion of gastric juice
   (2) Secretion of succus entericus
   (3) Peristalsis
   (4) All of these

17. Water is absorbed in the jejunum, ileum and colon and excreted in the faeces. Arrange these in order of the amount of water absorbed or excreted from greatest to smallest
   (1) Colon, jejunum, ileum, faeces
   (2) Jejunum, ileum, colon, faeces
   (3) Colon, ileum, jejunum, faeces
   (4) Faeces, colon, ileum, jejunum

18. Auerbach plexus is present
   (1) Between longitudinal and circular muscles of muscularis externa
   (2) Between circular and oblique muscles of sub-mucosa
   (3) In muscularis mucosa
   (4) In sub-mucosa

19. The symptoms of vitamin B_1 deficiency are
   (1) Swollen lips, thick pigmented skin of hands and legs, irritability
   (2) Wasting of muscles, thin limbs, oedema and diarrhoea
   (3) Reduced aerobic carbohydrate metabolism. So peripheral nerves are inflammed causing pain numbness and weakness of limb muscles
   (4) Fragile blood vessels because of defective collagen fibres

20. Nicotinamide and riboflavin nucleotides act as co-enzymes of
(1) Reducing enzymes
(2) Oxidising enzymes
(3) Zymogens
(4) Allosteric enzymes

21. Which of the following hormone is incorrectly matched with its source and action?

S.No.	Hormone	Source	Action
(1)	Gastrin	Pyloric stomach	Stimulates gastric glands to secrete and release the gastric juice
(2)	GIP (Gastric Inhibitory Peptide)	Duodenum	Inhibits gastric secretion and mobility
(3)	Secretin	Small intestine	Stimulates the Brunner's glands to release mucus and enzymes
(4)	Vasoactive Intestinal Peptide (VIP)	Small intestine	Dilates peripheral blood vessels of gut and inhibits gastric acid secretion

22. Match the column

Column I		Column II
a. Thiamine	(i)	Dermatitis
b. Riboflavin	(ii)	Megaloblastic anaemia
c. Pantothenic acid	(iii)	Scurvy
d. Folic acid	(iv)	Cheilosis
e. Ascorbic acid	(v)	Wernicke's syndrome

(1) a(i), b(v), c(iv), d(ii), e(iii)
(2) a(iii), b(iv), c(i), d(ii), e(v)
(3) a(v), b(i), c(ii), d(iv), e(iii)
(4) a(v), b(iv), c(i), d(ii), e(iii)

23. Which of the following is incorrect about the enzyme, type of secretion and substrate?
(1) Pepsin - Gastric juice - Proteins
(2) Enteropeptidase - Succus entericus - Trypsinogen
(3) DNAase - Succus entericus - DNA
(4) Aminopeptidase - Succus entericus - Large peptide

24. The dark green mucilaginous material in the intestine of the full term foetus
(1) Stercobilinogen (2) Skatole
(3) Meconium (4) Urobilinogen

25. Heart burn condition can arise in case of
(1) Inflammation of alveoli
(2) Inflammation of atria
(3) Inflammation of pleural membrane
(4) Cardiac sphincter fails to close

26. The disease which is characterised by deficiency of proteins and calories in which subcutaneous fat is not preserved is
(1) Osteomalacia
(2) Megaloblastic anaemia
(3) Kwashiorkor
(4) Marasmus

27. Activation of chymotrypsinogen into chymotrypsin is caused by
(1) Enterokinase (2) Enteropeptidase
(3) Trypsin (4) Pepsin

28. Which layer of gastrointestinal tract forms rugae in stomach and small finger like foldings called villi in small intestine?
(1) Circular muscles of muscularis externa
(2) Connective tissue of submucosa
(3) Mucosa layer
(4) Serosa made of mesothelium

29. The dental formula of deciduous teeth in humans is
(1) $i\frac{2}{2}, c\frac{1}{1}, pm\frac{2}{2}, m\frac{3}{3}\times 2$
(2) $i\frac{2}{2}, c\frac{1}{1}, pm\frac{0}{0}, m\frac{2}{2}\times 2$
(3) $i\frac{2}{2}, c\frac{1}{1}, pm\frac{2}{2}, m\frac{2}{2}\times 2$
(4) $i\frac{2}{2}, c\frac{1}{1}, pm\frac{0}{0}, m\frac{3}{3}\times 2$

30. The ductus choledochus contains sphincter of Boyden which helps in
(1) Emptying of gall bladder
(2) Filling of pancreatic juice
(3) Filling of gall bladder
(4) Filling of succus entericus

31. Kupffer's cells in the liver are located in
(1) Glisson's capsule (2) Sinusoids
(3) Portal triad (4) Falciform ligament

32. Excessive stimulation of vagus nerve can be related to
(1) Xerostomia (2) Inhibition of peristalsis
(3) Cholelithiasis (4) Gastric ulcer

33. Distended or enlarged rectal vein of anal columns leads to
(1) Haemorrhoids (2) Appendicitis
(3) Piles (4) Both (1) & (3)

34. Digestive juice added into duodenum through sphincter of oddi is/are
a. Gastric juice b. Bile juice
c. Pancreatic juice d. Succus entericus
(1) Only c (2) Only b
(3) c and d (4) b and c

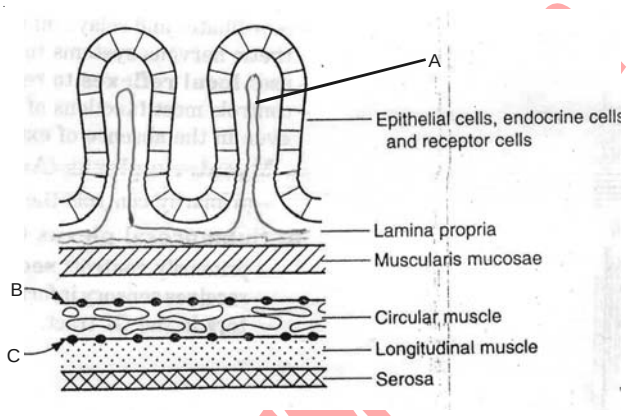
35. Oxyntic(parietal) cells of gastric gland secrete HCl. Mark wrong one regarding functions of HCl
(1) Inactivates ptyalin and maintains strong acidic medium
(2) Is germicidal and kills microbes
(3) Activates pro-enzymes
(4) Converts Fe^{3+} into Fe^{2+} which inhibits the absorption of iron

36. Sodium glycocholate and sodium taurocholate are the sodium salts of cholic acid. Mark incorrect one regarding them
(1) Cause emulsification of fats
(2) Increase lipase activity
(3) Also help in absorption of fat products
(4) Inorganic in nature

37. Which of the following condition can be related to iron deficiency anemia?
(1) Heart burn (2) Achlorhydria
(3) Achalasia cardia (4) Hypoglycaemia

38. Accessory duct of pancreas which directly opens into duodenum called
(1) Duct of Santorini (2) Duct of Wirsung
(3) Ventral duct (4) Ductus choledocus

39. Identify the following structure labelled as A,B & C in the diagram.



(1) A – Lacteal ; B – Submucosal plexus ; C – Myenteric plexus
(2) A – Submucosal plexus ; B – Myenteric plexus ; C – Lacteals
(3) A – Circular muscle ; B – Myenteric plexus ; C – Submucosal plexus
(4) A – Longitudinal muscle ; B – Myenteric plexus ; C – Submucosa

40. Enterohepatic circulation involves
(1) Hepatic portal vein and hepatic artery
(2) Hepatopancreatic duct and hepatic portal vein
(3) Hepatopancreatic duct, hepatic artery & hepatic portal vein
(4) Hepatopancreatic duct, hepatic vein & hepatic portal vein

41. Which of the following event can be conditioned?
(1) Secretion of adrenal medulla
(2) Secretion of salivary glands
(3) Deglutination
(4) Rotation of eye balls

[Chapter - 5 : Breathing and Exchange of Gases]

1. Select the **incorrect** match
(1) Dorsal respiratory group – Maintain basic respiratory rhythm
(2) Ventral respiratory group – Enhanced respiratory drive
(3) Pneumotaxic centre – Switch off point of respiration
(4) Hering - Breuer's reflex – Preventing excess deflation of the lungs

2. Which of the following can alter respiratory mechanism?
(1) Pneumotaxic centre of pons
(2) Chemosensitive area of pons
(3) Chemosensitive area of medulla
(4) Both (1) & (3)

3. In which of the following diseases inflammation does not occur?
(1) Bronchitis (2) Pneumonia
(3) Emphysema (4) All of these

4. Consider the following three chemical reactions about carbonic anhydrase
i. $CO_2 + H_2O \rightarrow H_2CO_3$
ii. $H_2CO_3 \rightarrow H^+ + HCO_3^-$
iii. $H_2CO_3 \rightarrow H_2O + CO_2$
Which set of the above reactions for such an enzyme is correct?
(1) i and ii (2) i and iii
(3) ii and iii (4) i, ii and iii

5. Partial pressure of O_2 in oxygenated blood is 95 when
(1) pO_2 is 40 mm Hg in deoxygenated blood
(2) pO_2 is 40 mm Hg in tissue
(3) pO_2 is 116 mm Hg in atmospheric air
(4) pO_2 is 104 mm Hg in alveoli

6. Select the **correct** match

	Column I		Column II
a.	Inspiration	(i)	Complemental air
b.	Normal expiration	(ii)	Active process
c.	IRV	(iii)	Passive process
d.	ERV	(iv)	Supplemental air

(1) a(ii), b(i), c(iii), d(iv) (2) a(ii), b(iii), c(i), d(iv)
(3) a(iii), b(ii), c(i), d(iv) (4) a(iv), b(iii), c(ii), d(i)

7. Consider the following cells present in lungs :
(a) Squamous epithelial cells
(b) Pneumocytes-II
(c) Dust cells
(d) Clara cells
Which set of the cells are correct w.r.t. phagocytic behaviour?
(1) (a), (b) and (c) (2) (a) and (c)
(3) (b) and (c) (4) (c) only

8. Select the correct statement
(1) Inspiration can occur if the pressure within the lungs is less than the atmospheric pressure
(2) Expiration can occur if the intra-pulmonary pressure is less than the atmospheric pressure
(3) Positive pressure in the lungs with respect to atmospheric pressure leads to inspiration
(4) Inspiration can occur if the intra-pulmonary pressure is equal as the atmospheric pressure

9. Choose the **correct** combination w.r.t. Po_2

	Column-I		Column-II
a.	Alveolar air	(i)	40 mm Hg
b.	Oxygenated blood	(ii)	95 mm Hg
c.	Deoxygenated blood	(iii)	100 mm Hg
d.	Expired air	(iv)	116 mm Hg

(1) a(iii), b(ii), c(i), d(iv) (2) a(iii), b(i), c(ii), d(iv)
(3) a(iii), b(i), c(iv), d(ii) (4) a(iii), b(iv), c(i), d(ii)

10. What is the total amount of CO_2 transported by RBCs?
(1) 70% (2) 80-90%
(3) 20-25% (4) 40%

11. At what partial pressure of oxygen 50% of haemoglobin molecules of RBC get saturated, under normal conditions?
(1) 10-15 mm Hg (2) 27-30 mm Hg
(3) 37-40 mm Hg (4) 45-50 mm Hg

12. Which of the following disease is characterised by proliferation of fibrous connective tissue in upper part of lungs?
(1) Pneumonia
(2) SARS
(3) Occupational respiratory disease
(4) Bronchial asthma

13. The following pulmonary capacities cannot be measured by simple spirometer directly
(1) Inspiratory capacity
(2) Functional residual capacity
(3) Total lung capacity
(4) Both (2) & (3)

14. Which of the following statement is not true?
(1) The concentration of CO_2 and H^+ cause increased strength of inspiratory as well as, expiratory signal
(2) During strong pneumotaxic signal, complete filling of lungs occur
(3) The volume of dissolved CO_2 in 100 ml of deoxygenated blood is 2.7 ml
(4) Diffusing capacity of oxygen is two times faster than nitrogen

15. Nerve impulse from the dorsal respiratory group of neurons stimulate the
(1) Diaphragm to become dome shaped
(2) Diaphragm to flatten
(3) External intercostal muscle to lower the rib cage
(4) Internal intercostal muscle to raise the rib cage

16. At a particular pressure difference the diffusion of carbon dioxide is
(a) Twenty times faster than oxygen
(b) Forty time faster than nitrogen
(c) Two times faster than oxygen
(d) Eight times faster than nitrogen
(1) Only a & d (2) Only a & b
(3) Only a & c (4) Only b, c & d

17. The impulse for voluntary muscles for forced breathing starts in
(1) Medulla (Pons) (2) Pneumotaxic area
(3) Cerebral hemispheres (4) Spinal chord

18. Gaseous exchange does not occurs in
(1) Lungs alveoli
(2) Alveolar ducts
(3) Terminal bronchioles
(4) Respiratory bronchioles

19. Contraction of the external intercostal muscle accounts for _____ of the change in intrathoracic volume during quiet inspiration
(1) 25% (2) 15%
(3) 55% (4) 75%

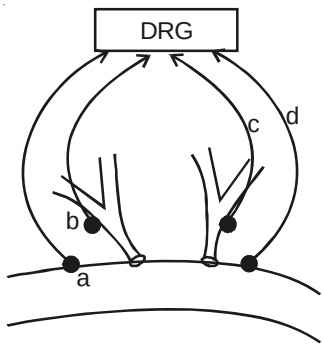
20. If the pneumotaxic signals are weak
(1) Complete filling of lungs is not possible
(2) Breathing rate becomes slow
(3) Inspiration takes less time period
(4) Expiration takes more time period

21. Which of the following statement is not true?
(1) The concentration of CO_2 and H^+ cause increased strength of inspiratory as well as expiratory signal
(2) During strong pneumotaxic signal, complete filling of lungs occur
(3) The volume of dissolved CO_2 in 100 ml of deoxygenated blood is 2.7 ml
(4) Diffusing capacity of oxygen is two times faster than nitrogen

22. Orthopnoea is
(1) Painful breathing
(2) Rapid breathing
(3) Slower breathing
(4) Difficult breathing in horizontal position

23. Carotid bodies and aortic bodies are associated with
(1) Regulation of blood volume
(2) Regulation of respiration rate
(3) Regulation of blood supply to heart and aortic arches
(4) Regulation of blood supply to brain

24.

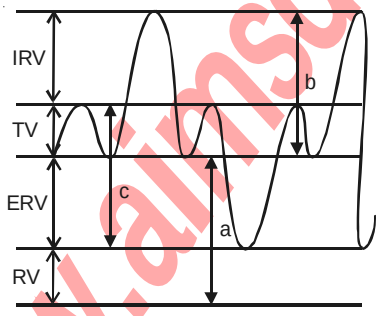


Identify a, b, c and d in the given figure
(1) a – Aortic body ; b – Carotid body ; c – X Cranial nerve ; d – IX Cranial nerve
(2) a – IX Cranial nerve ; b – X Cranial nerve ; c – Aortic body; d – Carotid body
(3) a – VIII Cranial nerve ; b – X Cranial nerve ; c – Carotid body ; d – Aortic body
(4) a – VII Cranial nerve ; b – XI Cranial nerve ; c – Aortic body ; d – Carotid body

25. Which of the following is correct?
(1) TLC = VC + RV
(2) EC = RV + ERV
(3) IC = ERV + TV
(4) FRC = TLC –(ERV + TV)

26. At times, the health care professionals have to administer neonatal lung surfactant intratracheally to the newly born babies suffering from
(1) Respiratory Distress Syndrome (RDS)
(2) Asthma
(3) Hypercapnia
(4) Asthma

27. In the following figure identify various pulmonary capacities (a, b and c) of human lung



(1) a–FRC ; b–EC ; c–IC (2) a–EC ; b–IC ; c–EC
(3) a–FRC ; b–IC ; c–EC (4) a–EC ; b–IC ; c–FRC

28. Larynx is a cartilaginous structure consist of nine pieces which of the following are unpaired cartilages of larynx?
(1) Epiglottis, thyroid, arytenoid
(2) Thyroid, cricoid, arytenoid
(3) Arytenoid, corniculate, cuneiform
(4) Thyroid, cricoid, epiglottis

29. Which of the following muscles involve in forceful expiration?
(1) Abdominal muscles and diaphragm muscles
(2) Diaphragm muscles and external intercostal muscles
(3) Abdominal muscles and internal intercostal muscles
(4) External and internal intercostal muscles

30. In expired air pO_2 and its percentage is respectively
(1) 159 mm Hg, 20.84%
(2) 116 mm Hg, 15.7%
(3) 159 mm Hg, 15.7%
(4) 116 mm Hg, 20.84%

31. Which of the following pulmonary capacities can not be measured by simple spirometer?
(1) Inspiratory capacity
(2) Functional residual capacity
(3) Vital capacity
(4) Expiratory capacity

32. There are several factors that affect the oxygen haemoglobin dissociation curve. Under which of the following, would the graph moves towards left?
(1) Increase in pH
(2) Increase in temperature
(3) Increase in pCO_2
(4) Excess of 2, 3-DPG

33. Which of the following is correct with reference to apneustic centre?
(1) It is present in the dorsal part of pons Varolii
(2) It operates in association with VRG
(3) It controls depth of inspiration
(4) It is associated Hering breurer reflex

34. Rate and depth of breathing will increase when
(1) CO_2 concentration increases in arteries
(2) O_2 concentration increases in arteries
(3) 2, 3 DPG concentration increases in vein
(4) HCO_3^- concentration increases in vein

35. Which one of the following statement is correct?
(1) All animals require oxygen for their survival
(2) In most of the invertebrate groups O_2 is transported through blood
(3) In lower invertebrates, respiration occurs through body surface
(4) The main function of nephridia is gaseous exchange

36. Much of the CO_2 reacts with water of the RBC to form carbonic acid. The reaction is facilitated by
(1) Carboxylase enzyme and Ca^{++} ions
(2) Bicarbonate synthetase and K^+ ions
(3) Carbonic anhydrase and Zn^{++} ions
(4) Carbonic acid lyase and Mg^{++} ions

37. Which one of the following is the correct matching pair of the disease and their three symptoms?

	Diseases		Symptoms
(1)	Bronchitis	-	Coughing, wheezing, difficulty in breathing mainly during expiration
(2)	Bronchial asthma	-	Hypertrophy and hyperplasia of sero-mucous gland, excess mucus secretion, thick greenis yellow sputum
(3)	Emphysema	-	Alveolar septa collapse, surfac area of lungs reduces, inflated lungs
(4)	Pulmonary tuberculosis	-	Inflammation in alveoli, alveoli is filled with fluid, blood oxyger reduced

38. Maximum volume of air that can be inspired during forceful inspiration after normal expiration
(1) Inspiratory capacity
(2) Expiratory capacity
(3) Functional residual capacity
(4) Total lung capacity

39. In which of the following has maximum CO_2 concentration?
(1) Alveoli of lungs (2) Atmospheric air
(3) Tissue fluid (4) Both (1) & (3)

40. Find the **incorrect** statement
(1) When pCO_2 is high and pO_2 is low as in tissues more binding of CO_2 occurs
(2) RBCs contain a very high concentration of carbonic anhydrase
(3) A parabolic curve is obtained when percentage saturation of Hb with oxygen is plotted against the pO_2
(4) Nearly 20-25% of CO_2 is transported by RBC's whereas 70% of it is carried as bicarbonate

41. Approximately how much ml of CO_2 is delivered by deoxygenated blood (per 100 ml) to alveoli?
(1) 19.4 ml (2) 14.4 ml
(3) 5.5 ml (4) 4 ml

42. Which of the following is **not** true regarding total lung capacity?
(1) TLC = VC + RV
(2) TLC = TV + IRV + ERV + RV
(3) TLC = IC + FRC
(4) TLC = VC + FRC

43. Hypoxia developed due to poor cardiac output or insufficient supply of oxygen and nutrients is
(1) Arterial hypoxia (2) Stagnant hypoxia
(3) Anaemia hypoxia (4) Hypoxia hypoxia

44. Find out the incorrect statement
(1) Less concentration of H^+ ions is favourable for formation of oxyhaemoglobin
(2) Larynx is cartilagenous sound box of body
(3) Solubility of CO_2 is less than solubility of O_2
(4) Affinity of CO with haemoglobin is more than O_2

45. HCO_3^- ions diffuse out into plasma and Cl^- ions move into the RBCs at the level of tissues and is known as
(1) Chloride shift (2) Haldane effect
(3) Hamburger phenomenon (4) Both (1) & (3)

46. Inspiratory reserve volume + Tidal, volume + Expiratory reserve volume is termed as
(1) Inspiratory capacity
(2) Functional residual capacity
(3) Vital capacity
(4) Total lung capacity

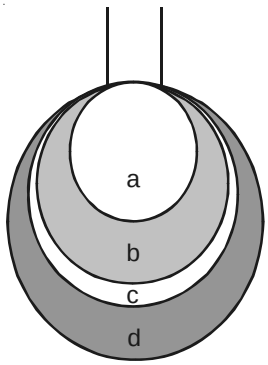
47. If residual volume is 1200 ml, expiratory reserve volume is 1100 ml, Tidal volume is 500 ml inspiratory reserve volume is 3000 ml then find out functional residual capacity of this person
(1) 4100 ml (2) 2300 ml
(3) 5800 ml (4) 3500 ml

48. Volume of air which we can inspire by a forceful inspiration over tidal volume is
(1) Inspiratory reserve volume
(2) Expiratory reserve volume
(3) Residual volume
(4) Functional residual capacity

49. Inspiration can occur when
(1) Intra-pulmonary pressure is less than atmospheric pressure
(2) Intra-pulmonary pressure is more than atmospheric pressure
(3) Intra-pulmonary pressure is equal to atmospheric pressure
(4) Intra-pulmonary pressure is mismatched with atmospheric pressure

50. In the given figure different respiratory volumes and capacities are shown by a, b, c and d. Identify them choosing the words from the box given below

Residual Volume (RV), Expiratory Reserve Volume (ERV), Tidal Volume (TV), Inspiratory Reserve Volume (IRV)



(1) a–RV ; b–ERV ; c–TV ; d–IRV
(2) a–TV ; b–RV ; c – ERV ; d–IRV
(3) a–RV ; b–IRV ; c–ERV ; d–TV
(4) a–TV ; b–RV ; c–IRV ; d–ERV

❑ ❑ ❑

ANSWERS

[PHYSICS]

Chapter 5 : System of Particles and Rotational Motion

1.	(4)	2.	(2)	3.	(3)	4.	(4)	5.	(1)	6.	(1)	7.	(2)
8.	(3)	9.	(4)	10.	(3)	11.	(3)	12.	(3)	13.	(1)	14.	(1)
15.	(2)	16.	(1)	17.	(1)	18.	(1)	19.	(3)	20.	(1)	21.	(3)
22.	(3)	23.	(3)	24.	(3)	25.	(2)	26.	(1)	27.	(2)	28.	(4)
29.	(1)	30.	(1)	31.	(2)	32.	(3)	33.	(2)	34.	(3)	35.	(2)
36.	(3)	37.	(1)	38.	(1)	39.	(2)	40.	(4)	41.	(4)	42.	(2)
43.	(1)	44.	(1)	45.	(4)	46.	(1)	47.	(3)	48.	(2)	49.	(2)
50.	(4)	51.	(2)	52.	(3)	53.	(1)	54.	(2)	55.	(4)	56.	(2)
57.	(2)	58.	(3)	59.	(2)								

Chapter 6 : Gravitation

1.	(3)	2.	(3)	3.	(2)	4.	(1)	5.	(4)	6.	(3)	7.	(4)
8.	(1)	9.	(2)	10.	(4)	11.	(2)	12.	(3)	13.	(2)	14.	(1)
15.	(3)	16.	(2)	17.	(3)	18.	(1)	19.	(4)	20.	(2)	21.	(4)
22.	(3)	23.	(2)	24.	(3)	25.	(2)	26.	(2)	27.	(4)	28.	(1)
29.	(3)	30.	(4)	31.	(3)	32.	(3)	33.	(2)	34.	(1)	35.	(4)
36.	(2)	37.	(3)	38.	(4)	39.	(2)						

Chapter 7 : Machanical Properties of Solids

1.	(4)	2.	(2)	3.	(1)	4.	(3)	5.	(4)	6.	(3)	7.	(1)
8.	(2)	9.	(4)	10.	(3)	11.	(4)	12.	(3)	13.	(2)	14.	(1)
15.	(3)	16.	(4)	17.	(2)	18.	(2)	19.	(3)	20.	(2)	21.	(1)
22.	(1)												

Chapter 8 : Machanical Properties of Fluids

1.	(2)	2.	(2)	3.	(3)	4.	(4)	5.	(3)	6.	(3)	7.	(2)
8.	(4)	9.	(2)	10.	(3)	11.	(2)	12.	(4)	13.	(1)	14.	(1)
15.	(1)	16.	(3)	17.	(1)	18.	(2)	19.	(4)	20.	(2)	21.	(2)
22.	(1)	23.	(2)	24.	(3)	25.	(3)	26.	(1)	27.	(1)	28.	(3)
29.	(1)	30.	(2)	31.	(3)	32.	(3)	33.	(1)	34.	(1)	35.	(3)
36.	(2)	37.	(2)	38.	(3)	39.	(3)	40.	(3)	41.	(3)	42.	(4)
43.	(4)	44.	(3)	45.	(2)	46.	(1)						

[CHEMISTRY]

Chapter 6 : Thermodynamics

1.	(4)	2.	(2)	3.	(1)	4.	(3)	5.	(1)	6.	(4)	7.	(1)
8.	(1)	9.	(4)	10.	(1)	11.	(2)	12.	(4)	13.	(3)	14.	(2)
15.	(1)	16.	(1)	17.	(2)								

Chapter 7 : Equlilbrium

1.	(3)	2.	(2)	3.	(1)	4.	(4)	5.	(2)	6.	(4)	7.	(4)
8.	(4)	9.	(1)	10.	(2)	11.	(3)	12.	(3)	13.	(1)	14.	(4)
15.	(2)	16.	(2)	17.	(3)	18.	(4)	19.	(2)	20.	(4)	21.	(3)
22.	(3)	23.	(3)	24.	(3)								

Chapter 8 : Redox Reaction

1.	(1)	2.	(2)	3.	(1)	4.	(2)	5.	(2)	6.	(3)	7.	(4)
8.	(3)	9.	(1)	10.	(1)	11.	(4)	12.	(3)	13.	(2)	14.	(43)
15.	(4)												

Chapter 9 : Hydrogen

1.	(4)	2.	(2)	3.	(1)	4.	(1)	5.	(3)	6.	(2)	7.	(3)

Chapter 10 : s-Block Elements

1.	(4)	2.	(2)	3.	(2)	4.	(2)	5.	(2)	6.	(1)	7.	(1)
8.	(2)	9.	(4)	10.	(3)	11.	(4)	12.	(3)	13.	(1)	14.	(3)
15.	(1)	16.	(2)										

Chapter 11 : Some p-Block Elements

1.	(2)	2.	(4)	3.	(4)	4.	(2)	5.	(4)	6.	(2)	7.	(1)
8.	(3)	9.	(3)	10.	(1)	11.	(3)	12.	(1)	13.	(3)	14.	(2)
15.	(2)	16.	(2)	17.	(3)	18.	(3)						

[BOTANY]

Chapter 4 : Morphology of Flowering Plants

1.	(4)	2.	(4)	3.	(2)	4.	(4)	5.	(4)	6.	(4)	7.	(2)
8.	(2)	9.	(3)	10.	(2)	11.	(4)	12.	(1)	13.	(3)	14.	(1)
15.	(1)	16.	(2)	17.	(4)	18.	(1)	19.	(4)	20.	(3)	21.	(4)
22.	(3)	23.	(3)	24.	(2)	25.	(4)	26.	(2)	27.	(1)	28.	(4)
29.	(2)	30.	(3)	31.	(2)	32.	(1)	33.	(2)	34.	(2)	35.	(3)
36.	(2)	37.	(3)	38.	(3)	39.	(4)	40.	(3)	41.	(2)	42.	(3)
43.	(2)	44.	(3)	45.	(1)	46.	(2)	47.	(3)	48.	(3)	49.	(2)
50.	(3)	51.	(2)	52.	(2)	53.	(4)	54.	(4)	55.	(2)	56.	(4)
57.	(2)	58.	(4)	59.	(4)	60.	(3)	61.	(1)	62.	(2)	63.	(2)
64.	(2)	65.	(1)	66.	(2)	67.	(3)	68.	(1)	69.	(4)	70.	(3)
71.	(1)	72.	(1)	73.	(3)	74.	(1)	75.	(2)				

Chapter 5 : Anatomy of Flowering Plants

1.	(3)	2.	(1)	3.	(2)	4.	(2)	5.	(2)	6.	(1)	7.	(3)
8.	(4)	9.	(1)	10.	(3)	11.	(3)	12.	(4)	13.	(4)	14.	(3)
15.	(1)	16.	(4)	17.	(4)	18.	(4)	19.	(3)	20.	(3)	21.	(1)
22.	(1)	23.	(2)	24.	(4)	25.	(4)	26.	(3)	27.	(3)	28.	(3)
29.	(3)	30.	(1)	31.	(4)	32.	(2)	33.	(2)	34.	(2)	35.	(4)

36. (1)	37. (4)	38. (4)	39. (4)	40. (3)	41. (4)	42. (3)
43. (1)	44. (3)	45. (4)	46. (1)	47. (4)	48. (1)	49. (3)
50. (4)	51. (2)	52. (4)	53. (1)	54. (2)	55. (2)	56. (2)
57. (3)	58. (4)	59. (2)	60. (2)	61. (3)	62. (3)	63. (4)
64. (4)	65. (2)	66. (2)	67. (2)	68. (2)	69. (2)	70. (1)
71. (4)	72. (2)	73. (3)	74. (4)	75. (2)	76. (4)	77. (4)
78. (2)	79. (1)	80. (1)	81. (2)	82. (4)	83. (3)	84. (4)
85. (1)	86. (1)	87. (2)	88. (3)	89. (1)	90. (2)	

Chapter 6 : The Cell : The Unit of Life

1. (4)	2. (2)	3. (3)	4. (1)	5. (1)	6. (2)	7. (4)
8. (1)	9. (2)	10. (1)	11. (2)	12. (4)	13. (4)	14. (4)
15. (1)	16. (1)	17. (3)	18. (4)	19. (2)	20. (3)	21. (4)
22. (2)	23. (1)	24. (3)	25. (2)	26. (2)	27. (1)	28. (4)
29. (2)	30. (3)	31. (2)	32. (3)			

Chapter 7 : The Cell Cycle and Cell Division

1. (2)	2. (3)	3. (2)	4. (1)	5. (1)	6. (1)	7. (3)
8. (4)	9. (3)	10. (1)	11. (2)	12. (4)	13. (1)	14. (3)
15. (1)	16. (2)	17. (1)	18. (3)	19. (1)	20. (2)	21. (4)
22. (1)	23. (4)	24. (3)	25. (4)	26. (2)		

Chapter 8 : Transport in Plant

1. (3)	2. (4)	3. (4)	4. (3)	5. (3)	6. (1)	7. (4)
8. (1)	9. (4)	10. (1)	11. (4)	12. (4)	13. (4)	14. (3)
15. (4)	16. (4)	17. (4)	18. (3)	19. (3)	20. (4)	21. (1)
22. (4)	23. (3)	24. (2)	25. (1)	26. (1)	27. (3)	28. (1)
29. (3)	30. (3)	31. (3)	32. (4)	33. (4)	34. (4)	35. (3)
36. (1)	37. (2)	38. (1)	39. (1)	40. (3)	41. (3)	42 (4)
43. (3)	44. (2)	45. (4)	46. (4)			

[ZOOLOGY]

Chapter 2 : Structural Organization in Animals

1. (3)	2. (1)	3. (4)	4. (2)	5. (2)	6. (2)	7. (2)
8. (1)	9. (4)	10. (3)	11. (4)	12. (3)	13. (3)	14. (4)
15. (1)	16. (3)	17. (4)	18. (3)	19. (2)	20. (4)	21. (1)
22. (4)	23. (2)	24. (3)	25. (4)	26. (2)	27. (4)	28. (2)
29. (4)	30. (3)	31. (1)	32. (2)	33. (3)	34. (2)	35. (2)
36. (2)	37. (3)	38. (2)	39. (3)	40. (1)	41. (3)	42. (1)
43. (3)	44. (4)	45. (2)	46. (3)	47. (3)	48. (2)	49. (1)
50. (1)	51. (4)	52. (3)	53. (1)	54. (1)	55. (4)	56 (2)
57. (2)	58. (2)	59. (3)	60. (3)	61. (2)	62. (2)	63. (2)
64. (3)	65. (3)	66. (4)	67. (3)	68. (3)	69. (4)	

Chapter 3 : Biomolecules

1.	(2)	2.	(3)	3.	(2)	4.	(3)	5.	(2)	6.	(2)	7.	(4)
8.	(3)	9.	(3)	10.	(4)	11.	(2)	12.	(3)	13.	(3)	14.	(2)
15.	(3)	16.	(3)	17.	(1)	18.	(4)	19.	(3)	20.	(4)	21.	(1)
22.	(4)	23.	(3)	24.	(4)	25.	(2)	26.	(2)	27.	(2)	28.	(3)
29.	(4)	30.	(4)	31.	(4)	32.	(2)	33.	(4)	34.	(4)	35.	(4)
36.	(2)	37.	(4)	38.	(3)	39.	(3)	40.	(3)	41.	(3)	42.	(2)
43.	(4)	44.	(4)	45.	(3)	46.	(2)	47.	(3)	48.	(3)	49.	(1)
50.	(4)	51.	(3)	52.	(4)	53.	(2)	54.	(3)	55.	(1)	56	(2)

Chapter 4 : Digestion and Absorption

1.	(2)	2.	(2)	3.	(3)	4.	(3)	5.	(3)	6.	(3)	7.	(3)
8.	(2)	9.	(4)	10.	(1)	11.	(4)	12.	(3)	13.	(1)	14.	(3)
15.	(4)	16.	(4)	17.	(4)	18.	(1)	19.	(3)	20.	(2)	21.	(3)
22.	(4)	23.	(3)	24.	(3)	25.	(4)	26.	(4)	27.	(3)	28.	(3)
29.	(2)	30.	(3)	31.	(2)	32.	(4)	33.	(4)	34.	(4)	35.	(4)
36.	(4)	37.	(2)	38.	(1)	39.	(1)	40.	(2)	41.	(2)		

Chapter 5 : Breathing and Exchange of Gases

1.	(4)	2.	(4)	3.	(3)	4.	(4)	5.	(4)	6.	(2)	7.	(4)
8.	(1)	9.	(1)	10.	(4)	11.	(2)	12.	(3)	13.	(4)	14.	(2)
15.	(2)	16.	(2)	17.	(3)	18.	(3)	19.	(1)	20.	(2)	21.	(2)
22.	(4)	23.	(2)	24.	(1)	25.	(1)	26.	(1)	27.	(3)	28.	(4)
29.	(3)	30.	(2)	31.	(2)	32.	(1)	33.	(3)	34.	(1)	35.	(3)
36.	(3)	37.	(3)	38.	(1)	39.	(3)	40.	(3)	41.	(4)	42.	(4)
43.	(2)	44.	(3)	45.	(4)	46.	(3)	47.	(2)	48.	(1)	49.	(1)
50.	(1)												

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Practice Question Bank for NEET - 2013

Booklet -3

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CONTENTS

2012-13

PHYSICS

[Chapter-9 : Thermal Properties of Matter]

1. A black body having temperature T K emits energy at the rate of E watt per minute. If the temperature is reduced to $\frac{T}{2}$K, then rate of emission becomes

(1) $\frac{1}{16}E$ (2) $\frac{1}{32}E$

(3) 16 E (4) 32 E

2. Two rods having length l_1 and l_2 made by two material having thermal expansion coefficient α_1 and α_2. If the difference between their lengths is independent of temperature, then

(1) $l_1\alpha_1 = l_2\alpha_2$ (2) $l_1\alpha_2 = l_2\alpha_1$

(3) $l_1^2\alpha_1 = l_1^2\alpha_2$ (4) $l_2 + l_1 = \alpha_2 + \alpha_1$

3. How much amount of energy must be given to a mixture of 10 g hydrogen and 20 g of He to change the temperature by 30°C, while they are kept in a closed vessel?

(1) 500 R (2) 600 R

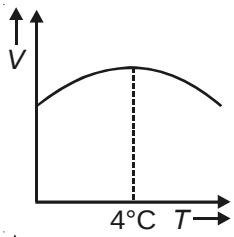
(3) 300 R (4) 400 R

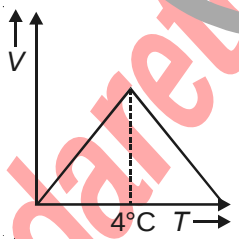
4. When a room is heated upto a temperature 30°C, the outside temperature is –30°C and when it is heated upto 20°C, outside temperature is –60°C. Then the temperature of heater used to heat the room is (Newton's law of cooling is valid)(Assume same time duration of heating)

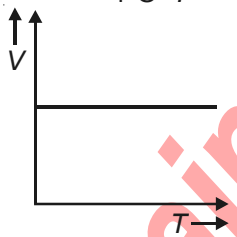
(1) 20°C (2) 40°C

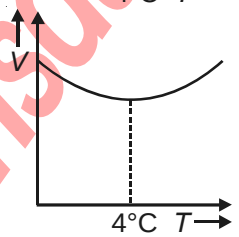
(3) 80°C (4) 60°C

5. Which of the following graph correctly shows, the behaviour of volume of water (V) with temperature (T)?

(1) 

(2) 

(3) 

(4) 

6. J is mechanical equivalent of heat, R is radius of earth, ω is angular velocity of earth and S is specific heat of earth. If earth suddenly stop the rotation about it's polar axis, then the maximum change in temperature of earth will be

(1) $\frac{R\omega}{5SJ}$ (2) $\frac{R^2\omega^2}{5SJ}$

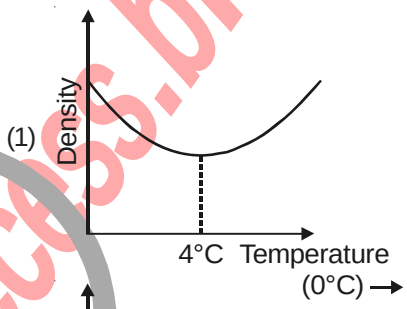
(3) $\frac{1}{3}\frac{R^2\omega^2}{SJ}$ (4) $\frac{R\omega}{3SJ}$

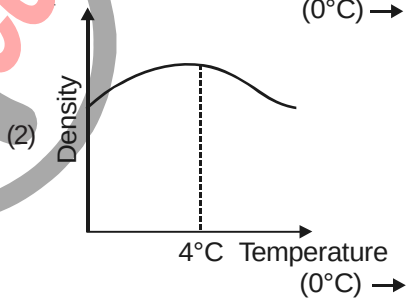
7. A bullet having velocity V, collides against a wall and one-third of its kinetic energy is converted into heat. If specific heat of bullet is S, then the temperature of the bullet rises by (Given, J=mechanical equivalent of heat)

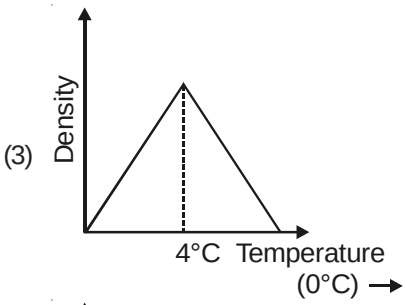
(1) $\frac{V^2j}{6S}$ (2) $\frac{V^2}{6}jS$

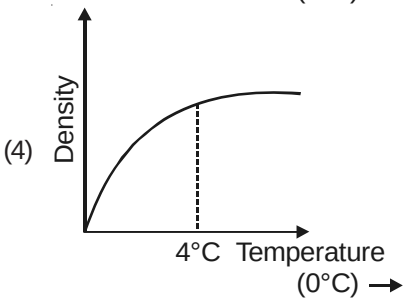
(3) $\frac{V^2}{6jS}$ (4) $\frac{V^2j}{3S}$

8. Which of the following curve shows the behaviour of density of water with temperature accurately?

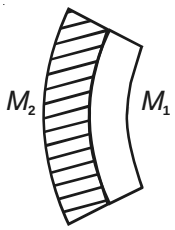
(1) 

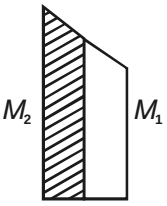
(2) 

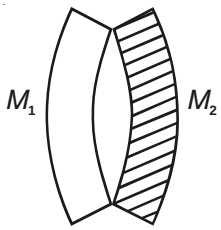
(3) 

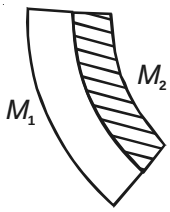
(4) 

9. A bimetallic strip is made of two metals M_1 and M_2 having coefficient of linear expansion α_1 and α_2, respectively ($\alpha_1 > \alpha_2$). When the strip is heated then shape of strip will be

(1) 

(2) 

(3) 

(4) 

10. The mass of the cube of an unknown metal is 5 kg. When 15,000 J of heat energy is supplied to it, its temperature rises by 3ºC. The heat capacity of the cube is

(1) 5000 J/ºC (2) 1000 J/ºC

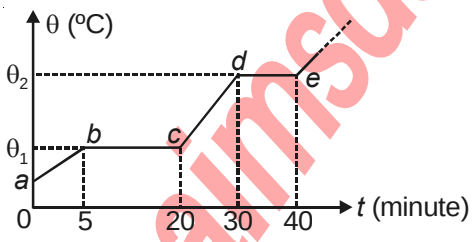
(3) 3000 J/ºC (4) 3 J/ºC

11. A calorimeter 'A' contains 100 g water at 50ºC and another calorimeter 'B' contains 150 g water at 20ºC. If the water of both the calorimeters is mixed together, the temperature of the mixture will be

(1) 70ºC (2) 35ºC

(3) 32.0ºC (4) 15.0ºC

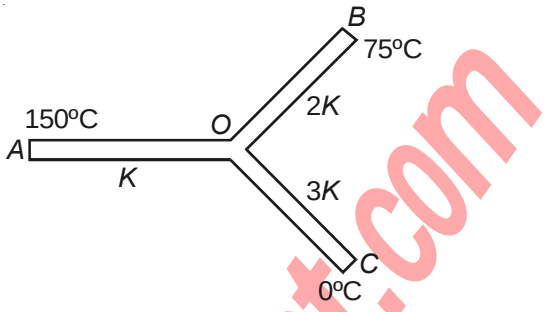
12. The heat energy is supplied to a 100 g solid with a rate of 200 cal/minute. The temperature (θ) versus time (t) plot is shown below. The latent heat of fusion of the substance is



(1) 30 cal/g (2) 20 cal/g

(3) 10 cal/g (4) 5 cal/g

13. The three rods of identical dimensions and made of different materials are joined as shown in the diagram below. The temperatures of the ends A, B, C are given in the diagram itself. Which of the following is incorrect statement?



(1) The temperature at the junction O is 50ºC

(2) The heat current in the rod AO is from A to O

(3) The heat current in the rod BO is from O to B

(4) The heat current in the rod OC is from O to C

14. Temperature of water in a lake is at 0ºC and atmospheric temperature is –10ºC. If 1 cm thickness of ice formed on the lake takes 2 days, then time taken to form next 2 cm thickness of ice is

(1) 8 days (2) 6 days

(3) 16 days (4) 10 days

15. The temperature of spherical black body falls from 80ºC to 76ºC in 10 minutes and from 76ºC to 74ºC in next 10 minutes. Assuming that the body follows Newton's law of cooling, the temperature of surroundings is

(1) 72ºC (2) 74ºC

(3) 70ºC (4) 65ºC

16. A liquid of mass m and specific heat c is heated to a temperature θ. The temperature of another liquid of mass 2m and specific heat 2c is at temperature $\frac{\theta}{2}$. If the two liquids are mixed, the temperature of the mixture will be

(1) $\left(\frac{5}{3}\right)\theta$ (2) $\left(\frac{3}{5}\right)\theta$

(3) θ (4) $\frac{\theta}{2}$

17. If α_x, α_y and α_z are the co-efficients of linear expansion of a solid along x-axis, y-axis and z-axis respectively, then the volume expansion of solid is

(1) $3(\alpha_x + \alpha_y + \alpha_z)$ (2) $\alpha_x + \alpha_y + \alpha_z$

(3) $\frac{1}{3}(\alpha_x + \alpha_y + \alpha_z)$ (4) $\alpha_x + \alpha_y$

18. A black-body has maximum wavelength λ_m at 2500 K. Corresponding wavelength at 4000 K will be

(1) $\frac{16}{81}\lambda_m$ (2) $\frac{3}{2}\lambda_m$

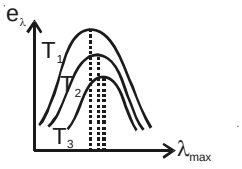
(3) $\frac{2}{3}\lambda_m$ (4) $\frac{5}{8}\lambda_m$

19. Two spheres of radius r and R at temperature 1000 K and 1500 K respectively radiates energy at same rate then
(1) $16r^2 = 81R^2$ (2) $16R^2 = 81r^2$
(3) $2R^2 = 3r^2$ (4) $3R^2 = 2r^2$

20. A steel meter scale is to be ruled so that the millimeter intervals are accurate upto 1×10^{-3} mm at certain temperature. The maximum temperature variation allowed during ruling is ($\alpha = 1 \times 10^{-4}$/K)
(1) 5°C (2) 2°C
(3) 10°C (4) 4°C

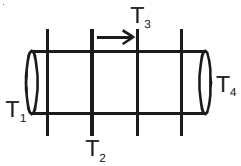
21. Ice starts forming on the surface of lake and takes 8 hours to form a layer of 1 cm thick. To increase the thickness of layer to 2 cm, it will take (assume water is at 0°C)
(1) 8 hours (2) < 8 hours
(3) < 16 hours (4) > 16 hours

22. The following graph shows power of a black body radiation vs temperature at three temperatures. Then



(1) $T_1 > T_2 > T_3$ (2) $T_3 > T_2 > T_1$
(3) $T_1 = T_2 = T_3$ (4) $T_2 > T_1 > T_3$

23. The shown rod is in steady state with $T_1 > T_4$ then which of the following statement is true

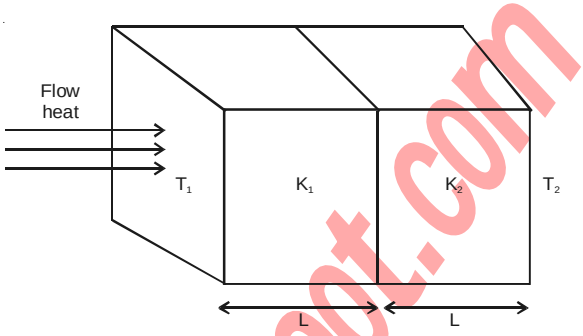


(1) Heat is flowing from T_4 to T_1
(2) T_2, T_3 are are increasing with time
(3) T_2, T_3 are constant with time
(4) $T_3 = T_2$

24. A rod of length L and cross sectional area A is subjected to a temperature difference ΔT at two ends and the rate of heat flow is Q. If the rod is cut in two pieces from the middle lengthwise and now the two rods are connected in series and subjected to same temper ature difference. Then new rate of heat flow is
(1) 4Q (2) $\frac{Q}{4}$
(3) 2Q (4) $\frac{Q}{2}$

25. A body cools in 10 minutes from 60°C to 40°C. What will be its temperature after next 10 minutes, if surrounding temperature is 10°C (Assume Newton's law of cooling valid)
(1) 29 °C (2) 50 °C
(3) 28 °C (4) 35 °C

26. The thermal conductivity of the combination of slabs



(1) $K_1 + K_2$ (2) $(2K_1K_2) / (K_1 + K_2)$
(3) K_1K_2 (4) $(K_1 + K_2)/(2K_1K_2)$

27. Two rods of length l and 2l, thermal conductivities 2k and k are connected end to end. If cross-sectional area of the rods are equal, then equivalent thermal conductivity of the system is
(1) $\left(\frac{5}{6}\right)$K (2) 1.5k
(3) 1.2k (4) $\left(\frac{8}{9}\right)$K

28. Steam at 100°C is passed through 2 kg water maintained at 25°C in a calorimeter having water equivalent 50 g. If final temperature of water is 95°C, then the amount of steam passed is about
(1) 153 g (2) 263 g
(3) 311 g (4) 381 g

29. Two identical cubes of metals are connected as shown in figure A. 50 cal heat flows through it in 2 minute. If the cubes are connected as figure B, then the same amount of heat will flow through the rods in

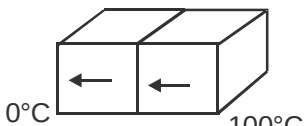


Figure A

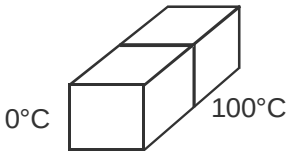
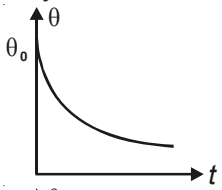
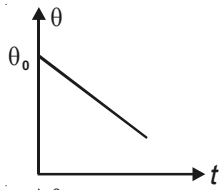


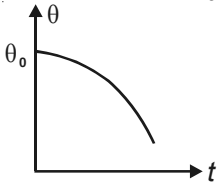
Figure B

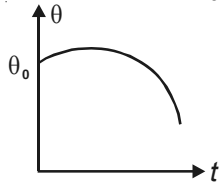
(1) 0.5 minute (2) 1 minute
(3) 2 minute (4) 8 minute

30. A liquid kept in an open vessel cools according to Newton's law of cooling. The temperature of the liquid (θ) is plotted with time (t). Which of the following graphs correctly shows the variation of θ with t?

(1) 

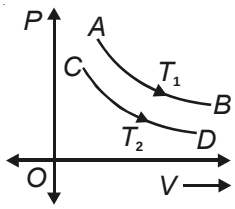
(2) 

(3) 

(4) 

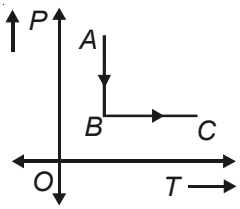
1. An ideal gas, $\left(\gamma = \frac{5}{3}\right)$ is changed from initial state (100 kPa, 100 cc) to (200 kPa, 200 cc) linearly. Temperature of the gas
   (1) Increases continuously
   (2) Decreases continuously
   (3) First increases to a maximum value then decreases
   (4) First decreases to a minimum value then increases

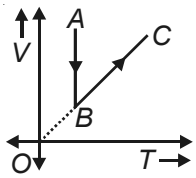
2. T_1 and T_2 represent the absolute temperatures of a given mass of an ideal gas undergoing isothermal changes AB and CD. Which of the following is correct?

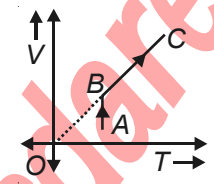


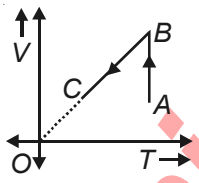
   (1) $T_1 > T_2$ (2) $T_1 < T_2$
   (3) $T_1 = T_2$ (4) $T_1 \le T_2$

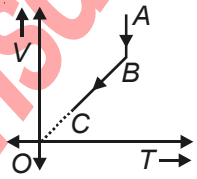
3. P-T diagram for an ideal gas undergoing a change ABC is as shown in figure. Corresponding V-T graph will be



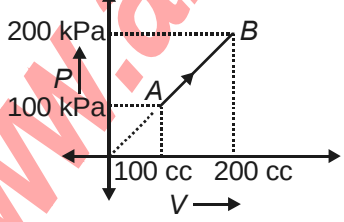
   (1)


   (2)


   (3)


   (4)


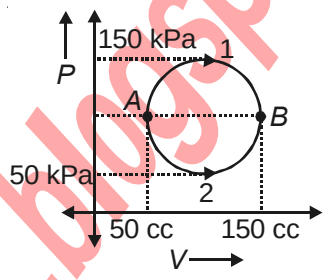
4. Workdone by the ideal gas during the process AB is



   (1) 15 J (2) 30 J
   (3) 10 J (4) 25 J

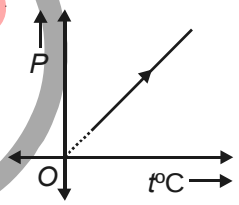
5. An ideal gas expands isothermally from a volume V_1 to V_2 and then compressed to original volume V_1 adiabatically. Initial pressure is P_1 and final pressure is P_3. The total work done is W. Then
   (1) $P_3 > P_1$, $w > 0$ (2) $P_3 < P_1$, $w < 0$
   (3) $P_3 > P_1$, $w < 0$ (4) $P_3 = P_1$, $w = 0$

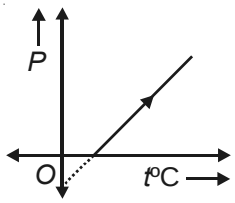
6. The processes 1 and 2 enclose a circular area. An ideal gas is changing from A to B through process 1 absorbs 5π J. Heat absorbed by the same gas changing from A to B through process 2 is

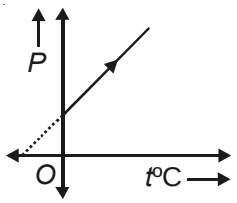


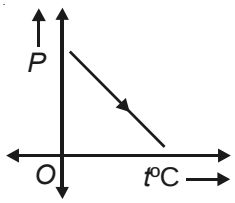
   (1) 2.5π J (2) Zero
   (3) 5π (4) 7.5π

7. If a graph is plotted between pressure (P) and temperature (t^oC) for an ideal gas at constant volume, then the nature of the graph is

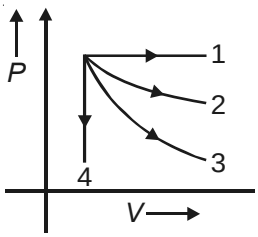
   (1)


   (2)


   (3)


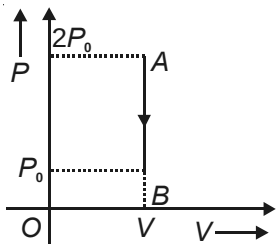
   (4)


8. Which of the following can represent an adiabatic process (assuming each one of them represents either of the four processes –isothermal, –isochoric, –isobaric, –adiabatic)



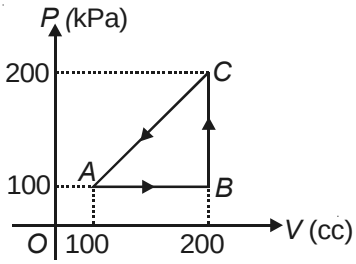
   (1) 4 (2) 3
   (3) 2 (4) 1

9. Work done by the gas in the process AB is



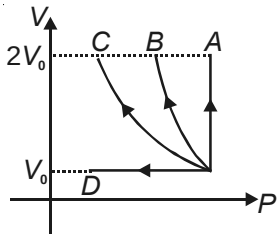
(1) P_0V (2) $2P_0V$
(3) Zero (4) $4P_0V$

10. Change in internal energy of the gas during the process ABC is 20 J. Change in internal energy in the process CA will be



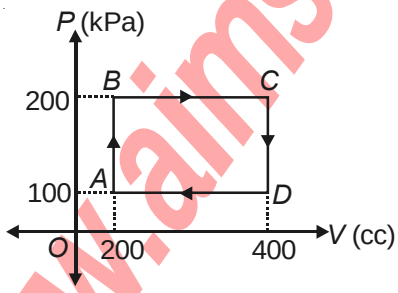
(1) –20 J (2) –10 J
(3) 20 J (4) 25 J

11. In which of the following processes work done is more?



(1) A (2) B
(3) C (4) D

12. The heat absorbed by an ideal gas during one cycle of the cyclic process ABCD is

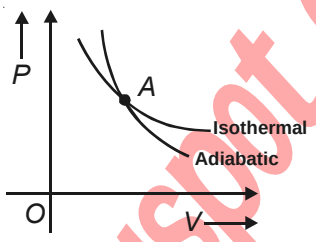


(1) 10 J (2) 20 J
(3) 40 J (4) 30 J

13. m kg ice is melted at 0ºC. Increase in entropy of the ice is (in SI units)

(1) Zero (2) $\frac{mL_f}{273}$
(3) $\frac{mL_f}{373}$ (4) Infinity

14. Slope of the adiabatic at A is 5/3 times the slope of the isothermal at A. The gas is

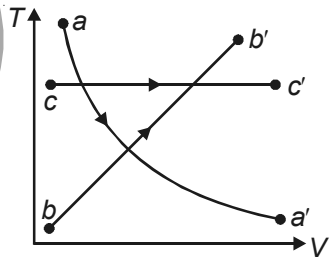


(1) Monoatomic (2) Diatomic
(3) Polyatomic (4) Triatomic

15. Efficiency of heat engine is 0.5 when its sink temperature is 500 K. If the sink temperature is made 400 K at same source temperature, then the efficiency becomes / remains

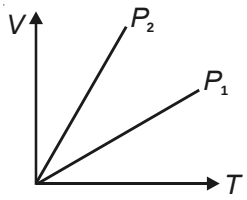
(1) 0.5 (2) 0.4
(3) 0.6 (4) 0.8

16. In the diagram shown below some thermodynamic processes are drawn. Which one is an isothermal process?



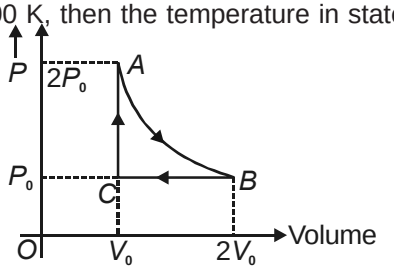
(1) aa′ (2) bb′
(3) cc′ (4) All of these

17. For a perfect gas the volume (V) versus temperature (T) graphs are drawn at pressures P_1 and P_2 as shown below. From the graphs, we can conclude that



(1) $P_1 < P_2$
(2) $P_1 > P_2$
(3) $P_1 = P_2$
(4) The information is insufficient to predict

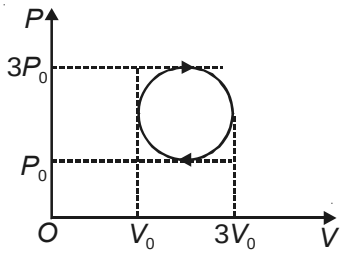
18. The following figure is the PV diagram for a cyclic process for an ideal gas. If the temperature in state B is 600 K, then the temperature in state C will be



(1) 900 K (2) 600 K

(3) 300 K (4) 150 K

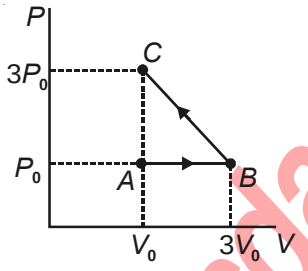
19. In the cyclic process shown by indicator diagram, the work done by the gas is



(1) πP_0V_0 (2) $4\pi P_0V_0$

(3) $\frac{\pi}{4}P_0V_0$ (4) $\frac{3}{4}\pi P_0V_0$

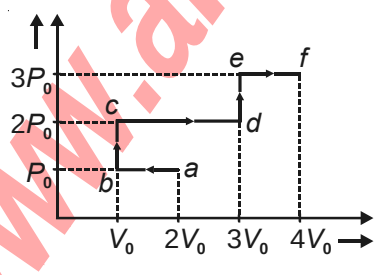
20. A thermodynamic system goes from state A to state C via a state B as indicated by P-V diagram. Find the work done by the gas for the process $A \rightarrow B \rightarrow C$



(1) $-P_0V_0$ (2) Zero

(3) $-2P_0V_0$ (4) $-3P_0V_0$

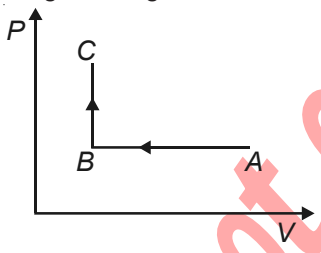
21. P-V diagram for an ideal gas as is shown in figure. The work done by the gas during the process abcdef is

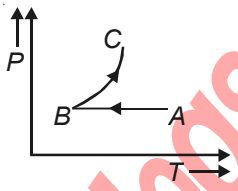


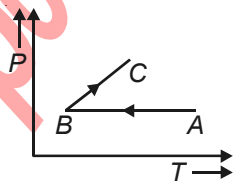
(1) $8\ P_0V_0$ (2) $17\ P_0V_0$

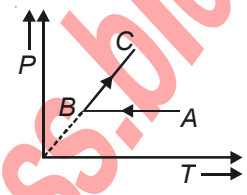
(3) $5\ P_0V_0$ (4) $6\ P_0V_0$

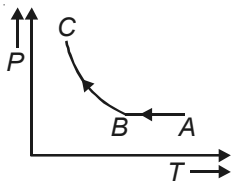
22. P-V graph for an ideal gas is shown in the figure. Corresponding P-T diagram will be



(1)


(2)


(3)


(4)


23. In an adiabatic process; the pressure and absolute temperature of a gas are related as $P \propto T^3$. Then, the value of $\frac{C_p}{C_v}$ is

(1) $\frac{4}{3}$ (2) $\frac{3}{2}$

(3) $\frac{7}{3}$ (4) $\frac{5}{3}$

24. An ideal gas with adiabatic exponent 1.5 is heated at constant pressure. Fraction of heat absorbed used in increasing the temperature is

(1) $\frac{1}{2}$ (2) $\frac{1}{3}$

(3) $\frac{2}{3}$ (4) $\frac{3}{4}$

25. A container have two part in which the gases are in the volume V_1 and V_2 under pressure P_1 and P_2 at same temperature. If the position of the separator is withdrawn the new pressure is

(1) $\frac{P_1V_1 + P_2V_2}{V_1 + V_2}$ (2) $P_1 + P_2$

(3) $\frac{P_1V_1 + P_2V_2}{PT(V_1 + V_2)}$ (4) Both (1) & (2)

26. An ideal heat engine exhausting heat at 27°C have 40% efficiency. Then it takes heat from a reservoir at

(1) 127°C (2) 227°C

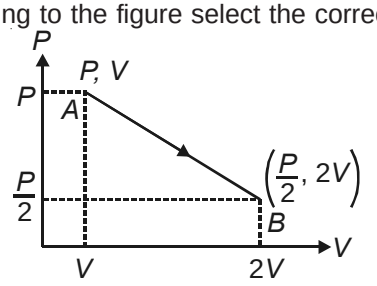
(3) 327° (4) 427°

27. The pressure (P), volume V and temperature (T) of a certain gas are related as $P = \frac{\alpha T}{V}$. Then the work done by the gas when temperature changes from T_0 to $3T_0$ at constant pressure will be

(1) $2\alpha T_0$ (2) 2α

(3) $2\alpha T_0^2$ (4) $2\alpha^2 T_0^2$

28. According to the figure select the correct statement



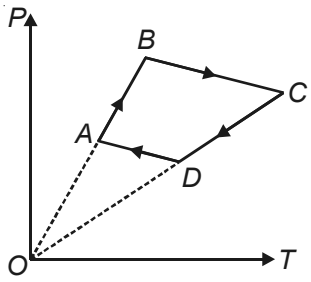
(1) The work in this process greater than isothermal process between A & B

(2) The corresponding V - T curve is a parabola

(3) Both (1) & (2) are correct

(4) Only (2) is correct

29. One mole of an ideal monoatomic gas perform a cycle as shown in figure



Mark correct option

(1) Work done in process AB is zero

(2) Work done in process BC is non-zero

(3) Work done in process CD is zero

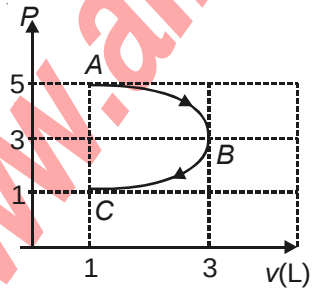
(4) All of these

30. A refrigerator, whose coefficient of performance K = 5. extracts heat from the cooling compartment at the rate of 250 J/cycle. The work done per cycle to operate the refrigerator will be

(1) 30 J (2) 50 J

(3) 40 J (4) 20 J

31. If the thermodynamic process ABC is a semicircle, then work done in the process ABC is



(1) + 2π unit (2) –2π unit

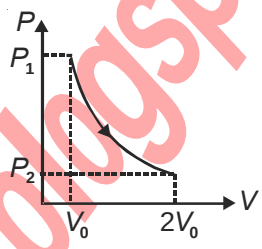
(3) +4 unit (4) –4 unit

32. An ideal gas is supplied with Q amount of heat at constant volume to increase the temperature of gas by ΔT. If the same sample is supplied with heat at constant pressure, then to increase the temperature by the same amount heat must be (γ is the adiabatic exponent)

(1) $Q' = \frac{Q}{\gamma}$ (2) $Q' = \gamma Q$

(3) $Q' = Q$ (4) $Q' = (\gamma - 1)Q$

33. Find the work done by an ideal monoatomic gas during an adiabatic expansion shown in P-V diagram



(1) $(P_1 - 2P_2)V_0$ (2) $\frac{1}{2}(P_1 - 2P_2)V_0$

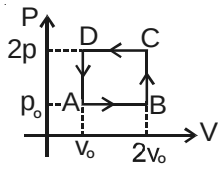
(3) $\frac{3}{2}(P_1 - 2P_2)V_0$ (4) $\frac{3}{5}(P_1 - 2P_2)V_0$

34. A Carnot engine takes heat from a reservoir at 627°C and rejects at 27°C. Calculate its efficiency

(1) $\frac{200}{209}$ (2) $\frac{3}{5}$

(3) $\frac{1}{3}$ (4) $\frac{2}{3}$

35. An ideal gas is taken round the cycle as shown on an PV diagram.



Work done by the gas during the cycle is

(1) P_0V_0 (2) $2\ P_0V_0$

(3) $-\ P_0V_0$ (4) $-\frac{P_0V_0}{2}$

36. One mole of an ideal monoatomic gas at temperature T_0 expands slowly according to the law P/v = constant. If the final temperature is $2T_0$, heat supplied to the gas is

(1) $2RT_0$ (2) $\frac{3}{2}RT_0$

(3) RT_0 (4) $\frac{1}{2}RT_0$

37. When 'Q' amount of heat energy is supplied to a diatomic gas, it does a work of $\frac{'Q'}{4}$. Then molar specific heat capacity of the process is

(1) $\frac{2}{5}R$ (2) $\frac{5}{2}R$

(3) $\frac{10}{3}R$ (4) $\frac{6}{7}R$

38. With reference to the diagram (a) and (b) select the correct option (W refers to work done)

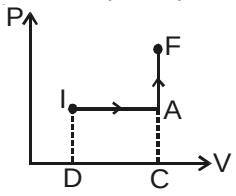


Fig (a)

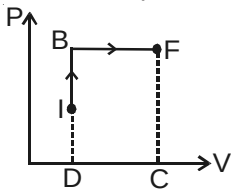
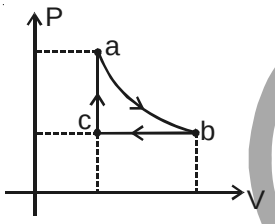


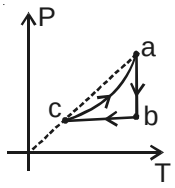
Fig (b)

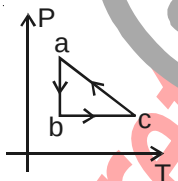
(1) $W_a > W_b$ (2) $W_a < W_b$

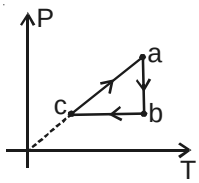
(3) $W_a = W_b$ (4) None of the above

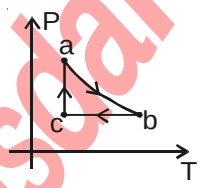
39. Figure shows a cyclic process abca for one mole of an ideal gas. If a $\rightarrow$ b is isothermal process, then the which one represents P – T diagram for the given cyclic process



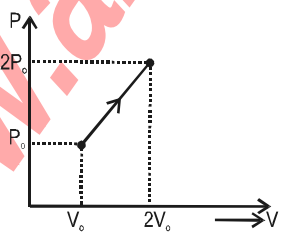
(1)


(2)


(3)


(4)


40. The P–V diagram of 2g of Helium gas for a certain process $A \rightarrow B$. is shown in figure. Heat given to the gas during the process is



(1) P_oV_o (2) $1.5\ P_oV_o$

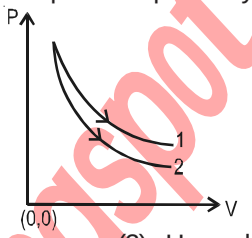
(3) $4.5\ P_oV_o$ (4) $6\ P_oV_o$

41. A carnot engine working between 300K and 600K perform work of 800 Jper cycle. The amount of heat energy supplied to engine from the source in each cycle is

(1) 800J (2) 1600J

(3) 3200J (4) 6400J

42. The P–V plot for two gases during adiabatic processes are shown in the figure. The graphs 1 and 2 should correspond respectively to



(1) O_2 and He (2) He and O_2

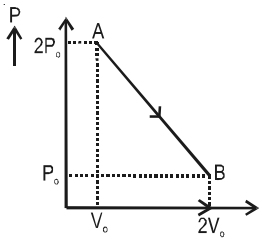
(3) O_2 and CO (4) N_2 and O_2

43. One mole of an ideal gas at a temperature T_1K expands slowly according to the law $\frac{P}{V}$ constant . The final temperature is T_2K. The work done by the gas is

(1) $R(T_2-T_1)$ (2) $2R(T_2-T_1)$

(3) $\frac{R}{2}(T_2-T_1)$ (4) $\frac{2R}{3}(T_2-T_1)$

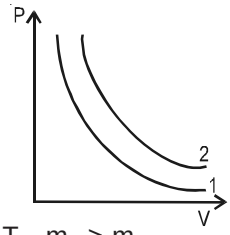
44. A sample of gas follows process AB, then which of the following is incorrect about AB?



(1) $\Delta U = 0$ (2) $W > 0$

(3) $Q = W$ (4) $\Delta U < 0$

45. The P–V diagram of a gas at constant temperature are drawn. The curve 1 is for a constant mass m_1 and temperature T_1 and curve T_2 is for a constant mass m_2 and temperature T_2. Select the incorrect alternative



(1) When $T_1 = T_2$, $m_2 > m_1$

(2) When $m_1 = m_2$, $T_2 > T_1$

(3) When $T_1 = T_2$, $m_1 > m_2$

(4) $m_1T_1 < m_2T_2$

46. A polyatomic gas with six degree of freedom does 25J of work when it is expanded at constant pressure. The heat given to the gas is

(1) 100J (2) 150J

(3) 200J (4) 250J

1. A diatomic gas is at very high temperature T such that it possesses translatory, rotational as well as vibrational motion. The energy associated with each molecule due to their vibration is (k = Boltzman constant)

(1) kT (2) $\frac{kT}{2}$

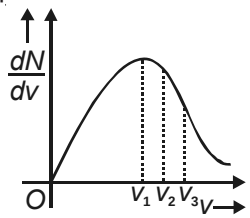
(3) 2kT (4) $\frac{kT}{4}$

2. If N_1 and N_2 are the number of air molecules in an open room in peak winter and peak summer respectively, then

(1) $N_1 = N_2$ (2) $N_1 < N_2$

(3) $N_1 > N_2$ (4) $N_1 > 2N_2$

3. In Maxwell speed distribution curve v_1 represents



(1) r.m.s. speed (2) Average speed

(3) Most probable speed (4) Average velocity

4. If ratio of density ρ and pressure P of an ideal gas is x, then the root mean square speed of gas molecules is

(1) $\sqrt{3x}$ (2) $\sqrt{\frac{3}{x}}$

(3) $\sqrt{3x^2}$ (4) $\sqrt{\frac{3}{x^2}}$

5. A vessel contains a mixture of oxygen gas and hydrogen gas. The average kinetic energy of a H_2 molecule is K_1 and that of O_2 molecule is K_2, then the ratio $\frac{K_1}{K_2}$ is equal to (the temperature in the vessel is uniform)

(1) 1 : 16 (2) 1 : 8

(3) 1 : 4 (4) 1 : 1

6. The mean free path for a gas is equal to (n is the number density and d is the diameter of a molecule of the gas)

(1) $\frac{1}{\sqrt{2}\, n\pi d}$

(2) $\frac{1}{\sqrt{2}\, n\pi d^2}$

(3) $\frac{1}{\sqrt{2}\, n\pi d^3}$

(4) $\frac{1}{\sqrt{2}\, n\pi d^{3/2}}$

7. n moles of ideal gas is heated at constant pressure from 50°C to 100°C, the increase in internal energy of the gas is

$\left(\frac{C_P}{C_V} = r \text{ and } R = \text{gas constant}\right)$

(1) $\frac{50nR}{\gamma - 1}$ (2) $\frac{100nR}{\gamma - 1}$

(3) $\frac{50n\gamma R}{\gamma - 1}$ (4) $\frac{25n\gamma R}{\gamma - 1}$

8. An insulated box containing 1 mole O_3 gas of mass M moving with velocity v_0 and suddenly stopped. Find the increase in temperature as a result of stopping the box

(1) $\frac{8Mv_0^2}{R}$ (2) $\frac{Mv_0^2}{8R}$

(3) $\frac{12Mv_0^2}{R}$ (4) $\frac{Mv_0^2}{6R}$

9. The specific heat of a diatomic gas undergoing the process $P^2 = V^5$ is

(1) $\frac{7}{2}R$ (2) $\frac{31R}{14}$

(3) $\frac{39R}{14}$ (4) $\frac{10R}{14}$

10. If pressure of a gas is increased at constant temperature by 2%, then the rms velocity of the gas will

(1) Increase by 2% (2) Increase by 1%

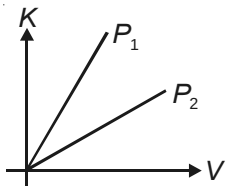
(3) Not change (4) Decrease by 1%

11. Four moles of O_2 gas and two moles of Argon gas and one mole of water vapour is mixed. Then molar heat capacity at constant pressure of the mixture is

(1) $\frac{16}{7}R$ (2) $\frac{7}{16}R$

(3) R (4) $\frac{23}{7}R$

12. Two gases of same amount under different pressure and volume. The graph of their total kinetic energy (K) versus volume (V) as shown in figure, then



(1) $P_1 > P_2$ (2) $P_1 < P_2$

(3) $P_1 = P_2$ (4) Cannot be calculate

13. During an experiment an ideal gas obeys an additional law P^2V = constant. The initial temperature and volume of the gas are T and V respectively. If it expands to a volume 2V, then its temperature will be

(1) 2T (2) $\sqrt{3}T$

(3) $\sqrt{2}T$ (4) T

14. Which of the following is wrong?

(1) The average distance through which a molecule moves freely between successive collisions is called mean free path

(2) Formula for mean free path is $\frac{KT}{\pi d^2 P\sqrt{2}}$

(3) Formula for mean free path is $\frac{1}{\pi^2 d^2\sqrt{2}}$

(4) Mean free path is directly proportional to the number density of the gas

15. If the speed of sound in a gas is v and the rms velocity of the gas molecule is v_{rms}, then the ratio of $\frac{v}{v_{rms}} =$

(1) $\frac{\gamma}{r}$ (2) $\frac{\gamma}{3}$

(3) $\sqrt{\frac{\gamma}{r}}$ (4) $\sqrt{\frac{\gamma}{3}}$

16. The pressure and density of two di-atomic mixture of gases $\left(\gamma = \frac{7}{5}\right)$ change adiabatically from (P, ρ) to (P′, ρ′). If $\frac{P}{P'} = 128$, the value of $\frac{\rho}{\rho'}$ is equal to

(1) 16 (2) 32

(3) 64 (4) 128

17. The mean or average speed of gas molecules of a gas having molar mass M at absolute temperature T is given by

(1) $\sqrt{\frac{3RT}{M}}$ (2) $\sqrt{\frac{8RT}{\pi M}}$

(3) $\sqrt{\frac{2RT}{M}}$ (4) $\sqrt{\frac{8RT}{M}}$

18. If pressure, absolute temperature and Boltzman constant for a gas are P, T and K respectively for a gas, then mean free path of the gas molecules of diameter d is

(1) $\frac{KT}{\pi d^2 P\sqrt{2}}$ (2) $\frac{PT}{\pi d^2 K\sqrt{2}}$

(3) $\frac{KP}{\pi d^2 T\sqrt{2}}$ (4) $\frac{KPT}{\pi d^2\sqrt{2}}$

19. Four particles have speeds 2 c m/s, 3 c m/s, 4 c m/s and 5 cm/s respectively. Their rms speed is

(1) 3.5 c m/s (2) $\sqrt{54}$ cm/s

(3) $\frac{27}{2}$ cm/s (4) $\frac{\sqrt{54}}{2}$ cm/s

20. If E is the energy density of one mole of monoatomic in an ideal gas, then the pressure of the ideal gas is

(1) $P = \frac{2}{3}E$ (2) $P = \frac{3}{2}E$

(3) $P = \frac{5}{2}E$ (4) $P = \frac{2}{5}E$

21. A mixture of ideal gases has 2 moles of He, 4 moles, of oxygen and 1 mole of ozone at absolute temperature T. The internal energy of mixture is

(1) 13RT (2) 11RT

(3) 16RT (4) 14RT

22. The rms speed of gas molecules of molecular weight M at temperature T is given by

(1) $\sqrt{\frac{5RT}{M}}$ (2) $\sqrt{\frac{2RT}{M}}$

(3) $\sqrt{\frac{8RT}{M}}$ (4) $\sqrt{\frac{3RT}{M}}$

[Chapter-12 : Oscillations]

1. Which among the following is incorrect?

(1) x = sinωt + cosωt represents S.H.M.

(2) x = sin2ωt + cosωt represents S.H.M.

(3) For a particle to execute oscillatory motion about x = 0 the force must satisfy the condition, F < 0 for x > 0 and F > 0 for x < 0

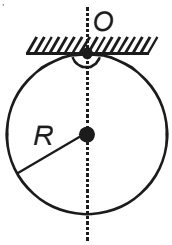
(4) None of these

2. The time period of a simple pendulum in lift accelerating vertically upward with acceleration g is

(1) $2\pi\sqrt{\frac{\ell}{g}}$ (2) $2\pi\sqrt{\frac{\ell}{\sqrt{2}g}}$

(3) $2\pi\sqrt{\frac{\ell}{2g}}$ (4) $2\pi\sqrt{\frac{\sqrt{3}\ell}{g}}$

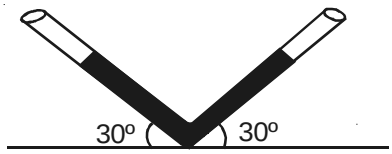
3. The time period of uniform disc of radius R, pivoted at a point O on its periphery is



(1) $2\pi\sqrt{\frac{R}{g}}$ (2) $2\pi\sqrt{\frac{2R}{g}}$

(3) $2\pi\sqrt{\frac{R}{2g}}$ (4) $2\pi\sqrt{\frac{3}{2}\frac{R}{g}}$

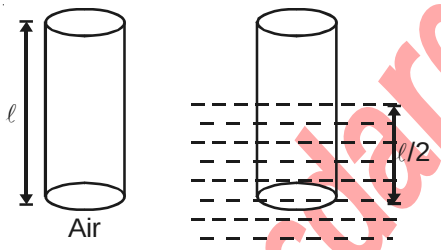
4. The time period of oscillation of liquid column of length ℓ placed in narrow V-tube of uniform cross-section as shown in the figure is



(1) $2\pi\sqrt{\frac{2\ell}{g}}$ (2) $2\pi\sqrt{\frac{\ell}{g}}$

(3) $2\pi\sqrt{\frac{\ell}{2g}}$ (4) $2\pi\sqrt{\frac{\ell\sqrt{3}}{g}}$

5. The fundamental frequency of an open organ pipe is f_0 in air. When it is placed half way in water, then the new fundamental frequency is



(1) f_0 (2) $\frac{f_0}{2}$

(3) $2f_0$ (4) None of these

6. A simple pendulum consisting of a ball of mass m tied to a string of length ℓ is made to oscillate with small amplitude a about mean position. If a stationary heavy obstacle is at a distance x from the mean position and ball hits it elastically then impulse imparted by ball on the wall is

(1) $m\sqrt{\frac{g(a^2-x^2)}{\ell}}$ (2) $2m\sqrt{\frac{g(a^2-x^2)}{\ell}}$

(3) $\sqrt{\frac{mgx^2}{\ell}}$ (4) $\sqrt{\frac{mgx^2}{A}}$

7. A particle performing SHM with amplitude A and time period T. At some instant it is at a position $-\frac{A}{2}$ and moving in +ve direction. The time after which its potential energy will be equal to its total energy is

(1) T (2) $\frac{T}{2}$

(3) $\frac{T}{3}$ (4) $\frac{T}{4}$

8. A ring of mass m and radius R is pivoted at a point on its periphery. It oscillates with time period T. If a point mass m is gently attached at lowest point, then new time period is

(1) $\frac{T}{2}$ (2) $\frac{T}{\sqrt{2}}$

(3) T (4) $\sqrt{2}\,T$

9. A uniform spring has a force constant K. It is cut into two pieces of lengths ℓ_1 and ℓ_2 such that $\ell_1 = n\ell_2$. Time period of oscillation of m with spring of length ℓ_1 is

(1) $2\pi\sqrt{\frac{mn}{K(n+1)}}$ (2) $2\pi\sqrt{\frac{m}{K(n+1)}}$

(3) $2\pi\sqrt{\frac{K(n+1)}{m}}$ (4) $2\pi\sqrt{\frac{m(n+1)}{nK}}$

10. A simple pendulum is immersed in a liquid of density ρ. If its length is ℓ, the time period of the pendulum for small oscillation (density of bob is σ)

(1) $T = 2\pi\sqrt{\frac{\ell}{g}}$ (2) $T = 2\pi\sqrt{\frac{\rho\ell}{\sigma g}}$

(3) $T = 2\pi\sqrt{\frac{(\sigma-\rho)\ell}{\sigma g}}$ (4) $T = 2\pi\sqrt{\frac{\sigma\ell}{(\sigma-\rho)g}}$

11. A particle of mass 50 g is performing S.H.M. with amplitude 20 cm and time period 0.2 s. Maximum force acting on the particle is

(1) π^2 N (2) π N

(3) $\frac{1}{\pi^2}$ N (4) $\sqrt{\pi}$ N

12. A particle is performing S.H.M. Its velocity is v_1 when it is at a distance x_1 from mean position and v_2 when it is at a distance x_2 from mean position. Then its time period is

(1) $2\pi\sqrt{\frac{y_2^2-y_1^2}{v_1^2-v_2^2}}$ (2) $2\pi\sqrt{\frac{y_2^2}{v_1^2}}$

(3) $2\pi\sqrt{\frac{y_1^2}{v_2^2}}$ (4) $2\pi\sqrt{\frac{y_1^2+y_2^2}{v_1^2+v_2^2}}$

13. The potential energy of a particle executing SHM is given by $U(x)=\frac{kx^2}{2}$, where k = 0.5 N/m (force constant of oscillation) and x → position of particle from equilibrium position. If total mechanical energy of a particle is 1 joule, then it will turn back from position

(1) x = +2 m (2) x = –2 m

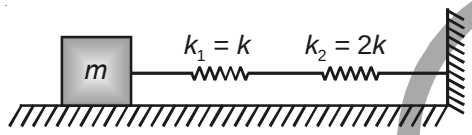
(3) $x=\sqrt{2}$ m (4) Both (1) & (2)

14. A simple pendulum is performing SHM with amplitude A and time period T. Speed of the pendulum when it is at a displacement $\frac{A}{\sqrt{2}}$ from mean position is

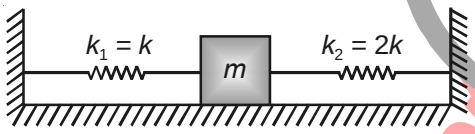
(1) $\frac{\sqrt{2}\pi A}{T}$ (2) $\frac{\pi A}{T}$

(3) $\frac{\pi A}{2T}$ (4) $\frac{2\pi A}{T}$

15. The ratio of time periods of oscillations of block in the situations shown in figure (i) and (ii) is



(i)

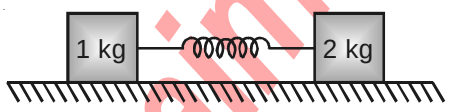


(ii)

(1) $\sqrt{2}$: 3 (2) 3 : $\sqrt{2}$

(3) 4 : 3 (4) 1 : 1

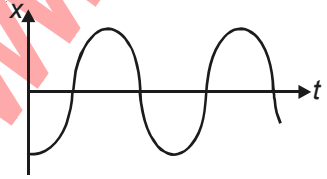
16. Two blocks of 1 kg and 2 kg are attached to opposite ends of a horizontal spring whose spring constant is 726 N/m as shown in figure. The natural vibrational frequency of the system is about



(1) 5.25 Hz (2) 300 Hz

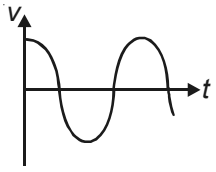
(3) 1 Hz (4) 100 Hz

17. Position time curve for a particle executing SHM is shown

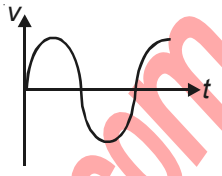


Corresponding velocity time curve will be

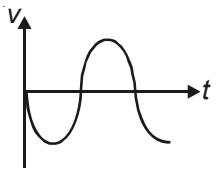
(1)



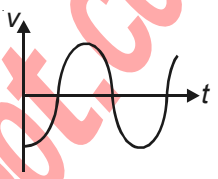
(2)



(3)



(4)



18. Position of a particle during SHM is represented by $y=4\sin\left(2t+\frac{\pi}{4}\right)$. The ratio of velocity amplitude to acceleration amplitude (in s) will be

(1) 4 (2) $\frac{1}{4}$

(3) 8 (4) $\frac{1}{2}$

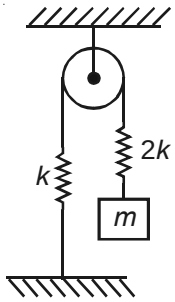
19. Time period of oscillation of block is (adjacent figure)

(1) $2\pi\sqrt{\frac{m}{3k}}$

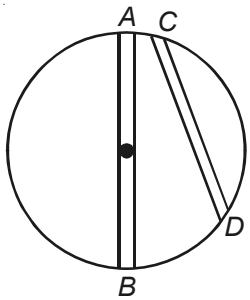
(2) $2\pi\sqrt{\frac{3k}{m}}$

(3) $2\pi\sqrt{\frac{3m}{2k}}$

(4) $2\pi\sqrt{\frac{2k}{3m}}$



20. Two bottomless frictionless wells AB and CD of length 2R and R are dug through the earth of radius R. If T_1 and T_2 are time periods of small oscillations of bodies dropped into these wells then which of the following is correct?



(1) $T_1 = T_2$

(2) $T_1 = \sqrt{2}\,T_2$

(3) $T_1 = 2T_2$

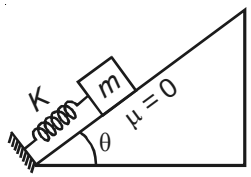
(4) $T_2 = \sqrt{2}\,T_1$

21. A block rests on a horizontal table which is executing SHM in the horizontal plane with an amplitude A. The coefficient of friction between the block and the table is μ, the block just starts to slip when the frequency of oscillation exceeds

(1) $\sqrt{\frac{\mu g}{A}}$ (2) $\frac{1}{2\pi}\sqrt{\frac{A}{\mu g}}$

(3) $2\pi\sqrt{\frac{\mu g}{a}}$ (4) $\frac{1}{2\pi}\sqrt{\frac{\mu g}{A}}$

22. If the inclined surface is frictionless, then time period of vibration of the block on the inclined plane is



(1) $2\pi\sqrt{\frac{m}{K}}$ (2) $2\pi\sqrt{\frac{m}{K\cos\theta}}$

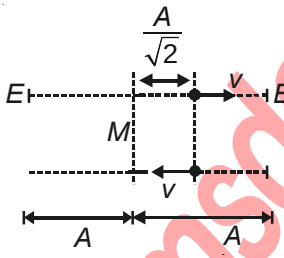
(3) $2\pi\sqrt{\frac{m}{K\sin\theta}}$ (4) $2\pi\sqrt{\frac{m\cos\theta}{K}}$

23. The equation of an SHM is given as, $x = a + b\sin(\omega t + \delta)$. The amplitude of the SHM is

(1) a (2) b

(3) (a + b) (4) $\frac{1}{2}$(a + b)

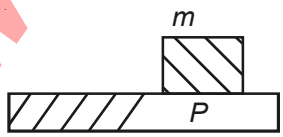
24. Two particles execute simple harmonic oscillations with same amplitude and same time period as shown in the diagram. At the instant shown what is the phase difference between the two particles?



(1) $\frac{\pi}{3}$ (2) $\frac{\pi}{2}$

(3) $\frac{2\pi}{3}$ (4) π

25. A horizontal platform P oscillates along vertical direction with amplitude A as shown in diagram. The maximum frequency of the platform so that the block does not detach from the platform, is



(1) $\frac{1}{2\pi}\sqrt{\frac{g}{A}}$ (2) $2\pi\sqrt{\frac{A}{g}}$

(3) $\frac{1}{2\pi}\sqrt{\frac{m}{g}}$ (4) $2\pi\sqrt{\frac{Ag}{m}}$

26. The maximum speed of a particle of mass executing SHM is v_0. What is the kinetic energy of the particle when it is at distance $\left(\frac{1}{\sqrt{2}}\right)$ times the amplitude form its mean position?

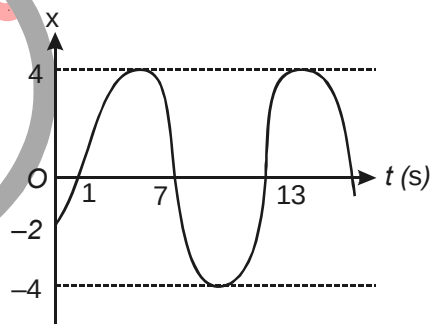
(1) $\frac{1}{2}mv_0^2$

(2) $\frac{1}{3}mv_0^2$

(3) $\frac{1}{4}mv_0^2$

(4) $\frac{\sqrt{3}}{2}mv_0^2$

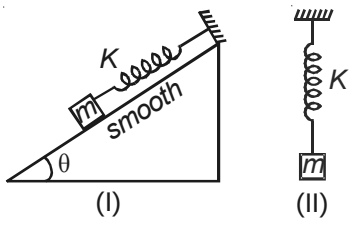
27. The displacement (x) is plotted with time (t) for a particle executing SHM as shown below. The correct equation of SHM is



(1) $x = 4\sin\left(\frac{\pi t}{6} + \frac{\pi}{6}\right)$ (2) $x = 4\sin\left(\frac{\pi t}{6} - \frac{\pi}{6}\right)$

(3) $x = 2\sin\left(\frac{2\pi}{6} + \frac{\pi}{6}\right)$ (4) $x = 2\sin\left(\frac{\pi t}{6} - \frac{\pi}{6}\right)$

28. Identical spring-block systems oscillate in two arrangements (I) and (II) as shown. The ratio of time-periods in the two arrangements is



(1) $\cos\theta : 1$ (2) $\tan\theta : 1$

(3) $\sin\theta : 1$ (4) 1 : 1

29. The potential energy of a simple harmonic oscillator in mean position and extreme position are 20 J and 100 J respectively. The mean value of potential energy for whole cycle of oscillation is

(1) 50 J (2) 60 J

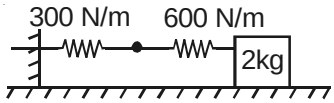
(3) 70 J (4) 120 J

30. The acceleration of a particle executing SHM is given as $a = -4\pi^2 x$, where x is displacement from mean position in meters and a is in m/s^2. The frequency of oscillations is

(1) 2 Hz (2) 1 Hz

(3) 0.5 Hz (4) $\left(\frac{4}{\pi}\right)$ Hz

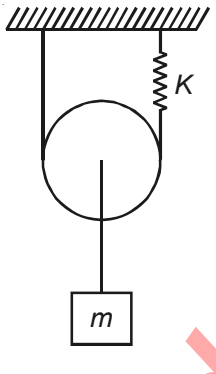
31. What is the angular frequency of the oscillations of the block in the arrangement shown below?



(1) 20 rad/s (2) 15 rad/s

(3) 10 rad/s (4) 5 rad/s

32. The frequency of oscillation of the block attached with the spring as shown in figure is (spring and pulley are ideal)



(1) $\frac{1}{2\pi}\sqrt{\frac{K}{m}}$ (2) $\frac{1}{2\pi}\sqrt{\frac{4K}{m}}$

(3) $\frac{1}{2\pi}\sqrt{\frac{K}{4m}}$ (4) $\frac{1}{2\pi}\sqrt{\frac{2K}{m}}$

33. A particle executes SHM along x-axis with origin at mean position. At a certain instant the particle is at $x = \frac{A}{2}$, where A is the amplitude and is moving towards positive x-axis. After what minimum time the particle will be at the same position if period of oscillation is T?

(1) $\frac{T}{12}$ (2) $\frac{T}{6}$

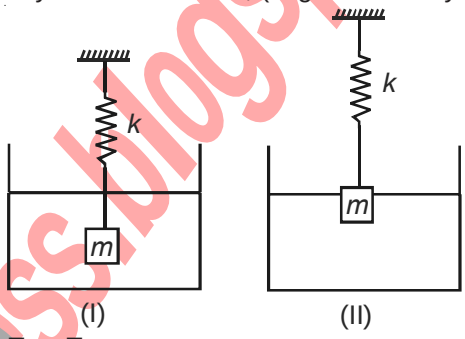
(3) $\frac{T}{4}$ (4) $\frac{T}{3}$

34. A particle of mass m executes SHM with speed v_0 at the mean position. Mean value of kinetic energy for the whole cycle is

(1) $\frac{1}{8}mv_0^2$ (2) $\frac{1}{4}mv_0^2$

(3) $\frac{1}{2}mv_0^2$ (4) mv_0^2

35. Two identical spring block systems oscillate in two different arrangements as shown in the diagram (I) and (II) with time-periods T_1 and T_2 respectively. In arrangement (I) the block remains always inside water and in arrangement (II) the block is always partially immersed. Then, (neglect viscosity of water)



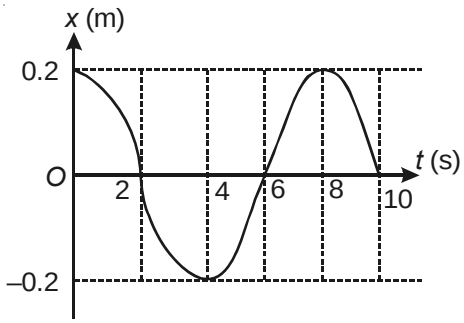
(1) $T_1 = T_2$

(2) $T_1 < T_2$

(3) $T_1 > T_2$

(4) Any of the above depending on the value of k

36. The displacement (x) of simple harmonic oscillator with respect to mean position is plotted with time (t) as shown in the diagram. The incorrect statement about the oscillator is



(1) The period of oscillations is 4 s

(2) The frequency of oscillations is 0.125 Hz

(3) The amplitude is 0.2 m

(4) Initially the particle is at extreme position

37. The maximum and minimum potential energies of a simple harmonic oscillater of mass 2 kg are 40 J and 140 J respectively. The speed of the oscillater at mean position is

(1) 40 m/s (2) 20 m/s

(3) 10 m/s (4) 5 m/s

38. The resonance frequency of a forced oscillator is given by [where symbols have their usual meaning]

(1) $\sqrt{\omega_0^2 - \left(\frac{2b}{m}\right)^2}$ (2) $\sqrt{\omega_0^2 - \frac{b^2}{2m^2}}$

(3) $\sqrt{\omega_0^2 - \left(\frac{bm}{2}\right)^2}$ (4) $\sqrt{\omega_0^2 - \frac{b^2}{4m^2}}$

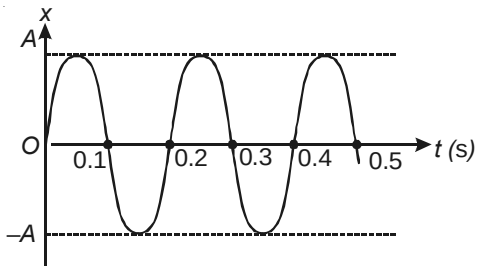
39. The displacement (x) of a simple harmonic oscillator varies with time (t) as shown in diagram. What is the frequency of variation of kinetic energy?

(1) 5 Hz

(2) 10 Hz

(3) 20 Hz

(4) 40 Hz



40. Which of the following equations represents a simple harmonic motion?

(1) $x = \sin^2\omega t + \cos^2\omega t$ (2) $x = A + B\sin\omega t$

(3) $x = A\tan\omega t$ (4) $x = A\sec\omega t$

41. Due to small damping present in the system amplitude is reduced to 80% of the initial value in five hours. If initial amplitude is A_0, then after 15 hours, the amplitude will be

(1) $\frac{A_0}{3}$ (2) $\frac{A_0}{4}$

(3) $\frac{5A_0}{36}$ (4) $\frac{64}{125}A_0$

42. A uniform spring of length ℓ, mass m and force constant k is hung from a rigid support and is loaded with a mass 5m at its lower end. The time period of vibration of the loaded mass is

(1) $2\pi\sqrt{\frac{5m}{k}}$ (2) $2\pi\sqrt{\frac{m}{2k}}$

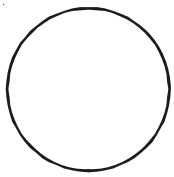
(3) $8\pi\sqrt{\frac{m}{k}}$ (4) $8\pi\sqrt{\frac{m}{3k}}$

43. Two simple pendulum of effective length of 10 m and 40 m respectively start oscillate in same direction at the same time with same phase. They will again be in the same phase when the pendulum of shorter length has completed n oscillations. Here n equal to

(1) 5 (2) 1

(3) 2 (4) 3

44. A disc of mass M and radius R is suspended from one point on its periphery as shown in figure. It is given little displacement to oscillate. The angular frequency of oscillations is



(1) $\sqrt{\frac{3g}{2R}}$ (2) $\sqrt{\frac{g}{R}}$

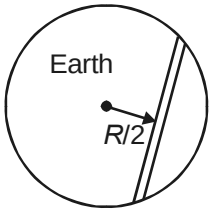
(3) $\sqrt{\frac{2g}{3R}}$ (4) $\sqrt{\frac{2R}{3g}}$

45. The differential equation of a SHM along x axis is given as $a\frac{d^2x}{dt} + bx = 0$, where a and b are constants. The time period of SHM is

(1) $2\pi\sqrt{\frac{a}{b}}$ (2) $2\pi\sqrt{\frac{b}{a}}$

(3) $2\pi\sqrt{ab}$ (4) $2\pi\sqrt{\frac{b^2}{a}}$

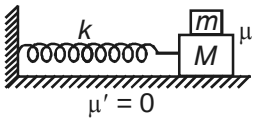
46. An object of mass 2 kg is dropped into a frictionless tunnel through the earth as shown in figure. The time interval in which body will reach at the mid-point of tunnel



(1) 21.1 minute (2) 42.3 minute

(3) 84.6 minute (4) 169.2 minute

47. The maximum amplitude of oscillations of system shown in the figure for which no relative motion exist between two blocks is (μ = coefficient of friction between blocks and floor is smooth)



(1) $\frac{\mu mg}{k}$ (2) $\frac{\mu Mg}{k}$

(3) $\frac{\mu(M+m)g}{k}$ (4) $\frac{\mu(M-m)g}{k}$

48. The displacement of a particle from mean position in SHM is given by $x = 5\sin\left(\pi t + \frac{\pi}{3}\right)$ where x is in meter and t is in second. The maximum velocity V_{max} and maximum acceleration a_{max} respectively are

(1) 5π, 5π (2) 5π, $5\pi^2$

(3) $5\pi^2$, $5\pi^2$ (4) $5\pi^2$, 5π

49. Starting from the origin, a body oscillates simple harmonically with a period of 2 second. After what time, its kinetic energy will be 75% of the total energy?

(1) $\frac{1}{6}$s (2) $\frac{1}{4}$s

(3) $\frac{1}{3}$s (4) $\frac{1}{12}$s

50. A simple pendulum with a metallic bob has a time period T. The bob is now immersed in a non viscous liquid and made to oscillate. If the density of the liquid is $\frac{1}{4}$ times that of metal, then the time period of the pendulum will be

(1) $\frac{T}{\sqrt{3}}$ (2) $\frac{2T}{\sqrt{3}}$

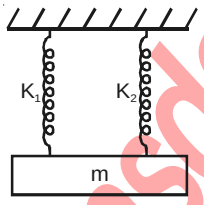
(3) $\frac{4}{3}$T (4) $\frac{2}{3}$T

51. A simple pendulum performs simple harmonic motion about x = 0 with an amplitude a and time period T. The speed of the pendulum at $x = \frac{a}{2}$ will be

(1) $\frac{\pi a}{T}$ (2) $\frac{3\pi^2 a}{T}$

(3) $\frac{\pi a\sqrt{3}}{T}$ (4) $\frac{\pi a\sqrt{3}}{2T}$

52. A mass is suspended seperately by two different springs in successive order then time periods are t_1 and t_2 respectively. If it is connected by both springs as shown in figure then time period is t_0, then correct relationship is



(1) $t_0^2 = t_1^2 + t_2^2$ (2) $t_0^{-2} = t_1^{-2} + t_2^{-2}$

(3) $t_0^{-1} = t_1^{-1} + t_2^{-1}$ (4) $t_o = t_1 + t_2$

53. For a particle executing SHM has a kinetic energy $K_o\cos^2\omega t$. The maximum values of the potential energy and the total energy are respectively

(1) $\frac{K_o}{2}$ and K_o (2) K_o and $2K_o$

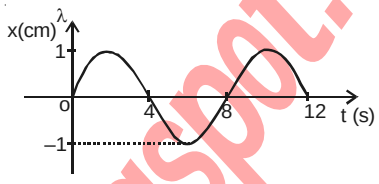
(3) K_o and K_o (4) 0 and 2K

54. If x, v and a denote the displacement, velocity and acceleration respectively of a particle executing simple harmonic motion of time period T, then which of the following does not change with time

(1) $a^2T^2 + 4a^2v^2$ (2) $\frac{aT}{v}$

(3) $aT + 2\pi v$ (4) $\frac{aT}{x}$

55. The x–t graph of a particle undergoing simple harmonic motion is shown below. The acceleration of the particle at $t = \frac{4}{3}$s is



(1) $\frac{\sqrt{3}}{32}\pi^3 cm/s^2$ (2) $\frac{-\pi^2}{32}cm/s^2$

(3) $\frac{\pi^2}{32}cm/s^2$ (4) $-\frac{\sqrt{3}}{32}\pi^2 cm/s^2$

56. For a particle executing SHM having amplitude A, the speed of the particle is half of its maximum speed when displacement of the particle from mean position is

(1) $\frac{A}{2}$ (2) $\frac{A}{\sqrt{2}}$

(3) $\frac{\sqrt{3}A}{2}$ (4) $\frac{\sqrt{3}A}{\sqrt{2}}$

57. The motion equation of a particle executing SHM is given by :

x = (0,01) sin[100π(t + 0.005)], where

x is in metre and t is in second. The time period in second is

(1) 0.01 (2) 0.02

(3) 0.1 (4) 0.2

58. A block of mass M is suspended from a uniform wire of area of cross section 'A', length 'L' and young's modulus 'Y'. Time period of small vertical oscillations of block is

(1) $2\pi\sqrt{\frac{MY}{AL}}$ (2) $2\pi\sqrt{\frac{ML}{YA}}$

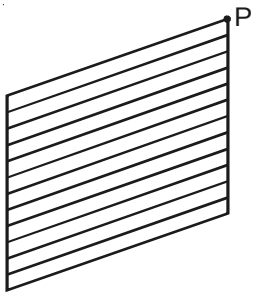
(3) $2\pi\sqrt{\frac{YAM}{L}}$ (4) $2\pi\sqrt{\frac{M}{YAL}}$

59. A particle executing SHM along x-axis about x = 0 has amplitude A and angular frequency ω. If at t = 0, the particle is $x = -\frac{A}{2}$ moving towards mean position, then equation of SHM is

(1) $x = A\sin\left(\omega t - \frac{\pi}{4}\right)$ (2) $x = A\sin\left(\omega t - \frac{\pi}{3}\right)$

(3) $x = A\sin\left(\omega t - \frac{\pi}{6}\right)$ (4) $x = A\sin\left(\omega t - \frac{2\pi}{3}\right)$

60. A thin uniform square plate of mass 'M' and side length 'L' is pivoted from one vertex on a vertical plane as shown, Time period of small oscillation in its plane



(1) $2\pi\sqrt{\left(\frac{\sqrt{2}L}{3g}\right)}$ (2) $2\pi\sqrt{\left(\frac{L}{3\sqrt{2}g}\right)}$

(3) $2\pi\sqrt{\left(\frac{2\sqrt{2}L}{3g}\right)}$ (4) $2\pi\sqrt{\left(\frac{3g}{\sqrt{2}L}\right)}$

61. A particle is moving on x–y plane in such a way that x and y co-ordinates of the particle are changing with time 't', as

$x = A_1 \sin\omega t$ and $y = A_2 \sin\left(\omega t + \frac{\pi}{4}\right)$

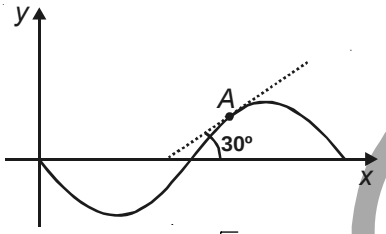
A_1, A_2 and ω are constants

Then path of the particle must be

(1) Straight line
(2) Circular
(3) Elliptical
(4) Parabolic

[Chapter-13 : Waves]

1. At t = 0, photograph of the wave is shown in the figure.



If the wave speed is $10\sqrt{3}$ m/s, then the speed of particle at point A is

(1) 30 m/s (2) 10 m/s

(3) $10\sqrt{3}$ m/s (4) $\frac{10}{\sqrt{3}}$ m/s

2. A tuning fork of frequency 480 Hz sounded with a second tuning fork gives 9 beats in 3 s. Then, the frequency of second tuning fork is

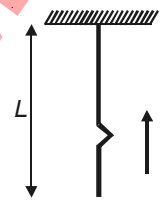
(1) 471 Hz (2) 477 Hz
(3) 483 Hz (4) Either (2) or (3)

3. In a resonance tube, if the resonance is obtained first at length ℓ_1 and then at length ℓ_2 with a tuning fork of frequency ν then the velocity of sound is

(1) $2\nu(\ell_2 + \ell_1)$ (2) $\frac{\nu(\ell_2 - \ell_1)}{2}$

(3) $2\nu(\ell_2 - \ell_1)$ (4) $\nu(\ell_2 - \ell_1)$

4. A transverse wave pulse is generated at lower end of a hanging rope of uniform linear density and length L. The time taken by the pulse to reach the upper end of rope is



(1) $2\sqrt{\frac{L}{g}}$ (2) $\sqrt{\frac{2L}{g}}$

(3) $\sqrt{\frac{L}{2g}}$ (4) $\sqrt{\frac{L}{g}}$

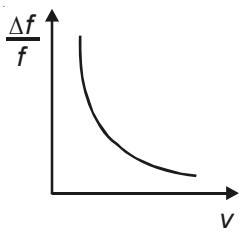
5. Which among the following is equation of transverse progressive wave

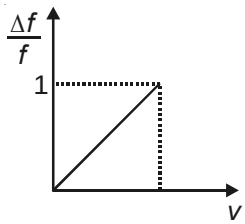
(1) y = 2A sin ωt cos kx (2) y = 2A cos ωt sin ωt
(3) y = A sin (ωt – kx) (4) All of these

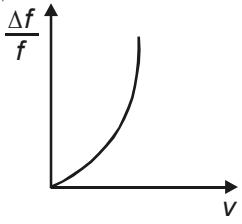
6. Two wires made of same material having same length and of radii r and 2r respectively are welded together end to end. The combination is used as a sonometer wire and is kept under a tension T. The ratio of the number of loops formed in the wires such that the joint is a node, when stationary waves are set up in the wires is

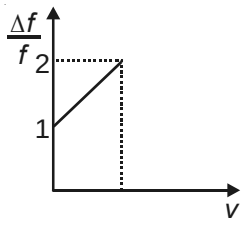
(1) 2 : 3 (2) 1 : 2
(3) 1 : 4 (4) 1 : 1

7. An observer approaches a stationary source with speed v, which of the following correctly represent the variation of fractional change in observed frequency with speed of observer?

(1) 

(2) 

(3) 

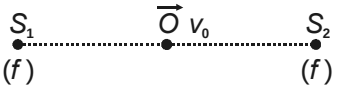
(4) 

8. If velocity of sound in air at 0ºC is 330 m/s, then the velocity of sound in air at 2ºC is

(1) 331.22 m/s (2) 332.22 m/s

(3) 328.22 m/s (4) 333 m/s

9. An observer is moving with velocity v_0 on the line joining two identical sources at rest as shown. Beat frequency observed by observer is, where v is the velocity of sound



(1) $\frac{2v_0}{v}f$ (2) $\frac{v_0}{v}f$

(3) $\frac{v}{2v_0}f$ (4) $\frac{v}{v_0}f$

10. In a stationary wave distance between two nearest antinodes is 30 cm. Two particles are at a distance 60 cm. Phase difference between them is

(1) π (2) $\frac{\pi}{2}$

(3) $\frac{3\pi}{4}$ (4) Zero

11. A stationary wave is given by the equation

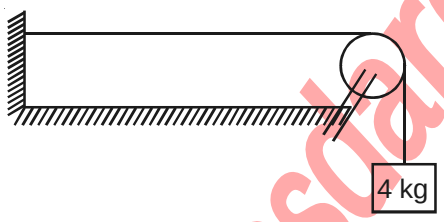
y = 1.5 sin200tcos10πx.

The wavelength of the wave is (y and x are in cm and t in second)

(1) 0.2 cm (2) 0.1 cm

(3) 2 cm (4) 0.5 cm

12. A block of mass 4 kg is supported by a string as shown mass per unit length of wire is 2 g/cm. Velocity of transverse wave in the string is



(1) 8 m/s (2) 7 m/s

(3) 13 m/s (4) 14 m/s

13. The equation of a stationary wave is

$$y = 6\sin\left(\frac{2\pi x}{15}\right)\cos(84\pi t)$$

where x and y are in cm and t in second. The distance between a node and adjacent antinode is

(1) 3.75 cm (2) 7.5 cm

(3) 15 cm (4) 5 cm

14. Sound wave travelling in air is represented by y = 2sin(2t + 3x) cm. The equation of the wave, which is reflected completely from water surface, will be

(1) 2sin(2t + 3x) cm (2) – 2sin(2t + 3x) cm

(3) 2sin(2t – 3x) cm (4) – 2sin(2t – 3x) cm

15. The string of a sonometer wire is divided into 2 parts so that frequencies of vibrations of the two parts of string are corresponding to 3rd and 5th overtone of a closed organ pipe. The ratio in the length of two parts will be

(1) 3 : 5 (2) 5 : 3

(3) 11 : 7 (4) 2 : 3

16. Equation $y = 8\sin\left(\frac{\pi x}{80}\right)\cos(90\pi t)$ (where x and y in cm and t in s) represents vibration in a stretched string of length l = 30 cm. The amplitude of the particle at $x = \frac{40}{3}$ cm will be

(1) 8 cm (2) 4 cm

(3) $4\sqrt{3}$ cm (4) 60 cm

17. In case of travelling wave the minimum distance between two particles having same speed at every instant, is

(1) λ (2) $\frac{\lambda}{2}$

(3) $\frac{\lambda}{4}$ (4) $\frac{\lambda}{8}$

18. The number of nodes in a string of length 4 cm, fixed at both the ends, if the equation for the stationary wave is given by y = A sin πx sinωt is (where x is in cm and t is in seconds)

(1) 3 (2) 4

(3) 5 (4) 6

19. Which of the following is incorrect?

(1) Transverse wave can be polarised

(2) Longitudinal wave can be polarised

(3) Speed of sound does not depend on pressure at constant temperature

(4) The differential equation of wave motion is $v^2\frac{d^2y}{dx^2} = \frac{d^2y}{dt^2}$

20. The equation of a wave is given as

$$y = (4.0\text{ m})\sin 2\pi\left(\frac{t}{10} - \frac{x}{5}\right),$$

where x is in meters and t in seconds. Then which of the following is incorrect?

(1) The wave is transverse

(2) The wave moves towards, negative x-axis

(3) Wave speed is 0.5 m/s

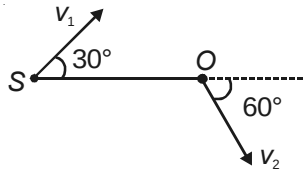
(4) Wavelength is 5.0 m

21. The equation of a wave pulse is given as $y = \frac{A}{B+(at-bx)^2}$, where a, b, A, B are constants. The speed of the wave is

(1) $\frac{A}{B}$ (2) $\frac{a}{b}$

(3) $\frac{B}{A}$ (4) $\frac{b}{a}$

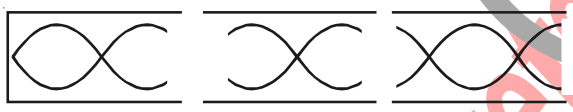
22. An observer O and sound source S move with velocities shown in the diagram. For what value of the ratio $\frac{v_1}{v_2}$, the perceived frequency by the observer will be equal to original frequency at the instant shown?



(1) $\frac{1}{\sqrt{3}}$ (2) $\frac{1}{\sqrt{2}}$

(3) $\frac{1}{2}$ (4) $\sqrt{3}$

23. Displacement nodes and antinodes are shown in the three pipes of same lengths. The ratio of frequencies of the notes in the three pipes is



(*I*) (*II*) (*III*)

(1) 3 : 2 : 4 (2) 2 : 3 : 4

(3) 3 : 4 : 2 (4) 4 : 3 : 2

24. A uniform rope of length L is suspended from the ceiling of a room. The speed of a transverse wave pulse at $x = \frac{L}{4}$, from the lower end is

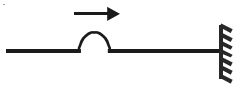
(1) $\sqrt{Lg}$ (2) $\frac{1}{2}\sqrt{Lg}$

(3) $\sqrt{\frac{Lg}{2}}$ (4) $\sqrt{\frac{3Lg}{4}}$

25. The equation of the wave pulse moving on stretched string, as shown in the diagram, is given as

$y = A\sin(\omega t - kx)$,

The equation of the reflected wave pulse is



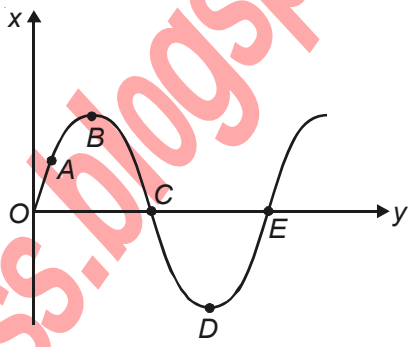
(1) $y = A \sin(\omega t + kx)$

(2) $y = A \sin(\omega t - kx + \pi)$

(3) $y = A \sin(\omega t + kx + \pi)$

(4) $y = A \sin(\omega t - kx)$

26. The position (x) of medium particles is plotted with displacement (y) as shown in the diagram. Which of the following is incorrect?



(1) Velocity of particles C and E is same

(2) Speed of B and D is zero

(3) Speed of C and E is equal

(4) Particles A and E move in the same direction

27. The speed of sound in oxygen gas is v_0, then under the same conditions of temperature and pressure, the speed of sound in hydrogen will be

(1) v_0 (2) $2v_0$

(3) $4v_0$ (4) $16v_0$

28. A sonometer wire under a given tension T has a fundamental frequency of 400 Hz. When tension is decreased by 1 kgf, the fundamental frequency becomes 300 Hz. The value of T in kgf units is

(1) $\frac{16}{7}$ (2) $\frac{16}{9}$

(3) $\frac{25}{16}$ (4) 1.5

29. Two sonometer wires of same length oscillate in unison. When length of one wire is increased by 1%, 5 beats per second are heard. The frequency of oscillation of the other wire is

(1) 250 Hz (2) 500 Hz

(3) 1000 Hz (4) 2000 Hz

30. The fundamental frequency of the air column in an open organ pipe is 400 Hz. It half length of the pipe is dipped in water, the new fundamental frequency of the air column in the pipe will be

(1) 800 Hz (2) 400 Hz

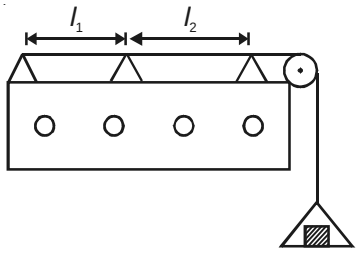
(3) 300 Hz (4) 150 Hz

31. Three successive frequencies of the notes produced by a closed organ pipe are 150 Hz, 250 Hz, 350 Hz. The fundamental frequency is

(1) 50 Hz (2) 100 Hz

(3) 150 Hz (4) 200 Hz

32. A sonometer wire of length 75 cm is divided into two segments of length l_1 and l_2 as shown.



If ratio of the fundamental frequencies of these segments is 1 : 4 then

(1) l_1 = 20 cm, l_2 = 55 cm

(2) l_1 = 60 cm, l_2 = 15 cm

(3) l_1 = 15 cm, l_2 = 60 cm

(4) l_1 = 25 cm, l_2 = 50 cm

33. When temperature of air (on absolute scale) increases by 1%, the speed of sound in air

(1) Remains unchanged (2) Increases by 1%

(3) Increases by 0.5% (4) Decreases by 0.5%

34. The minimum separation between a node and an antinode in the stationary wave y = 20sin(2x) cos(400πt)

(1) $\frac{\pi}{2}$ (2) $\frac{\pi}{4}$

(3) $\frac{\pi}{6}$ (4) $\frac{\pi}{8}$

35. Standing waves are produced in 10 m long stretched string. If the string vibrates in 5 segments and wave velocity is 20 m/s. Its frequency is

(1) 2 Hz (2) 4 Hz

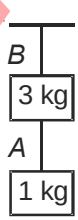
(3) 5 Hz (4) 10 Hz

36. Due to interference of two coherent waves a minimum intensity of I and maximum intensity of 9I are detected. The ratio of amplitudes of waves is

(1) 1 (2) 2

(3) 3 (4) 9

37. Two strings A and B of same material are used to hang blocks of mass 1 kg and 3 kg. If velocity of transverse wave is same in two strings, then their radii are in ratio of



(1) $\frac{1}{2}$ (2) $\frac{5}{1}$

(3) $\frac{4}{1}$ (4) 1

38. If two tuning forks have frequencies 250 Hz and 256 Hz respectively, then on sounding together, the time interval between two successive minimum intensities will be

(1) 6 s (2) 3 s

(3) $\frac{1}{3}$ s (4) $\frac{1}{6}$ s

39. A source of sound of frequency f_0 is revolving in a circle of radius R with angular speed ω. The frequency observed by an observer at a distance 2R from centre on the line perpendicular to the plane of circle and passing through centre is

(1) f_0 (2) $2f_0$

(3) Zero (4) ∞

40. The equation of a stationary wave along a stretched string is given by $y = 0.2\sin\left(\frac{\pi}{9}x\right)\cos 20\pi t$, where x is in cm, y is in meter and t is in minute. The distance between two consecutive nodes is

(1) 9 cm (2) 18 cm

(3) 9 m (4) 18 m

41. A sound source and an observer are moving away from each other with equal speeds 15 m/s. Speed of sound is 330 m/s. If observer detects the frequency 840 Hz, then original frequency of source is

(1) 660 Hz (2) 1680 Hz

(3) 920 Hz (4) 880 Hz

42. In a stretched string equation of a transverse wave is $y = 2\sin\left[2\pi\left(\frac{x}{10} - \frac{t}{0.01}\right)\right]$, where x and y are in metre and t in second. The maximum particle velocity is

(1) 400π m/s (2) 40π m/s

(3) 100π m/s (4) 10π m/s

43. A wave propagating through a medium is represented by $y = 20\sin\left\{\frac{\pi}{4}t - \frac{\pi}{3}x\right\}$, where x and y are in metre. The phase difference between two particles of medium separated by distance 1.5 m will be

(1) Zero (2) $\frac{\pi}{2}$

(3) π (4) 2π

44. A pipe open at both ends has fundamental frequency f_1. When $\frac{3}{4}$th of its length is in water, it produces fundamental note of f_2. Then $\frac{f_1}{f_2}$ is

(1) $\frac{1}{2}$ (2) 2

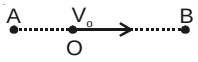
(3) $\frac{3}{4}$ (4) $\frac{4}{3}$

45. When two tuning forks (fork 1 and 2) are sounded simultaneously, 4 beats per second are heard. Now some tape is attached on the prong of the fork 2. When the tuning forks are sounded again, 4 beats per second are heard. If the frequency of fork 1 is 200 Hz, then what was the original frequency of fork 2?

(1) 204 Hz (2) 196 Hz

(3) 202 Hz (4) 200 Hz

46. Two sources A and B are sounding notes of frequency 660 Hz. A listener moves from A and B with a constant velocity v. If the speed of sound is 330 m/s. What must be the value of v_0 so that he hears 8 beats per second?



(1) 2.8 m/sec (2) 2 m/sec

(3) 3.0 m/sec (4) 3.5 m/sec

47. Seperation between two particles vibrating with a phase difference of $\frac{7\pi}{3}$ rad in a progressive transverse mechanical wave in terms of wavelength λ is

(1) $\frac{7\lambda}{3}$ (2) $\frac{7\lambda}{6}$

(3) $\frac{14\lambda}{3}$ (4) $\frac{6\lambda}{7}$

48. A wave disturbance propagating along x-axis is given by

$y = \frac{1}{1+x^2}$ at t = 0 and $y = \frac{1}{1+(x-2)^2}$ at t = 4s

where y is in mm and x is in cm. The shape of the wave disturbance does not change with time. The speed of wave is

(1) 0.5 cm/s (2) 1 cm/s

(3) 3 cm/s (4) 4 cm/s

49. Velocity of sound in air is 320 m/s. A pipe closed at one end has a length 1 m. Neglecting end correction, the air column in the pipe can not resonate with a sound of frequency :

(1) 80 Hz (2) 240 Hz

(3) 320 Hz (4) 400 Hz

50. A cylindrical tube open at both ends, has fundamental frequency f in air. The tube is dipped in water, so that half of it is in water. The fundamental frequency of air column is now

(1) $\frac{f}{2}$ (2) $\frac{3f}{4}$

(3) f (4) 2f

CHEMISTRY

[Chapter-12 : Organic Chemistry]

1. Consider the following alkyl cations

$\overset{+}{C}H_3$, $CH_3\overset{+}{C}H_2$, $(CH_3)_2\overset{+}{C}H$, $(CH_3)_3\overset{+}{C}$

Which is more stable and why?

(1) $\overset{+}{C}H_3$ (Resonance)

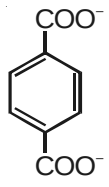
(2) $CH_3\overset{+}{C}H_2$ (Polarity)

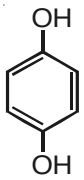
(3) $(CH_3)_3\overset{+}{C}$ (Hyperconjugation)

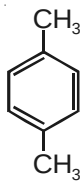
(4) $(CH_3)_2\overset{+}{C}$ (Inductive effect)

2. Non-zero dipole moment is found in

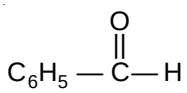
(1) 

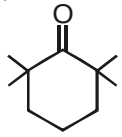
(2) 

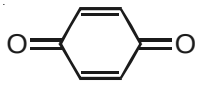
(3) 

(4) 

3. Which of the following cannot exhibit tautomerism?

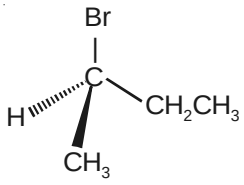
(1) 

(2) 

(3) 

(4) All of these

4. Consider the following compound

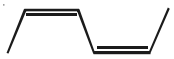
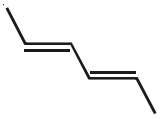


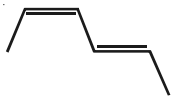
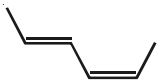
This compound is

(1) (S)-2-Bromobutane (2) (R)-2-Bromobutane

(3) (S)-3-Bromobutane (4) (R)-3-Bromobutane

5. Consider the following geometrical isomers

I.  II. 

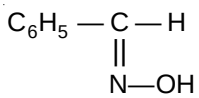
III.  IV. 

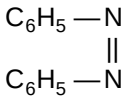
Which are identical to each other?

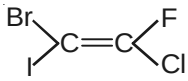
(1) (I) & (II) (2) (I) & (III)

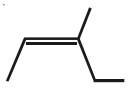
(3) (III) & (IV) (4) (II) & (III)

6. Which is incorrectly matched?

(1)  (syn-Benzaldoxime)

(2)  (syn-Azobenzene)

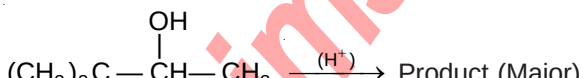
(3)  (Z-isomer)

(4)  (E-isomer)

7. Which of the following shows free radical mechanism in presence of peroxide upon double bond?

(1) HCl (2) HBr

(3) HF (4) HI

8. 

(1) $(CH_3)_3$—CH=CH_2

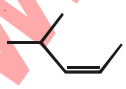
(2) $(CH_3)_2C$=$C(CH_3)_2$

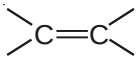
(3) $(CH_3)_2$CH—CH=CH_2

(4) $(CH_3)_2$CH—CH_2—CH=CH_2

9. Which of the following will not exhibit geometrical isomerism?

(1)  (2) 

(3)  (4) 

10. Arrange the following alkenes in decreasing  bond length

I. H_3C—CH=CH—CH_3

II. H_3C—CH=CH_2

III. H_3C—CH=$C(CH_3)_2$

IV. H_2C=CH_2

(1) I > III > II > IV (2) III > I > II > IV

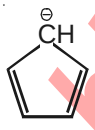
(3) I > IV > III > II (4) IV > II > III > I

11. Which reagent of following gives anti-hydrogenation product of alkene ?

(1) $Na/NH_3(l)$ (2) $Pd/BaSO_4$

(3) $NaBH_4$ (4) DIBAL

12. Which are aromatic compounds?

I.  II. 

III.  IV. 

(1) I, II, III (2) II, III, IV

(3) I, III, IV (4) All of these

13. Which are the correct match/es?

(i) Sulphonation of Benzene – SO_3 as an electrophile

(ii) Nitration of Benzene – $\overset{\oplus}{N}O$ as an electrophile

(iii) Halogenation of Benzene – Br_2/CCl_4 as a reagent

(1) (i) & (iii) (2) (i) only

(3) (i) & (ii) (4) All of these

14. The correct statement is

(1) Carbocations are not prone to rearrangement

(2) Rearrangement of carbocation occurs much faster than proton elimination

(3) In elimination reaction if the major product is capable to show cis-trans isomerism then the cis product predominates

(4) All of these

15. During estimation of nitrogen by Kjeldahl method the ammonia evolved from 0.4 g of an organic compound was absorbed in 30 ml of 0.25 M H_2SO_4. The excess of acid was neutralised by 30 ml of 0.2 M NaOH. The percentage of nitrogen in the compound is

(1) 25.25% (2) 31.50%

(3) 39.65% (4) 51.60%

16. Which of the following is most stable carbanion?

(1) $CH{\equiv}C^-$ (2) $CH_2{=}\overline{C}H$

(3) CH_3—$\overline{C}H_2$ (4) $(CH_3)_2\overline{C}H$

17. The correct order among the following is

(1) $F^- > Cl^- > Br^- > I^-$ (Basicity order)

(2) $F^- < Cl^- < Br^- < I^-$ (Nucleophilicity order)

(3) F > Cl > Br > I (Electronegativity order)

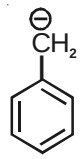
(4) All of these

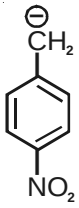
18. Which of the following method is not related to the detection or determination of nitrogen?

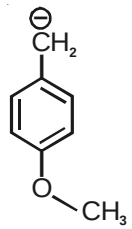
(1) Duma's method (2) Kjeldahl's method

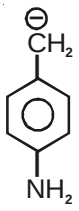
(3) Soda lime method (4) Carius method

19. Which of the following carbanion is most stable?

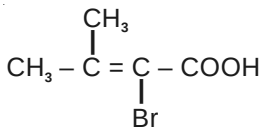
(1) 

(2) 

(3) 

(4) 

20. The IUPAC name of the compound



(1) 3 Methyl-2-bromobut-3-enoic acid

(2) 2 Bromo-3-methyl but-3-enoic acid

(3) 2 Bromo-3-methyl but-2-enoic acid

(4) 3 Bromo-2-methyl but-2-enoic acid

21. IUPAC name of neopentyl alcohol is

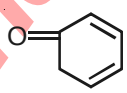
(1) 2, 2 dimethyl pentan-2-ol

(2) 2, 3 dimethyl propan-2-ol

(3) 2-methyl butan-2-ol

(4) 2, 2 dimethyl propanol

22. Tautomerism is shown by

(1) $CH_3-COCH_2COCH_3$ (2) 

(3) $CH_3CH_2NO_2$ (4) All of these

23. Total number of possible structural isomers of $C_4H_{10}O$ are

(1) 6 (2) 7

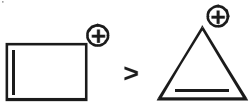
(3) 4 (4) 5

24. Which of the following is correct order of stability of carbocation?

(1) $CH_2 = \overset{\oplus}{C}H > CH_3 - \overset{\oplus}{C}H_2$

(2) $CH_3 - O - \overset{\oplus}{C}H_2 > CH_3 - \overset{\oplus}{C}H_2$

(3) $CH_3 - CH_2 - \overset{\oplus}{C}H_2 > CH_2 = CH - \overset{\oplus}{C}H_2$

(4) 

25. The type of isomerism due to different types of alkyl group on either side of functional groups in the molecule of compounds $CH_3CH_2OCH_2CH_3$ and $CH_3OC_3H_7$ is referred as

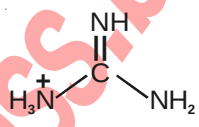
(1) Metamerism

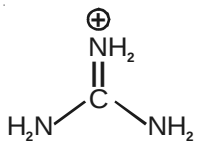
(2) Chain isomerism

(3) Functional isomerism

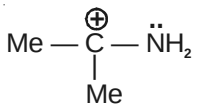
(4) Position isomerism

26. In which of the following molecule positive charge is not delocalized because of resonance?

(1) 

(2) 

(3) 

(4) 

27. A mixture contains 3 solids (x), (y) & (z). On heating, (y) changes from solid to vapour state. The compound (y) can be separated from the mixture by

(1) Distillation (2) Sublimation

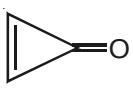
(3) Crystallization (4) Separating funnel

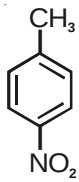
28. In Lassaigne's test, the sodium extract of an organic compound containing both N & S. On treatment with $FeCl_3$ solution produces a blood red colour. The appearance of blood red colour is due to

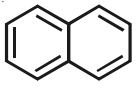
(1) $[Fe(CN)_5NOS]^{4-}$ (2) $Fe_4[Fe(CN)_6]_3 .xH_2O$

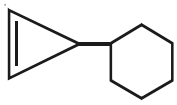
(3) $[Fe(CN)_6]^{4-}$ (4) $Fe(NCS)^{2+}$

29. Which of the following compound will have all electronic effect namely inductive, mesomeric and hyperconjugative effects?

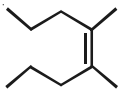
(1) 

(2) 

(3) 

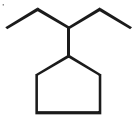
(4) 

30. The IUPAC name of given compound is



(1) 4, 5 dimethyl oct-5-ene
(2) 3, 4 dimethyl oct-5-ene
(3) 4, 5 dimethyl oct-4-ene
(4) 2, 3 dipropy but-2-ene

31. Total number of 2º carbon atom present in the given compound is

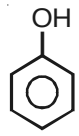
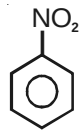
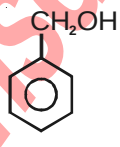


(1) 2 (2) 4
(3) 6 (4) 8

32. Nitration of benzene and sulphonation of benzene is an example of (respectively)
(1) Nucleophilic, Nucleophilic substitution
(2) Nucleophilic, Electrophilic substitution
(3) Electrophilic, Nucleophilic substitution
(4) Electrophilic, Electrophilic substitution

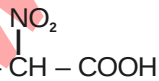
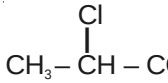
33. The correct order of bond length of C – C in C_2H_6, C_2H_4, C_2H_2 & C_6H_6 are
(1) $C_2H_2 < C_6H_6 < C_2H_4 < C_2H_6$
(2) $C_2H_6 < C_6H_6 < C_2H_4 < C_2H_2$
(3) $C_2H_2 < C_2H_4 = C_6H_6 < C_2H_6$
(4) $C_2H_2 < C_2H_4 < C_6H_6 < C_2H_6$

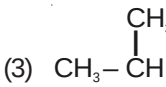
34. Which one of the following is most reactive towards electrophilic attack?

(1) 
(2) 
(3) 
(4) 

35. In $(t-Bu)_3\dot{C}$, the hybridization of central carbon atom is
(1) sp (2) sp^2
(3) sp^3 (4) dsp^2

36. Which of the following is least acidic species?

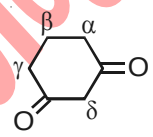
(1)  (2) 

(3)  (4) CH_3CH_2COOH

37. The shape of methyl carbocation & methyl carbanion are respectively
(1) Trigonal planar & tetrahedral
(2) Trigonal planar & pyramidal
(3) Pyramidal & pyramidal
(4) Tetrahedral & trigonal planar

38. In an estimation of sulphur by Carius method, 0.468 g of organic sulphur compound gave 0.668 g of $BaSO_4$. The % of sulphur in the compound is nearly (Mol. mass of $BaSO_4$ = 233)
(1) 20% (2) 80%
(3) 40% (4) 60%

39. Which carbon has most acidic hydrogen?



(1) C_α (2) C_β
(3) C_γ (4) C_δ

40. How many primary amines are possible of the formula $C_4H_{11}N$?
(1) 3 (2) 4
(3) 5 (4) 8

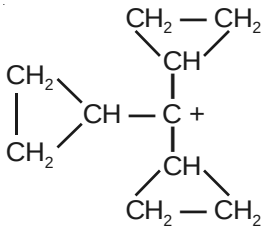
41. Which of the following is strongest electron withdrawing group?
(1) $-NO_2$ (2) –I
(3) $-CH_3$ (4) –COOH

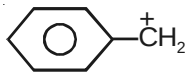
42. The number of 'C'-atoms in alkene having lowest molecular mass which can show chain and position isomerism are respectively
(1) 4 and 3 (2) 4 and 4
(3) 4 and 5 (4) 4 and 6

43. In the following carbocations, the stability order is

I. $R-CH_2-\overset{+}{C}H_2$

II. $CH_3\overset{+}{C}HCH_3$

III. 

IV. 

(1) III > II > IV > I (2) IV > I > II > III
(3) IV > III > II > I (4) III > IV > II > I

44. The nucleophilicity order of F^-, $\overline{C}H_3, \overline{O}H, \overline{N}H_2$ in decreasing order is

(1) $\overline{F} > \overline{O}H > \overline{N}H_2 > \overline{C}H_3$

(2) $\overline{C}H_3 > \overline{N}H_2 > \overline{O}H > \overline{F}$

(3) $\overline{F} > \overline{C}H_3 > \overline{N}H_2 > \overline{O}H$

(4) $\overline{C}H_3 > \overline{F} > \overline{O}H > \overline{N}H_2$

45. In which of the following molecules, all the carbon atoms are not in the same hybrid state?

(1) Benzene (2) 

(3) $CH_2 = C = CH_2$ (4) $CH_2 = CH–CH = CH_2$

46. Which of the following sets in options explains increasing dipole moment?

I. Toluene II. m-dichlorobenzene

III. o-dichlorobenzene IV. p-dichlorobenzene

(1) I < IV < II < III (2) IV < I < II < III

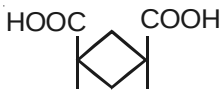
(3) IV < I < III < II (4) IV < II < I < III

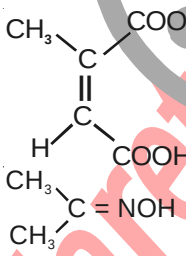
47. During nitration of an organic compound, HNO_3 acts as

(1) Acid (2) Base

(3) Neutral (4) Salt

48. Which molecule can not show goemetrical isomerism?

(1) 

(2) 

(3) $CH_3–CH=NOH$ (4)

49. Which of the following are m-directing groups?

I II

III IV

(1) I, II, III, IV (2) II, III

(3) I, III, IV (4) II, IV

50. The IUPAC name of the given compound

 is

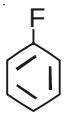
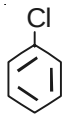
(1) 3-Cyclopropaneprop-1-ene

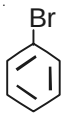
(2) 3-Cyclopropylprop-1-ene

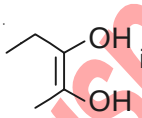
(3) 1-Allylcyclopropane

(4) 3-Allylcyclopropane

51. Towards electrophilic substitution, the most reactive haloarene is

(1)  (2) 

(3)  (4) 

52. IUPAC name of  is

(1) But-2-ene-2, 3-diol

(2) Pent-2-ene-2, 3-diol

(3) 2-methyl but-2-ene-2, 3-diol

(4) Hex-2-ene-2, 3-diol

53. The correct increasing order of nucleophilicity is

(1) $Me_3CO^- < Me_2\overset{H}{\overset{|}{C}}O^- < MeO^-$

(2) $MeO^- < Me_2\overset{H}{\overset{|}{C}}O^- < Me_3CO^-$

(3) $Me_2\overset{H}{\overset{|}{C}}O^- < Me_3CO^- < MeO^-$

(4) $Me_3O^- < MeO^- < Me_2\overset{H}{\overset{|}{C}}O^-$

54. Which of the following statement is correct?

(1) A singlet carbene has bent structure

(2) A triplet carbene is more stable than singlet carbene

(3) Simple alkyl carbanions are pyramidal in shape

(4) All of these

55. The composition of prussian blue formed in the test of nitrogen by Lassaigne's test is

(1) $Na_4[(Fe(CN)_6]$

(2) $Fe_4[Fe(CN)_6]_3$

(3) $K_2Fe[Fe(CN)_6]$

(4) $Fe(SCN)_3$

56 . Sodium nitroprusside is used in test of

(1) Nitrogen (2) Phosphorus

(3) Sulphur (4) Halogen

1. Kharasch effect (Peroxide effect) is observed only by HBr, because
   (1) Low bond energy & Endothermic reaction
   (2) Low bond energy & Exothermic reaction
   (3) High bond energy & Exothermic reaction
   (4) High bond energy & Endothermic reaction

2. $H_3C—C\equiv CH$ on reaction with HI gives
   (1) $H_3C—CH_2—CHI_2$ (2) $H_3C—CH=CH_2I$
   (3) $H_3C—CH(I)—CH_3$ (4) $H_3C—Cl_2—CH_3$

3. $H_3C—CH_2—CH(CH_3)_2$ on bromination in the presence of light gives which product as the major one?
   (1) $BrCH_2—CH_2—CH(CH_3)_2$
   (2) $H_3C—\underset{\displaystyle Br}{\underset{|}{CH}}—CH(CH_3)_2$
   (3) $H_3C—CH_2—CBr(CH_3)_2$
   (4) $H_3C—CH_2—\underset{\displaystyle CH_3}{\underset{|}{CH}}—CH_2(Br)$

4. Which alkene on ozonolysis gives the mixture of three products HCHO, $H_3C—\underset{\displaystyle O}{\underset{\|}{C}}—CH_3$,
   $H_3C—\underset{\displaystyle O}{\underset{\|}{C}}—CH_2—\underset{\displaystyle O}{\underset{\|}{C}}—CH_3$?
   (1) $(H_3C)CH=C(CH_3)—CH_2—C(CH_3)=CH—CH_2$
   (2) $H_3C—\underset{\displaystyle C(CH_3)_2}{\underset{\|}{C}}—CH_2—CH_2—CH=CH_2$
   (3) $(H_3C)_2C=C(CH_3)—CH_2—C(CH_3)=CH_2$
   (4) $H_2C=CH—CH_2—\underset{\displaystyle CH_3}{\underset{|}{CH}}—CH=C(CH_3)$

5. By which reagent alkene can be distinguished from alkanes?
   (1) Dil. H_2SO_4 (2) Dilute alkaline $KMnO_4$
   (3) H_2O_2 (4) Both (1) & (2)

6. Which of the following is not responsible for green house effect?
   (1) CO_2 (2) Water vapours
   (3) CFCs (4) O_2

7. Bhopal gas tragedy is caused by
   (1) Methyl isocyanate (2) Methyl isocyanide
   (3) DDT (4) CFCs

8. A conjugated alkadiene having molecular formula $C_{13}H_{22}$ on ozonolysis yielded ethyl methyl ketone glyoxal and cyclohexanecarbaldehyde. The alkadiene is
   (1) 1-cyclohexyl-4-methylhexa-1, 3 diene
   (2) 6-cyclohexyl-3-methylhexa-3,5-diene
   (3) 1-heptenyl cyclohexane
   (4) 5-Methyl hexadine-1, 3-glcyclohexane

9. $CH_3—C\equiv C—CH_3$ —(Birch reduction)→ x; —(Lindlar catalyst)→ y
   x and y respectively are
   (1) trans but-2-ene, cis-but-2-ene
   (2) cis-but-2-ene, trans-but-2-ene
   (3) trans-but-2-ene, trans-but-2-ene
   (4) cis-but-2-ene, cis-but-2-ene

10. $CH_3—CH=CH_2 + HCl \xrightarrow[\text{Peroxide}]{\text{Organic}} \underset{\text{(Major)}}{A}$,
    The product A is
    (1) $CH_3—\underset{\displaystyle Cl}{\underset{|}{CH}}—CH_3$ (2) $CH_3—CH_2—CH_2—Cl$
    (3) $\underset{\displaystyle Cl}{\underset{|}{CH_2}}—CH=CH_2$ (4) $CH_3—CH=CH—Cl$

11. Which reaction will not give ethane?
    (1) Electrolysis of potassium acetate solution
    (2) Reaction of methyl alcohol with ethyl magnesium bromide
    (3) Reaction of Al_4C_3 with water
    (4) Reaction of methyl chloride with Na/ether

12. $CH_3—\underset{\displaystyle CH_3}{\underset{|}{CH}}—CH_3 \xrightarrow{Cl_2/h\nu}$ Monochlorination product (major)
    (1) $CH_3—\underset{\displaystyle CH_3}{\underset{|}{CH}}—CH_2Cl$
    (2) $CH_3—\underset{\displaystyle Cl}{\underset{|}{\underset{\displaystyle CH_3}{\underset{|}{C}}}}—CH_3$

(3) $CH_3-CH_2-\underset{\displaystyle CH_3}{\overset{|}{CH}}-Cl$

(4) $CH_3CH_2CH_2CH_2Cl$

13. Product of Kolbe's electrolysis of HCOONa on cathode and anode are respectively

(1) CH_4 and H_2 (2) H_2 and CH_4

(3) CH_4 and CH_4 (4) H_2 and H_2

14. $Al_4C_3 \xrightarrow{\text{Hydrolysis}}$ (A)

$Mg_2C_3 \xrightarrow{\text{Hydrolysis}}$ (B)

The products (A) and (B) are respectively

(1) CH_4 & $CH_3-CH_2-CH_3$

(2) CH_4 & CH_4

(3) CH_4 & $CH_3-C\equiv CH$

(4) CH_4 & $CH_3-CH=CH_2$

15. During reaction

$$CH_3C\equiv CH \xrightarrow[333K]{H^+, Hg^{++}} A \xrightarrow{\text{Tautomerise}} B\ ;$$

A and B are

(1) $CH_3-\underset{\displaystyle OH}{\overset{|}{CH}}=CH_2$ and $CH_3-\overset{\displaystyle O}{\overset{\|}{C}}-CH_3$

(2) $CH_3-CH=CHOH$ and $CH_3\ CH_2\ \overset{\displaystyle O}{\overset{\|}{C}}H$

(3) $CH_3CH_2CH_2OH$ and $CH_2=CH-CH_2OH$

(4) $CH_3CH=CHOH$ and $CH_2=CH-CH_2OH$

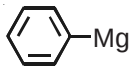
16. Arrange the following in order of increasing boiling point

(a) $CH_3-\underset{\displaystyle CH_3}{\overset{\displaystyle CH_3}{\overset{|}{\underset{|}{C}}}}-CH_3$ (b) $CH_3\underset{\displaystyle CH_3}{\overset{|}{CH}}CH_2CH_3$

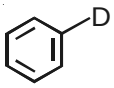
(c) $CH_3CH_2CH_2CH_2CH_3$

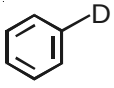
(1) (a) < (b) < (c) (2) (c) < (b) < (a)

(3) (c) = (b) = (a) (4) (c) < (b) = (a)

17.  $\xrightarrow{D_2O}$ A + B.

What are A and B?

(1)  + $Mg(OH)_2$ (2)  + $Mg(OD)_2$

(3)  + Mg(OD)Br (4)  + $Mg(OH)_2$

18. Terminal alkynes react with Na metal and gives hydrogen gas because

(1) All hydrocarbons give hydrogen when react with sodium metal

(2) All hydrogens present in alkynes are acidic in nature

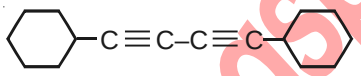
(3) Hydrogen linked with sp hybridised carbon is acidic in nature

(4) α-carbon in alkynes are acidic in nature

19. Major components of photochemical smog are

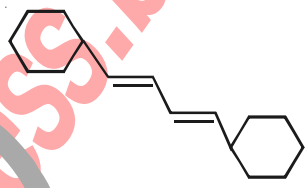
(1) CO_2, SO_3, SO_2 (2) O_3, Cl_2, SO_3

(3) O_2, Cl_2, HNO_3 (4) NO, N_2O, PAN

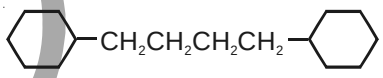
20.  $\xrightarrow{Li/NH_3}$ A.

The product 'A' is

(1) 

(2) 

(3) Both (1) & (2)

(4) 

21. $CH\equiv CH \xrightarrow[NH_4Cl]{CuCl(aq)\ \&}$ (A) $\xrightarrow{HCl}$ (B) $\xrightarrow{\text{Polymerised}}$ (C),

(C) is

(1) Poly cis-isoprene (2) Poly-trans-isoprene

(3) Chloroprene (4) Neoprene

22. Arrange the following in increasing order of bond energy of C–H bond (Assuming homolytic cleavage)

CH_3-CH_2-H (I)

$CH_3-\underset{\displaystyle CH_3}{\overset{|}{CH}}-H$ (II)

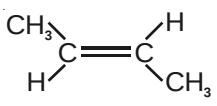
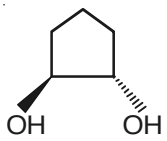
$CH_2=CH-H$ (III)

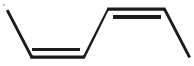
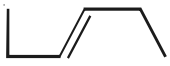
$C_6H_5-CH_2-H$ (IV)

(1) I < II < III < IV (2) IV < II < I < III

(3) IV < III < II < I (4) III < IV < II < I

23. Which of the following is a Z-isomer?

(1)  (2) 

(3)  (4) 

24. Which of the following on heating with hot alkaline potassium permanganate will generate?

(1) $CH_3 - CH = CH_2$ (2) 

(3)  (4) 

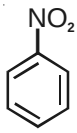
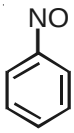
25. Match the following

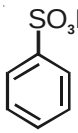
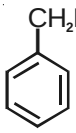
	Column-I Substance		Column-II Property
a.	Cis-1, 2-dichloroethene	(i)	Zero dipole moment
b.	Trans-2, 3-dichlorobutene	(ii)	Reacts with Tollen's reagent
c.	But-2-yne	(iii)	Does not form salts with $NaNH_2$
d.	But-1-yne	(iv)	Relatively high boiling point

(1) a(iv), b(i), c(iii), d(ii) (2) a(i), b(iv), c(iii), d(ii)

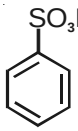
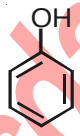
(3) a(i), b(iv), c(ii), d(iii) (4) a(iv), b(i), c(ii), d(iii)

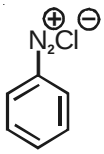
26. $C_6H_{14} \xrightarrow[873\ K]{Al_2O_3/Cr_2O_3} (A) \xrightarrow[Conc.\ H_2SO_4]{Conc.\ HNO_3} (B)$, (B) is

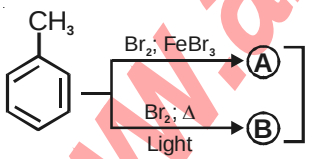
(1)  (2) 

(3)  (4) 

27. Toluene will be obtained on treatment with H_3PO_2

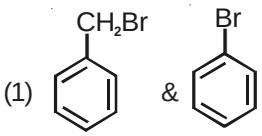
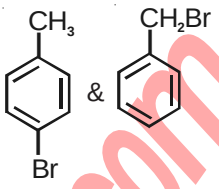
(1)  (2) 

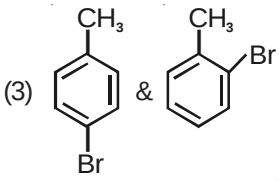
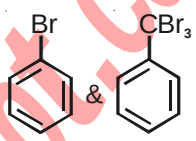
(3)  (4) 

28. 

Major products (Monosubstitution)

(A) & (B) are respectively

(1)  (2) 

(3)  (4) 

29. The product(s) obtained by the reductive ozonolysis of buta–1,3–diene is(are)

(1) HCHO & CH_3CHO

(2) CH_3–CHO only

(3) HCHO & CHO · CHO

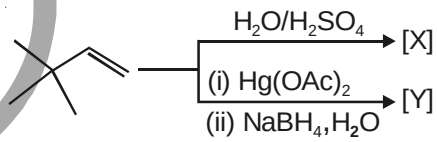
(4) H–CHO & CH_3–CO · CHO

30. The product obtained by the oxidation of propyne with SeO_2 is

(1) Glyoxal (2) Methyl glyoxal

(3) Oxalic acid (4) Glyceraldehyde

31. Consider the following reactions



The major product [X] and [Y] respectively are

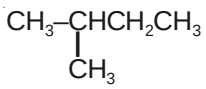
(1) 2, 3-Dimethyl-2-butanol and 3, 3-Dimethyl-2-butanol

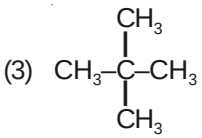
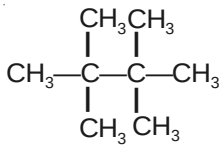
(2) 2, 3-Dimethyl-2-butanol and 2, 3-Dimethyl-2-butanol

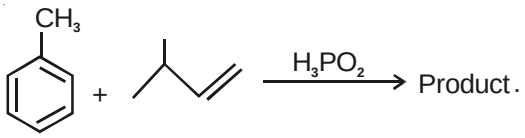
(3) 3, 3-Dimethyl-2-butanol and 2, 3-Dimethyl-2-butanol

(4) 3, 3-Dimethyl-2-butanol and 3, 3-Dimethyl-2-butanol

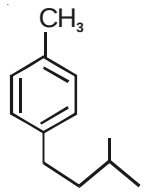
32. A hydrocarbon (A) was found to have vapour density 36. It forms only a single monochloro substitution product. The hydrocarbon (A) is

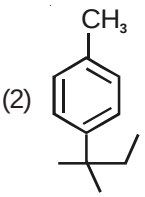
(1) $CH_3CH_2CH_2CH_2CH_3$ (2) 

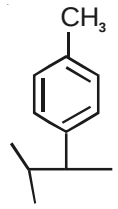
(3)  (4) 

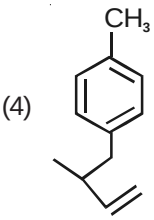
33. 

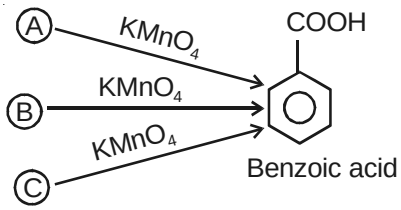
Major product of the reaction is

(1) 

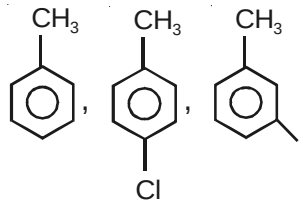
(2) 

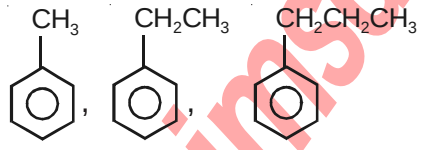
(3) 

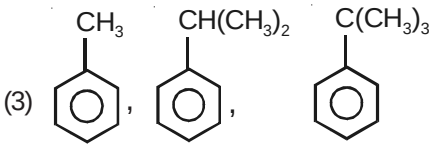
(4) 

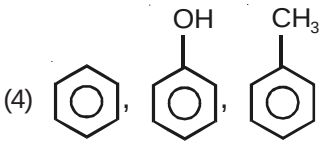
34. 

Which set represents A, B, C?

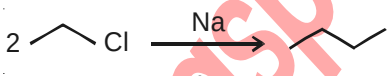
(1) 

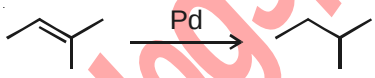
(2) 

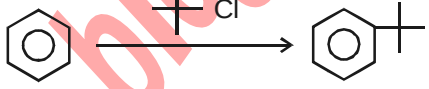
(3) 

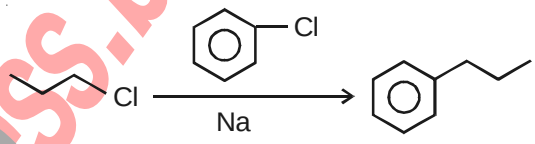
(4) 

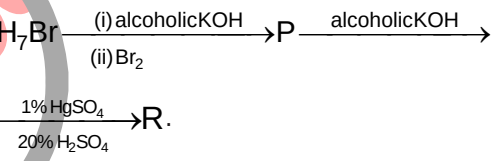
35. Which of the following is Wurtz–Fittig reaction?

(1) 

(2) 

(3) 

(4) 

36. 

P, Q, R respectively are

(1) $CH_3-CH=CH_2$, $CH_3-\underset{\displaystyle Br}{\underset{|}{CH}}-CH_3$, CH_3-CH_2-OH

(2) $CH_3-\underset{\displaystyle Br}{\underset{|}{CH}}-CH_2-Br$, $CH_3-CH=CH_2$, $CH_3-\underset{\displaystyle OH}{\underset{|}{C}}=CH_2$

(3) $CH_3-C\equiv CH$, $CH_3-\underset{\displaystyle Br}{\underset{|}{CH}}-CH_2-Br$, $CH-\underset{\displaystyle O}{\underset{\|}{C}}-CH_3$

(4) $CH_3-\underset{\displaystyle Br}{\underset{|}{CH}}-CH_2-Br$, $CH_3-C\equiv CH$, $CH_3-\underset{\displaystyle O}{\underset{\|}{C}}-CH_3$

BOTANY

[Chapter 9 : Mineral Nutrition]

1. Criterion of essentiality is applicable to
   (1) Only micronutrients
   (2) Only macronutrients
   (3) Both micro and macronutrients
   (4) Essential and functional elements

2. The N, P and K are called critical elements because
   (1) They are required in critical phase of flowering
   (2) They are commonly deficient in soil
   (3) They are required in small amount
   (4) Their deficiency can not be corrected

3. Nitrite is reduced into ammonia in the process of nitrate assimilation especially in the leaves because
   (1) The enzyme nitrate reductase occurs in chloroplast in leaves only
   (2) Ferredoxin is direct source of electron for its reduction
   (3) Nitrite reductase contain copper and iron both
   (4) Nitrite reductase does not require molybdenum
4. Curling of root hair tip in legume during nodule formation is due to
   (1) Formation of infection thread
   (2) Chemical secretion by bacteroid
   (3) Lectin receptors on surface
   (4) Oligosaccharide secreted by *Rhizobium*
5. Select an **incorrect** statement regarding hydroponics
   (1) Soil borne diseases can be prevented
   (2) Uniform growth and high yield
   (3) Water and fertilisers can be reused
   (4) Less expensive than conventional agriculture
6. Grey speck of oat and marsh spots of peas are caused by
   (1) Deficiency of Mn
   (2) Deficiency of Mn and Mo respectively
   (3) Deficiency of Mo and Mn respectively
   (4) Excess of Mo
7. Find out the **correct** match
   (1) Reclamation disease : Mn
   (2) Whiptail of cauliflower : B
   (3) Brown heart of turnip : Mg
   (4) Exanthema : Cu
8. Which of the following is released by *Rhizobium* in symbiotic N_2-fixation?
   (1) Oligosaccharides, Auxin, ATP
   (2) Lectins, Oligosaccharides, Heme
   (3) Nod-factor, CK, Heme
   (4) Nod-factor, Auxin, Globin
9. The formation of aspartic acid from oxaloacetic acid in presence of enzyme and glutamic acid represents the process of
   (1) Catalytic amidation (2) Reductive amination
   (3) Transamination (4) Deamination
10. Which of the following is not a criteria of essentiality of an element?
   (1) Deficiency symptoms of essential element are irreversible
   (2) A plant is unable to complete its vegetative or reproductive phase in its absence
   (3) Element is directly involved in metabolism of plants
   (4) Element cannot be replaced by any other element
11. The toxicity symptoms of Mn are actually combined deficiency symptoms of
   (1) N, S, Mo (2) K, Cu
   (3) Fe, Mg, Ca (4) P, Mg, Cu
12. Which of these is released by bacteria during symbiotic N_2 fixation?
   (1) Auxins
   (2) Heme of Lb
   (3) ATP for reduction of N_2
   (4) Globin of Hb
13. α – ketoglutaric acid + NH_4^+ + NAD(P)H $\xrightarrow[dh]{Glutamate}$ Glutamate + H_2O + NAD(P)
   The above reaction shows
   (1) Catalytic amidation
   (2) Reductive amination
   (3) Transamination
   (4) Nitrification
14. Plants of legume family contain usually more protein than other plants because
   (1) Plant can fix atmospheric nitrogen
   (2) Bacteria in their root nodule convert atmospheric nitrogen to ammonia
   (3) Bacteria in their root nodule convert ammonia to amino acid
   (4) Plants store atmospheric nitrogen as ammonia
15. Final step of nitrate assimilation in plants occur inside leaf because
   (1) Nitrate reductase is molybdoflavoprotein
   (2) Fd is direct source of electron for reduction of NO_2^- into NH_3
   (3) NADH + H^+ cannot act as electron donor
   (4) Nitrite reductase has Cu and Mo
16. The porins
   (1) Have been reported in eukaryotes only
   (2) Allow passage of very large sized solutes
   (3) Are protein lined pores present in all prokaryotes
   (4) Are proteins that form huge pores in outer membranes
17. Essential element which is an activator of enzyme pyridine nucleotide dehydrogenase and needed for synthesis of auxin is
   (1) Mo (2) Zn
   (3) Mn (4) Ca
18. Active mineral absorption
   (1) Does not require carriers
   (2) Leads towards ionic equilibrium
   (3) Result in accumulation of salt in cell
   (4) Is movement of ions along ecp

19. The concentration of essential elements below which plant growth is retarded is termed as
(1) Toxic level
(2) Critical concentration
(3) Hunger sign
(4) Deficiency symptom

20. Molybdenum is a component of enzymes involved in nitrogen metabolism. Its deficiency also shows retardation of growth and interveinal chlorosis. Its deficiency also cause
(1) Nitrogen deficiency
(2) Copper deficiency
(3) Potassium deficiency
(4) Magnesium deficiency

21. Ureides are / have
(1) Amino acid derivatives in which -OH component of carboxylic group is replaced by amino group
(2) Double aminated keto acids
(3) Degraded urea products
(4) High carbon to nitrogen ratio

22. Find out **correct** match

	Column-I		**Column-II**
a.	Ammonification	(i)	$N_2 \rightarrow NH_3$
b.	Nitrification	(ii)	Proteins $\rightarrow NH_3$
c.	Denitrification	(iii)	$NH_3 \rightarrow NO_3$
d.	N_2-fixation	(iv)	$NO_3 \rightarrow N_2$

(1) a(ii), b(iii), c(iv), d(i)
(2) a(ii), b(iii), c(i), d(iv)
(3) a(iii), b(ii), c(iv), d(i)
(4) a(ii), b(iv), c(i), d(iii)

23. In symbiotic N_2-fixation by *Rhizobium*
(1) ATP is provided by host cell
(2) Leghemoglobin is synthesised only by bacteria
(3) Bacteria enters usually in diploid cells
(4) Ferredoxin and $FMNH_2$ are not required

24. Mass flow
(1) Of substances in a suspension occurs at the differential pace
(2) Occurs through only positive hydrostatic pressure gradient
(3) Is short distance transport
(4) Can occur for water, minerals and food

25. Match the following

	Column I (Nitrogen fixer)		**Column II (Example)**
a.	Free living bacteria	(i)	*Anabaena*
b.	Free living cyanobacteria	(ii)	*Cylindrospermum*
c.	Symbiotic bacteria	(iii)	*Azotobacter*
d.	Symbiotic cyanobacteria	(iv)	*Frankia*

(1) a(iii), b(ii), c(i), d(iv) (2) a(ii), b(iii), c(i), d(iv)
(3) a(iii), b(ii), c(iv), d(i) (4) a(ii), b(i), c(iii), d(iv)

26. Enzyme nitrogenase
(1) Requires 8 ATP per H_2 release
(2) Possesses binding site for N_2 and NADH
(3) Is always associated with oxygen scavenger, leg haemoglobin
(4) Is present exclusively in prokaryotes

27. In the process of nitrate assimlation
(1) Protein is converted into ammonia
(2) Nitrite needs a metalloflavoprotein for its conversion into NO_3^-
(3) NO_3^- is converted into NH_3 through reduction in pressence of reducing agent Fd
(4) N_2 is reduced to NH_3 with the help of symbiotic N_2 fixing bacteria *Rhizobium*

28. Complete fertilizers are those chemical fertilizers which contain
(1) All essential elements
(2) Functional elements
(3) All balancing elements
(4) Critical elements

29. Consider the following statements regarding leghaemoglobin
a. It acts as oxygen scavenger
b. Heme part is produced by legume plant and globin part is produced by *Rhizobium*
c. It protects enzyme nitrogenase
d. It is present in legume as well as non-legume plants
Which of the above statements are **correct**?
(1) a, b (2) a, c
(3) c, d (4) a, d

30. For the fixation of one molecule of N_2 ..... and ..... are required
(1) 8 ATP; $8e^-$s (2) 16 ATP; $8e^-$s
(3) 8 ATP; $4e^-$s (4) 4 ATP; $4e^-$s

31. Enzyme nitrogenase is synthesized by 'nif' gene of diazotrophs. Cofactors of nitrogenase are
(1) Iron and Copper (2) Zinc and Molybdenum
(3) Iron and Boron (4) Iron and Molybdenum

32. Consider the statements given below regarding carrier concept of active ion absorption
a. Any carrier protein can transport any ion
b. Carrier proteins transport ions against the concentration gradient
c. Only cations can form carrier ion complex
d. Kinases are required to activate carrier protein

Which two of the above statements are **correct**?

(1) a, b (2) b, c

(3) b, d (4) a, c

33. Find the incorrect statement

(1) Nitrogen fixation is energy intensive

(2) Amides are transported through xylem

(3) The nitrogenase enzyme complex is separated into two components

(4) Both components of nitrogenase have Mo

34. Which of the following statement is **not correct** for the criteria for essentiality of an element?

(1) The element must be directly involved in the metabolism of the plant

(2) In the absence of the element the plants do not complete their life cycle

(3) The requirement of element must be specific and not replaceable by another element

(4) The element must be absolutely necessary for supporting normal growth and not for reproduction

35. How many ATP molecules are needed to produce 4 moles of NH_3 without release of H_2 during symbiotic N_2 fixation by *Rhizobium leguminosarum*?

(1) 32 (2) 24

(3) 16 (4) 12

36. Nod factors are considered as

(1) Proteins

(2) Glycoproteins

(3) Lipo-chito oligosaccharides

(4) Mo-Fe proteins

37. Select **incorrect** statement w.r.t. Calcium

(1) It does not help to maintain anion-cation balance

(2) It is needed during the formation of mitotic spindle

(3) It accumulates in older leaves

(4) It regulates opening and closing of stomata

38. Amides are the storage and transported forms of nitrogen because they

(1) Need less ATP for their transport

(2) Have high nitrogen to carbon ratio

(3) Are transported through xylem of tracheary elements

(4) Can easily be deaminated to form organic acid and ammonia

[Chapter 10 : Photosynthesis in Plants]

1. Choose the **correct** sequence of steps occuring in C_4 pathway

(a) Decarboxylation of malic acid

(b) Carboxylation of PEP

(c) Dehydrogenation of OAA

(d) Phosphorylation of pyruvate

(1) (b), (c), (a), (d) (2) (a), (b), (c), (d)

(3) (c), (a), (b), (d) (4) (d), (b), (c), (a)

2. Which one of the following is a visible product of photosynthesis?

(1) Glucose (2) Starch

(3) Sucrose (4) Raffinose

3. Which of the following is **incorrect** w.r.t. plant pigments?

(1) In chlorophyll c, phytol tail is absent

(2) Phycobilins are proteinaceous pigments

(3) Oxygenated xanthophyll acts as shield pigments

(4) In chlorophyll a, 4 methyl groups are present

4. For the formation of 12 ATP through CF_0–CF_1 complex how many hydrogen atoms are involved?

(1) 12 (2) 36

(3) 24 (4) 18

5. Cyclic photophosphorylation in favoured by

(1) Aerobic condition

(2) Low CO_2 availability

(3) High light intensity

(4) High CO_2 concentration

6. For the synthesis of one molecule of maltose during photosynthesis in C_3 plants, number of ATP molecules required are

(1) 18 (2) 36

(3) 12 (4) 24

7. How many ATP and NADPH molecules are required to reduce 3 CO_2 molecules in *Amaranthus*?

(1) 9 ATP and 18 NADPH

(2) 30 ATP and 12 NADPH

(3) 15 ATP and 6 NADPH

(4) 9 ATP and 6 NADPH

8. ATP synthesis in chloroplast and mitochondria is due to proton gradient across the membrane. Select **correct** statement w.r.t. ATP formation in chloroplast

(a) Proton accumulates in lumen of thylakoid

(b) Splitting of water occurs on inner side of membrane

(c) Proton accumulates in stroma side of chloroplast

(d) NADP reductase is located on stroma side of membrane

(1) Only (a) and (b) are correct

(2) Only (b) and (c) are correct

(3) Only (c) and (d) are correct

(4) (a), (b) and (d) are correct

9. How many ATP molecules are required for synthesis of one sucrose molecule by C_4 plants?
(1) 30 (2) 60
(3) 36 (4) 18

10. How many ATP and NADPH molecules are required to reduce 3 CO_2 molecules in a C_3 plant?
(1) 9 ATP and 18 NADPH
(2) 30 ATP and 12 NADPH
(3) 15 ATP and 6 NADPH
(4) 9 ATP and 6 NADPH

11. How many e^- are required to reduce two molecules of CO_2?
(1) $2e^-$ (2) $4e^-$
(3) $8e^-$ (4) $1e^-$

12. Identify the reaction for which the C_4 plants require some extra ATP molecules in comparison to C_3 plants
(1) Conversion of PEP to OAA
(2) Conversion of Pyruvate to PEP
(3) Conversion of Malate to Oxaloacetate
(4) Conversion of PEP to Malate

13. CO_2 concentration of the atmosphere is _____ and is a limiting factor for _____ plants
(1) 360 ppm, C_4 plants
(2) 360 ppm, C_3 plants
(3) 600 ppm, C_3 plants
(4) 600 ppm, C_3 and C_4 both

14. Moll's half leaf experiment has proved that
(1) O_2 is released during photosynthesis
(2) H_2O is the source of oxygen
(3) CO_2 is essential for photosynthesis
(4) Chlorophyll is essential for photosynthesis

15. First action spectrum of photosynthesis was described by T.W. Engelmann. Which of the following statement is not concerned with this experiment?
(1) Anoxygenic photosynthesis by experimental algae
(2) Using a pirsm he split light into its spectral components
(3) A green algae was placed in a suspension of aerobic prokaryote
(4) Aerobic prokaryote accumulated mainly in the region of blue and red light

16. Which of the following component is made up of one type of pigment molecule only?
(1) Photosystem
(2) LHC
(3) Reaction centre
(4) Quantasome

17. Cyclic flow of electrons in light reaction
(1) Can produce NADPH
(2) Is operated under optimum light and aerobic conditions
(3) Is dominant in higher plants
(4) Can induce H^+ pumping

18. Water splitting complex is associated with the ____, which itself is physically located on the _____ of the thylakoid membrane
(1) PS-II, outer side
(2) PS-II, inner side
(3) PS-I, inner side
(4) PS-I, outer side

19. The whole reactions of Calvin cycle can be divided in three parts
(a) Carboxylation
(b) Glycolytic reversal
(c) Regeneration of RuBP
How many turns of part 'c' are required to regenerate the 4 molecules of RuBP?
(1) 6 (2) 2
(3) 4 (4) 12

20. Affinity of Rubisco for CO_2 decreases and its affinity for O_2 increases with
(1) Increase in light intensity
(2) Decrease in temperature
(3) Increase in O_2 concentration
(4) More than one option is correct

21. Warburg effect is concerned with
(1) C_3-plants
(2) C_4-plants
(3) Photosynthetic enhancement effect
(4) CO_2 concentration effect

22. End product of photosynthetic carbon oxidative cycle is
(1) CO_2 and PGA
(2) Glycolic acid
(3) Serine and NADH
(4) RUBP and glyoxylate

23. In cyclic photophosphorylation
(1) Splitting of water is necessary
(2) NADPH molecules are produced
(3) ATPs are not synthesized
(4) External e^- donor is not required

24. The electrons needed to replace those removed from photosystem I are provided by
(1) PQ pump (2) LHC
(3) Pigment system-II (4) Cyt a_3

25. Match the following

Column-I	Column-II
a. Chlorophyll-b	(i) 55 'C', 72 'H'
b. Carotene	(ii) 55 'C', 70 'H'
c. Chlorophyll-c	(iii) 40 'C', 56 'H'
d. Chlorophyll-a	(iv) 35 'C', 32 'H'

(1) a(ii), b(iii), c(iv), d(i)
(2) a(iii), b(ii), c(iv), d(i)
(3) a(i), b(iv), c(iii), d(ii)
(4) a(iv), b(i), c(iii), d(ii)

26. Chlorophylls are synthesised from the precursor 'protochlorophyll'. Its synthesis starts from
(1) Glycine and Acetyl CoA
(2) Serine and Succinyl CoA
(3) Succinyl CoA and an aminoacid
(4) Glycerol and an intermediate of TCA cycle

27. Photosynthetic pigments with open chain tetrapyrrole structure
(1) Lacks Mg^{+2} and phytol tail
(2) Are associated with autumn colouration
(3) Acts as shield pigments
(4) More than one option is correct

28. Select **correct** statement w.r.t. CAM plants photosynthesis
(1) Enzymes of C_3-cycle and CAM-cycle are found in mesophyll cell
(2) Decarboxylation of malic acid occurs when stomata are open
(3) Plenty of organic acids and carbohydrates are synthesized when stomata are open
(4) Number of assimilatory powers used for 1 CO_2 reduction is similar to C_3-plants

29. Select a **correct** statement w.r.t. carotenoids
(1) These are antenna molecules, they take up energy from reaction centre
(2) They absorb light in blue-red part of spectrum
(3) They protect plant from excessive heat and prevents quantum conversion
(4) They can protect chlorophyll from oxidative destruction

30. Photorespiration is light dependent process because
(1) Its substrate is glycolate
(2) RUBP regeneration occurs in presence of light
(3) O_2 is used in chloroplast and peroxisome both
(4) It occurs at high light intensity

31. PS II differs forms PSI in
(1) Formation of ATP
(2) Its reaction centre and location
(3) Having cyclic electron transfer
(4) Absence of splitting of water

32. One of the following is a facultative CAM plant
(1) *Mesembryanthemum* (2) *Opuntia*
(3) *Kalanchoe* (4) *Sedum*

33. The chlorophyll which is found in all oxygenic photosynthetic organisms has molecular formula
(1) $C_{55}H_{70}O_6N_4Mg$ (2) $C_{55}H_{72}O_5N_4Mg$
(3) $C_{35}H_{32}O_5N_4Mg$ (4) $C_{40}H_{56}O_2$

34. Assimilatory power for bacterial photosynthesis is
(1) NADPH (2) NADH + NADPH
(3) NADPH + ATP (4) NADH + ATP

35. Choose the **correct** sequence of steps occuring in CAM pathway
a. Involvement of PEPcase activity
b. Carboxylation of RuBP
c. Dehydrogenation of OAA
d. Decarboxylation of malic acid
(1) a, b, c, d (2) c, d, a, b
(3) a, c, d, b (4) a, b, d, c

36. In C_2 cycle, the transamination is possible during the conversion of
(1) Glycolate → Glyoxylate
(2) Glycine → Serine
(3) Hydroxy pyruvate → Glycerate
(4) Glyoxylate → Glycine

37. CO_2 compensation point for C_4 plant is
(1) 0–10 ppm (2) 25-–50 ppm
(3) 40–100 ppm (4) 100–120 ppm

38. A proton motive force develops when
(1) H^+ concentration in stroma increases by 200 times
(2) H^+ concentration in thylakoid lumen decrease by 1000 – 2000 times
(3) H^+ concentration in stroma increases by 1000-2000 times
(4) H^+ concentration in thylakoid lumen increases by 1000-2000 times

39. C_4 plants are more sensitive to low temperature than C_3 because
(1) They have chloroplast dimorphism
(2) Regeneration of RUBP in bundle sheath cells is afected at low temperature
(3) Primary fixation of carbon is inhibited as pepcase becomes less active
(4) PEP regeneration is decreased as PEP synthetase is sensitive to low temperature

40. Which is not a role of carotenoids?
(1) As antenna molecule
(2) Dissipation of excess energy by converting into heat
(3) Production of vitamin A in vertebrates
(4) Complementary chromatic adaptation in oxyphotobacteria

41. PS-II differs from PS-I in
(1) Its occurrence on the outer surface of thylakoid membrane
(2) The involvement of non cyclic ETC only
(3) Absence of cytochromes
(4) Having more than twice the amount of chlorophyll 'a' than chlorophyll 'b'

42. Cyclic photophosphorylation operates when
(1) Light intensity is high or optimum
(2) Light wavelength beyond 680 nm are available for excitation
(3) CO_2 and O_2 are sufficiently available
(4) Excited electrons pass to $NADP^+$

43. Rubisco
(1) Is monofunctional enzyme
(2) Activation does not require Mg^{++}
(3) Is present in C_3 plants only
(4) Has a much greater affinity for CO_2 than for O_2

44. Number of electrons needed to pass through ETS for reduction of $3CO_2$ molecules in C_3 plants is
(1) 24 (2) 12
(3) 6 (4) 18

45. Which of these crops are allowed to grow in carbon dioxide enriched atmosphere that leads to higher yield?
(1) Tomato and bell pepper
(2) *Sorghum* and sugarcane
(3) Tobacco and maize
(4) Pineapple and *Amaranthus*

46. Biosynthetic phase of carbon assimilation
(1) Uses NADPH + H^+ only
(2) Depends upon the products of light reaction
(3) Directly depends on the presence of light
(4) Is temperature independent

47. In the CAM plants, which of the following events will not occur during day time?
(1) Activity of PEPCO and malic acid formation
(2) Carboxylation by chloroplast based enzyme
(3) Decarboxylation of malic acid
(4) Conversion of malic acid into pyruvic acid

48. What is true about cyclic photophosphorylation?
(1) It requires an external source of electron
(2) It produces ATP only
(3) Both PS I and PS II are involved
(4) It is associated with photolysis of water and liberation of O_2

49. Consider the following statements about pigment system of photosynthesis
a. Pigment system II is involved in both cyclic and non-cyclic photophosphorylation
b. Pigment system I is involved in cyclic photophosphorylation only
c. PS I is found in non-appressed regions of grana thylakoid
d. PS II is found in appressed regions of grana thylakoid
Which of the above statements are **correct**?
(1) a & b (2) b & d
(3) c & d (4) a & c

50. Which of the given enzyme is found in cytoplasm and is activated by blue light?
(1) Rubisco (2) Carboxydismutase
(3) Catalase (4) PEPCase

51. Methyl as well as ethyl group both are present in a pyrrole ring of chlorophyll-a. It is
(1) I pyrrole ring
(2) II pyrrole ring
(3) III pyrrole ring
(4) IV pyrrole ring

[Chapter 11 : Respiration in Plants]

1. First step of alcoholic fermentation from pyruvate is
(1) Dehydrogenation
(2) Oxidation
(3) Decarboxylation
(4) Oxidative decarboxylation

2. Select **incorrect** statement w.r.t. HMS
(1) It is direct oxidation of glucose
(2) Favoured by higher concentration of NAD^+
(3) Low activity in skeletal muscles
(4) Synthesis of pentose sugar

3. Decarboxylation during Kreb's cycle occurs at the time of the conversion of
(1) Citric acid to cisaconitic acid
(2) Isocitric acid to oxalosuccinic acid
(3) Oxalosuccinic acid to α-ketoglutaric acid
(4) Succinic acid to fumaric acid

4. The respiratory inhibitors which interferes with electron transport between cyt b and cyt c_1 is
(1) DNP (2) CO
(3) Antimycin A (4) Oligomycin

5. How many ATP are produced by substrate level phosphorylations when PEP molecules produced from one glucose are completely oxidised?
(1) Two (2) One
(3) Four (4) Three

6. How many reactions in a Krebs cycle are associated with the release of $NADH_2$?
(1) Three (2) Two
(3) Four (4) One

7. Brown fat on oxidation produces
(1) ATP and $NADH_2$ (2) ATP but no $NADH_2$
(3) No ATP and no heat (4) No ATP but heat

8. Ubiquinone is a mobile carrier in ETS and
a. It functions as e^- acceptor for complex I only
b. It can accept $2e^-$ from the donor
c. It helps to transport one e^- to a carrier which can accept only one e^- at a time.
d. It is also called as CoQ
(1) Only a is incorrect
(2) a, c and d are correct
(3) Only b and d are correct
(4) Only d is incorrect

9. Glyoxylate cycle
a. Is a variant of TCA cycle
b. Is a method of using stored fat for respiration
c. Consumes more Acetyl CoA than Kreb's cycle
d. Occurs in fatty seed of a plant
(1) All are correct
(2) a, b and c are correct
(3) b and d are incorrect
(4) a and c are incorrect

10. In Kreb cycle/TCA cycle
(1) 6C, 5C and 4C acids are produced
(2) Water is not used or produced
(3) There is no substrate level synthesis of ATP
(4) CO_2 is not released

11. Which of the following statement is **incorrect**?
(1) The breaking of C – C bonds of complex organic molecules by oxidation cells leading to release of a lot of energy
(2) All types of fermentation takes place under anaerobic conditions
(3) Acetyl CoA is oxidised in mitochondrial matrix in an eukaryotic cell
(4) Fats and proteins are poor in oxygen

12. How many light quanta are required for the production of 12 molecules of $\frac{1}{2}O_2$?
(1) 96 (2) 8
(3) 48 (4) 12.5

13. Consider
a. α ketoglutaric acid
b. Succinic acid
c. Citric acid
d. Fumaric acid
e. Oxalosuccinic acid
Choose the **correct** order in order to their formation in Kerb's cycle
(1) a, b, c, d, e (2) c, e, a, d, b
(3) c, e, a, b, d (4) e, d, c, b, a

14. Change from anaerobic to aerobic respiration decreases rate of sugar breakdown and CO_2 evolution. This process is called as
(1) Pasteur effect (2) Crabtree effect
(3) Warburg effect (4) Kutusky effect

15. Enolase enzyme in the glycolytic pathway performs dehydration of
(1) 2-phosphoglycerate
(2) Dihydroxyacetone phosphate
(3) Phosphoenol pyruvic acid
(4) 3-phosphoglycerate

16. In Embden - Meyerhof - Parnas pathway two redox equivalents are removed in the form of two hydrogen atoms from PGAL and transferred to a molecule of
(1) NADP (2) 1, 3-diPGA
(3) NAD^+ (4) DHAP

17. During respiration, metabolic water is produced in
(1) All living organisms
(2) Anaerobic organisms
(3) Aerobic organisms
(4) Eukaryotes only

18. Calculate the number of reduced FAD molecules produced during the complete oxidation of one fructose-6-phosphate
(1) 2 (2) 12
(3) 10 (4) 6

19. Find out the correct sequence of e^- transfer (w.r.t. oxidation of $NADH_2$ in ETC)
(1) FMN $\rightarrow$ FAD $\rightarrow$ cyt c $\rightarrow$ cyt a_3
(2) FMN $\rightarrow$ FeS $\rightarrow$ cyt b $\rightarrow$ cyt c_1
(3) FAD $\rightarrow$ FeS $\rightarrow$ cyt c_1 $\rightarrow$ cyt a
(4) FMN $\rightarrow$ FeS $\rightarrow$ cyt a_3 $\rightarrow$ cyt a

20. R.Q. value of germinating castor seed is _____ than germinating wheat seed due to _____
(1) Less, less oxygen content
(2) More, more oxygen requirement
(3) Less, more oxygen content
(4) More, less oxygen requirement

21. Cyt a, Cu_{α}, Cu_{β}, Cyt a_3 are the components of
(1) Cyt c-reductase complex
(2) Succinate dehydrogenase complex
(3) NADH-dehydrogenase complex
(4) Cyt c-oxidase complex

22. Reduced coenzyme $NADH_2$ helps in pushing 6 protons to outer-chamber of mitochondria while $FADH_2$ sends
(1) 4 pairs of H^+ to outer chamber
(2) 2 pairs of H^+ to inner chamber
(3) 4 pairs of H^+ to inner chamber
(4) 2 pairs of H^+ to outer chamber

23. Anaerobic and aerobic glycolysis are different from each other in
(1) Consumption of O_2 molecules
(2) Production of $NADH_2$
(3) Type of end product
(4) Efficiency

24. The energy stored in NADH + H^+ is released when it is oxidised through the electron transport system. This NADH + H^+ in a bacterial cell
(1) Can be cytoplasmic or mitochondrial in origin
(2) Is cytoplasmic in origin
(3) Is always produced in mesosome
(4) Is oxidised in inner mitochondrial membrane

25. During respiratory ETS
(1) Three complexes can pass protons to matrix
(2) Complex-II is not involved in proton transport
(3) Ubiquinone is a immobile carrier located on perimitochondrial side of mitochondrial membrane
(4) Complex II, III and IV operates when $NADH_2$ is oxidised during ETS

26 Which of these inhibits electron transfer chain in mitochondria by inhibiting complex IV?
(1) Cyanide and azide
(2) Antimycin and oligomycin
(3) DNP and rotenone
(4) Cyanide and rotenone

27. HMP pathway
(1) Occurs in presence of $NADP^+$
(2) Has only one dehydrogenation
(3) Does not occur in prokaryotes
(4) 36 moles of ATP is net yield per glucose molecule

28. How many ATP. molecules are produced by one turn of Krebs cycle through ETS?
(1) 12 (2) 15
(3) 11 (4) 24

29. In the glycolysis hydrogens required for the formation of reducing power are contributed by
(1) 1, 3-diphosphoglyceric acid
(2) Pyruvic acid
(3) Phosphoenol pyruvate
(4) Phosphoglyceraldehyde

30. How many metabolic water (by ETC) molecules are produced when one molecule of acetyl CoA enters the aerobic respiration?
(1) 3 (2) 4
(3) 5 (4) 2

31. For the formation of 10 ATP, how many H^+ ions should pass through $F_0 - F_1$ complex in mitochondrial E.T.S.?
(1) 20 (2) 40
(3) 30 (4) 60

32. Which of the following is not produced during glycolysis?
(1) ATP (2) NADH + H^+
(3) Pyruvic acid (4) CO_2

33. Breakdown of 8C fatty acid through complete oxidation will yield how many net ATP?
(1) 129 (2) 61
(3) 146 (4) 43

34. Which of the following complex of mitochondrial ETC has both Cu^{+2} and Fe^{+2} ?
(1) I (2) II
(3) IV (4) III

35. How many decarboxylations occur in Krebs cycle?
(1) 1 (2) 2
(3) 3 (4) 4

36. How many molecules of ATP are formed in one turn of Krebs cycle through oxidative phosphorylation?
(1) 12 (2) 11
(3) 15 (4) 24

37. How many molecules of ATP are produced from one molecule of NADH + H^+ and one molecule of $FADH_2$ through E.T.S. respectively?
(1) 3 ATP and 2 ATP (2) 2 ATP and 3 ATP
(3) 2 ATP and 1 ATP (4) 1 ATP and 4 ATP

38. Number of ATP molecules formed by complete oxidation of one pyruvic acid is
(1) 30 (2) 15
(3) 12 (4) 24

39. Bacterial cell performing alcoholic fermentation if provided with oxygen then
(1) Rate of glycolysis decreases
(2) Formation of ethanol increases
(3) Less ATP production
(4) CO_2 is not released

40. During the conversion of succinyl Co-A to succinic acid in Krebs cycle
(1) Substrate level phosphorylation occurs
(2) There is utilisation of membrane bound enzyme
(3) Multienzymatic complex is involved
(4) Dehydrogenation occurs

41. Malonate acts as the competitive inhibitor of an enzyme and this enzyme is involved in the conversion of
(1) Succinic acid → Fumaric acid
(2) Pyruvic acid → Acetyl CoA
(3) Fumaric acid → Malic acid
(4) Malic acid → Oxaloacetic acid

42. For the breakdown of one α-ketoglutaric acid through aerobic respiration, how many oxidative decarboxylation reactions will occur?
(1) Two (2) Three
(3) One (4) Zero

43. Final product of oxidative phosphorylation is
(1) ATP + H_2O (2) NADH + H^+
(3) GTP (4) Oxygen

44. Chemi-osmotic theory of ATP synthesis in the mitochondria is based on
(1) Pumping of H^+ ions in inter membrane space by all the complexes
(2) Pumping of H^+ ions by complex II
(3) Oxidation of $FADH_2$ by complex I
(4) Generation of PMF across inner mitochondrial membrane

45. If a molecule of glucose is oxidised into pyruvic acid in aerobic condition, number of CO_2 molecules evolve in this process is
(1) Six (2) Three
(3) Two (4) Zero

46. Choose **correct** statement w.r.t. net gain of ATP
(1) Aerobic glycolysis is two times more efficient than anaerobic glycolysis
(2) Aerobic glycolysis is four times more efficient than anaerobic glycolysis
(3) Both aerobic and anaerobic glycolysis are equally efficient
(4) Anaerobic glycolysis is three times more efficient than aerobic glycolysis

47. Phosphoric acid is needed for the phosphorylation of ..... in glycolysis
(1) Glucose
(2) Fructose 6 phosphate
(3) 3-phosphoglyceric acid
(4) 3 phosphoglyceraldehyde

48. During aerobic respiration in prokaryotes and eukaryotes, CO_2 is released in
(1) Cytoplasm
(2) Matrix of mitochondria
(3) Both (1) & (2)
(4) Inner membrane of mitochondria

49. In ETC, enzyme complex III have e^- carrier prosthetic group as
(1) FMN and Fe-S (2) FAD and Fe-S
(3) Cytochrome a-a_3 (4) Cyt. b, Fe-S, Cyt c_1

[Chapter 12 : Plant Growth & Development]

1. Plant growth is not related to which of the following?
(1) Always open ended
(2) Increase in number of parts
(3) Generally inderminate
(4) Lower plants shows localized growth

2. Kinetin is _____ derivative
(1) Adenine (2) Indole
(3) Carotene (4) Cytosine

3. The application of 2, 4 - D and 2, 4, 5 - T removes
(1) Broad leaved weeds in cereal crops
(2) Grasses in cereal crops
(3) Grasses in smoother crops
(4) Cereals in smoother crops

4. Seeds which need presence of light for their germination are positive photoblastic in which the phytochrome is
(1) Converted to active form at 660 nm wavelength
(2) Converted to active form at 730 nm wavelength
(3) Converted to inactive form at 660 nm and is present in cytosol
(4) Converted to inactive form at 730 nm and is present in cytosol

5. Which condition is essential for accelerating flowering ability of biennial plants or winter annuals?
(1) Differentiated cells
(2) Anaerobic condition
(3) Low temperature
(4) Reduced availability of nutrients

6. The hormone whose biosynthesis is associated with transfer RNA molecule
(1) IAA (2) ABA
(3) Zeatin (4) GA_7

7. Violaxanthin acts as a precursor molecule for the biosynthesis of
(1) C_2H_4 (2) ABA
(3) Auxin (4) Gibberellin

8. Precursor of the hormone exhibiting prevention of lodging in cereals is
(1) Violaxanthin (2) Methionine
(3) Tryptophan (4) Acetyl CoA

9. Select **correct** statement w.r.t. characteristic of plant growth
a. It shows apparent growth by increase in volume or weight
b. Growth is intrinsic and quantitative
c. Shows diffused growth in higher plants
d. There is increase in number of parts
e. Secondary growth is the feature of all flowering plants
(1) a, b, c
(2) b, d, e
(3) a, b, d
(4) All are correct except e

10. Find **correct** match from column-I and column-II

Column-I (Precursor)	**Column-II (PGR)**
a. Tryptophan	(i) Auxin
b. Acetyl CoA	(ii) CK
c. t-RNA	(iii) GA
d. Methionine	(iv) Ethylene

(1) a(i), b(iii), c(ii), d(iv) (2) a(iii), b(i), c(ii), d(iv)
(3) a(i), b(ii), c(iii), d(iv) (4) a(iv), b(iii), c(ii), d(i)

11. Triple response of seedling when treated with ethylene does not include
(1) Horizontal growth habit
(2) Inhibition of stem elongation
(3) Transverse geotropism and apogeotropism
(4) Delay in ageing

12. Select the hormonal combination which induces shoot differentiation in tobacco callus
(1) High auxin and low cytokinin
(2) High cytokinin and low auxin
(3) High cytokinin and auxin
(4) Equal proportion of auxin and cytokinin

13. Phytochrome is a chromo-protein pigment which is associated with many physiological processes. Select the group of **correct** role
a. Photomorphogenesis
b. Vernalin synthesis
c. Florigen synthesis
d. Stem elongation in genetically dwarf plant
e. Seed germination
f. Chlorophyll synthesis
(1) a, c and e (2) a, c, e and f
(3) c, d and e (4) b, c, d and e

14. The α-amylase induced metabolism in seed can be counteracted by
(1) Gibberellin (2) IAA
(3) Ethylene (4) Abscisic acid

15. Which one of the following events is not an example of differentiation?
(1) Lignocellulosic wall thickening
(2) Formation of cells by apical meristem
(3) Loss of end wall in case of vessel element
(4) Loss of nucleus and perforation of end wall in sieve tube members

16. Vernalization can not be demonstrated in
(1) Dry seeds (2) Germinating seeds
(3) Embryo tips (4) Active meristem

17. There are more than 100 gibberellins reported from
(1) Fungi (2) Higher plants
(3) Both 1 and 2 (4) Prokaryotes

18. Tropic movement is
(1) Curvature movement of variation only
(2) Autonomic curvature movement of growth
(3) Paratonic curvature movement of growth
(4) Paratonic movement of locomotion

19. Amino acid derived hormone formed in juvenile cells and showing membrane associated polar transport is not concerned with one of the following functions, *i.e.*,
(1) Xylem differentiation
(2) Prevention of pre-harvest fruit drop
(3) Richmond Lang effect
(4) Feminising effect

20. Ethylene causes
(1) Horizontal growth of seedlings
(2) Swelling of axis
(3) Apical hook formation in dicot seedlings
(4) More than one option is correct

21. Most widely used PGR in agriculture
a. Is formed from its precursor methionine
b. Can fit in both categories *i.e.* inhibitor and promoter of growth
c. Causes femaleness in *Cucumber*
d. Induces flowering in LDP
(1) a and d are incorrect
(2) b and c are incorrect
(3) a and c are incorrect
(4) Only d is incorrect

22. Hydrotropic movement is more powerful than
(1) Geotropic (2) Phototropic
(3) Chemotropic (4) All of these

23. Gibberellic acid stimulates all **except**
(1) α-amylase activity in seeds
(2) Parthenocarpy
(3) Internode elongation
(4) Prevention of lodging in cereals

24. Cork cambium resembles root vascular cambium in
(1) Being geometric in growth
(2) Being product of dedifferentiation
(3) Being responsible for longitudinal growth
(4) Having similar types of meristematic initial

25. Which among the following statements is **not correct** for phytochrome?
(1) It exists in photoreversible forms
(2) It is blue green chromoprotein
(3) It is only concerned with flowering
(4) It is absent in photosynthetic bacteria

26. Biennials
(1) Are polycarpic plants
(2) Are monocarpic plants
(3) Do not respond to vernalization
(4) More than one option is correct

27. Choose a biennial
(1) Sugarbeet
(2) Carrot
(3) Cabbage
(4) More than one option is correct

28. Lateral axillary buds are not allowed to grow by
(1) Auxin (2) Cytokinin
(3) Gibberellin (4) TIBA

29. Richmond Lang effect due to cytokinin pertains to
(1) Root formation
(2) Apical dominance
(3) Leaf abscission
(4) Delay of senescence

30. 'Stress Hormone' is
(1) ABA (2) Cytokinin
(3) Gibberellin (4) Auxin

ZOOLOGY

[Chapter - 6 : Body Fluids and Circulation]

1. Injection of _____ into the heart results in bradycardia
(1) Epinephrine (2) Acetylcholine
(3) Nor-adrenaline (4) Adrenaline

2. All the veins have deoxygenated blood except
(1) Renal vein only
(2) Pulmonary vein only
(3) Umbilical vein and pulmonary vein
(4) Renal vein and hepatic portal vein

3. If the nerves supplying the human heart are cut, then heart will beat
(1) Rhythmically
(2) Arhythmically
(3) Stop beating
(4) First arythmically followed by rhythmically

4. When atria contract, blood does not enter into pulmonary vein or superior vena cava because
(1) These openings are guarded by semilunar valves
(2) Pulmonary vein has Thebesian valve and superior vena cava has oblique opening
(3) Both pulmonary vein and superior vena cava has oblique openings
(4) Eustachian valve close superior vena cava and semilunar valve close pulmonary vein

5. Find the disorder indicating conduction abnormality
(1) Myocardial infarction
(2) Myocardial ischaemia
(3) Adam's stoke syndrome
(4) Heart attack

6. In foetus, blood from right ventricle is pumped into pulmonary artery. But little amount of this blood reaches non functional foetal lungs. So its maximum blood enters the aorta through _____
(1) Ductus venosus (2) Pulmonary vein
(3) Ductus arteriosus (4) Foramen ovale

7. Find the **incorrect** statement
(1) Composition of lymph is same as that of plasma but has low protein content
(2) Lymph capillaries are more permeable than blood capillaries
(3) Lymph cannot coagulate
(4) Lymph nodes are associated with the lymphatic system of mammals

8. Rheumatic fever is an acute systemic inflammatory disease, it may weaken the entire heart wall but mostly it damages
(1) The tricuspid and bicuspid valves
(2) The bicuspid and aortic valves
(3) The mitral and thebasian valves
(4) Aortic valves and tricuspid valves

9. Which of the following valve/s is/are in contact with only deoxygenated blood?
(1) Eustachius valve (2) Thebesian valve
(3) Tricuspid valve (4) All of these

10. Mark the **incorrect** statement
(1) Thickest chamber of heart is left ventricle
(2) Isovolumetric contraction appear just after dup sound
(3) Pulse rate is same as that of heart beat
(4) Pulse rate can felt in the regions where arteries are present superficially like wrist, neck and temples

11. Normally there is no sugar in the urine although blood entering into kidney have more sugar than the blood leaving the kidney because
(1) Sugar is absorbed in the urinary bladder
(2) Sugar is used up by kidney cells in metabolism
(3) Sugar is absorbed in the proximal convoluted tubule
(4) Sugar is absorbed by Loop of Henle

12. "Greater the heart muscle is stretched during filling, greater will be the quantity of blood pumped into aorta" is
(1) Marey's law (2) Stoke - Adam's law
(3) Bohr effect (4) Frank - starling law

13. The lymphatic vessels of left side begins at the cisterna chyli and it discharges its lymph into the
(1) Left subclavian vein (2) Right subclavian vein
(3) Superior vena cava (4) Inferior vena cava

14. During first rapid filling of heart
(1) Atria contract to force open the AV valves
(2) Atria do not contract
(3) Papillary muscles contract to open up AV valves
(4) Ventricle contract to become empty

15. The link between the AV valves and the papillary muscles of heart is
(1) Columnae carnaeae
(2) Musculi pectinati
(3) Trabeculae carnae
(4) Chordae tendinae

16. A puffy appearance, lack of alertness, intelligence, slow heart rate, low BP and decreased body temperature is caused by
(1) Hyposecretion of thyroxine in children
(2) Deficiency of thyroxine in adults
(3) Deficiency of parathormone
(4) Excessive secretion of aldosterone

17. Insufficient blood supply to heart walls is referred to as
(1) Dextrocardia (2) Ischaemia
(3) Cardiomegaly (4) Atherosclerosis

18. Of the three portal systems, which of the following is/are absent in humans?
(1) Hepatic portal system
(2) Renal portal system
(3) Hypophysial portal system
(4) Both (1) & (2)

19. What is the number of leucocytes per mm^3 of blood ? The leucocytes have been drawn and marked as a, b, c and d.

(1) a – 70 –300 ; b – 4000 – 5000 ; c – 200–700 ; d – 35-150
(2) a – 200–700 ; b – 70–300 ; c – 4000–5000 ; d – 35-150
(3) a – 1500 -2500 ; b – 200-700 ; c – 35-150 ; d – 70-300
(4) a – 70-300 ; b – 35-150 ; c – 4000-5000 ; d – 1500-2500

20. Defective or leaky valves leads to
(1) Murmur (2) Haematoma
(3) Rheumatic fever (4) Ischemia

21. In case, the foramen ovale were not to close after birth; which of the following statement(s) would be correct?
a. Mixing of deoxygenated and oxygenated blood would take place.
b. Blood from left atrium would enter right atrium
c. Blood from right atrium would enter left atrium
(1) a & c
(2) a & b
(3) Only a
(4) There will be no mixing at all

22. Heart sound 'Dupp' is produced during the closure of
(1) Bicuspid valves (2) Tricuspid valves
(3) Semilunar valves (4) Both (1) & (2)

23. Find the disorder indicating conduction abnormality
(1) Myocardial infarction
(2) Myocardial ischemia
(3) Adam's stoke syndrome
(4) Heart attack

24. Right and left atria of the mammalian foetus are connected through
(1) Foramen of magnum (2) Foramen ovale
(3) Fossa ovalis (4) Ductus arteriosus

25. Which of the following statement is incorrect w.r.t. myogenic heart?
(1) Impulse of heart beat develops within the heart
(2) Impulse is generated by a special muscular tissue
(3) Nerve fibres are spread over the heart to bring about contraction and expansion
(4) It will continue to beat for sometime, if detached heart is supplied with proper nourishment and favourable conditions

26. Match the following

	Column I		Column II
a.	Haemorrhoids	(i)	Vessel that supplies blood to other blood vessels
b.	Vasa vasorum	(ii)	Atherosclerosis
c.	Angina pectoris	(iii)	Varicose vein
d.	Coronary artery disease	(iv)	Chest pain

(1) a(iii), b(i), c(iv), d(ii) (2) a(i), b(ii), c(iii), d(iv)
(3) a(ii), b(iii), c(i), d(iv) (4) a(iv), b(i), c(iii), d(ii)

27. The heart beat rate could decrease under which of the following conditions?
(1) Fear, anxiety and depression
(2) Increase in Na and decrease in Ca
(3) Decrease in Na
(4) Decrease in K

28. Thoracic duct begins at the cisternae chyli which is a sac -like dilation situated in front of first and second lumbar vertebrae. It discharges its lymph into
(1) Left sub clavian artery
(2) Right sub clavian vein
(3) Left sub clavian vein
(4) Right sub clavian artery

29. Cardiac output is the amount of blood pumped by heart in
(1) One second (2) One beat
(3) One minute (4) One circulation

30. Which of the following is incorrect?
(1) Carotid artery - Head
(2) Superior mesentric artery - Small intestine
(3) Hypogastric - Spleen
(4) Renal artery - Kidney

31. Pulse pressure is
(1) $\frac{\text{Systolic pressure}}{\text{Diastolic pressure}}$
(2) $\frac{\text{Diastolic pressure}}{\text{Systolic pressure}}$
(3) Systolic pressure – Diastolic pressure
(4) Systolic pressure × Diastolic pressure

32. With reference to electrocardiogram, match the following

	Column I		Column II
a.	P wave	(i)	Depolarization of ventricles
b.	QRS wave	(ii)	Ventricular contraction
c.	ST wave	(iii)	Auricular depolarization

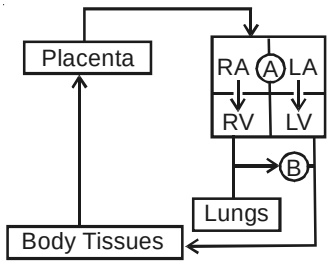
(1) a(ii), b(i), c(iii) (2) a(iii), b(i), c(ii)
(3) a(i), b(ii), c(iii) (4) a(ii), b(iii), c(i)

33. In atrium and ventricle of the same side are separated by the atrio-ventricular septum. Such septum is histologically made up of
(1) Muscular tissue(skeletal)
(2) Muscular tissue(cardiac)
(3) Fibrous tissue
(4) Peritoneum(Squamous epithelial)

34. Heart rate is increased by
a. Excess of calcium ions
b. Fear, anger and anxiety
c. Depression and grief
d. Increased levels of K^+ and Na^+ ions
(1) a & b (2) a, b & c
(3) c & d (4) a, c & d

35. Which of the following is **correct** for stroke volume?
(1) Stroke volume = End diastolic volume – End systolic volume
(2) Stroke volume = End systolic volume + End diastolic volume
(3) Stroke volume = Residual volume
(4) Stroke volume = Volume of blood pumped by heart per min

36. Identify the foetal bypasses A and B in the given diagram of foetal circulation



(1) A – Ductus arteriosus ; B – foramen ovale
(2) A – Foramen ovale ; B – ductus arteriosus
(3) A – Ductus venosus ; B – foramen ovale
(4) A – Foramen ovale ; B – ductus venosus

[Chapter-7 : Excretory Products and their Elimination]

1. If human nephrons were without loop of Henle which of the following would be expected?
(1) No change in the quality and quantity of urine
(2) Urine formation will stop
(3) Urine will be highly concentrated
(4) Urine will be very dilute

2. In ornithine cycle _____ enzyme is concerned with synthesis of urea
(1) Urease
(2) Arginase
(3) Protease
(4) Synthetase

3. The stimulation of which nerve causes contraction of detrusor muscle and relaxation of internal sphincter leading to emptying of urinary bladder?
   (1) Sympathetic nerve
   (2) Somatic nerve
   (3) Pudendal nerve
   (4) Parasympathetic nerve
4. Angiotensinogen is produced by
   (1) Juxtaglomerular cells (2) Liver
   (3) Macula densa (4) Lungs
5. A chordate animal having flame cells as excretory structure is _____
   (1) *Planaria* (2) *Flatworms*
   (3) Prawn (4) Cockroach
6. All the statements about, Atrial Natriuretic factor are correct but one is wrong. Which one is wrong?
   (1) The walls of the atria of heart release ANF in response to an increase in the blood volume and pressure
   (2) ANF can increase GFR
   (3) ANF is released in response to decrease in blood volume and blood pressure
   (4) ANF inhibits the release of renin from the JGA and reduces aldosterone release from adrenal gland
7. Creatine is not produced by
   (1) Children (2) Pregnant woman
   (3) Starving person (4) Normal males
8. With the help of which covering membrane kidney is anchored to the abdominal wall?
   (1) Renal capsule (2) Adipose capsule
   (3) Renal fascia (4) Peritoneum
9. Renal calculi are mainly formed of
   (1) Uric acid (2) Calcium sulphate
   (3) Calcium oxalate (4) Creatinine
10. If renal plasma flow is 1000 ml/min and filtration fraction is 24%. What will be glomerular filtration rate per hour?
   (1) 240 ml (2) 125 ml
   (3) 14.4 ml (4) 14.4 lit.
11. Choose the correct statement regarding the flow of filtrate
   (1) Collecting duct → Collecting tubule → Duct of Bellini → Papillary duct → Minor calyx
   (2) Duct of Bellini → Collecting tubule → Collecting duct → Papillary duct → Minor calyx
   (3) Collecting tubules → Collecting duct → Duct of Bellini → Papillary duct → Minor calyx
   (4) Collecting tubules → Collecting duct → Duct of Bellini → Papillary duct → Major calyx → Minor calyx
12. Hippuric acid a waste metabolite of mammals produced from
   (1) Carbohydrates
   (2) Proteins + glycine
   (3) Benzoic acid + glycine
   (4) Nucleic acid + glycine
13. In urea cycle/ornithine cycle, all occur **except**
   (1) Ornithine converted into citrulline
   (2) Arginine converted into ornithine
   (3) Argininosuccinate converted into arginine
   (4) The two nitrogen atoms that are incorporated into the urea cycle as ammonia and alanine
14. If in an animal GFR is 110 ml/min and RPF is 990 ml/min. Its filteration fraction is
   (1) 10% of RPF (2) 11.11% of RPF
   (3) 16% of RPF (4) 0.9% of RPF
15. If an osmoregulator is placed in fresh water which of the following will not occur?
   (1) Pass out dilute urine
   (2) As a general rule, do not drink water
   (3) Ionocytes release salts to outside actively
   (4) Both (1) & (2)
16. Sympathetic stimulation of the kidneys
   (1) Results in the dilation of the afferent arterioles
   (2) Decreases blood flow to the glomerulus
   (3) Increases the glomerular filtration rate
   (4) Increases glomerular permeability
17. Under which of the following condition there will be presence of abnormally high ketone bodies in urine?
   (1) Excessive breakdown of proteins
   (2) Excessive breakdown of nucleic acids
   (3) Starvation and diabetes mellitus
   (4) Fasting and diabetes insipidus
18. Ornithine transcarbamoylase of the 'Krebs-Henseleit Cycle" catalyzes
   (1) Synthesis of carbamoyl phosphate by condensation of NH_4^+ and CO_2
   (2) Synthesis of citrulline from carbamoyl phosphate
   (3) Condensation of ornithine with asparate to produce arginosuccinate
   (4) Formation of urea and resynthesis of ornithine from arginine
19. Malphigian tubules are the main excretory structures in
   (1) Crab (2) Silver fish
   (3) *Planaria* (4) Lobster
20. Juxtaglomerular apparatus is a mechanism for the autoregulation of glomerular filtration rate. It is formed by cellular modifications in _____ at the location of their contact

(1) Afferent arteriole and proximal convoluted tubule
(2) Afferent arteriole and distal convoluted tubule
(3) Efferent arteriole and proximal convoluted tubule
(4) Afferent arteriole and collecting ducts

21. Which of the following statements is incorrect about the PCT of a nephron?
(1) It is lined by simple cuboidal brush bordered epithelium
(2) PCT helps to maintain the pH and ionic balance of the body fluids
(3) 70-80% of electrolytes and water are reabsorbed in the peritubular capillaries around this segment
(4) Selective absorption of hydrogen ions, ammonia and potassium ions occurs in this segment

22. Excessive intake of proteins in food will result in an increase in
(1) Production of urea
(2) Transamination reaction
(3) Deamination reactions
(4) All of these

23. Out of all the parts of a nephron, least amount of reabsorption occurs in
(1) PCT (2) Loop of Henle
(3) DCT (4) Collecting duct

24. Which of the following events does not occur in case of a fall in glomerular blood flow?
(1) Release of ADH from neurohypophyses, causing vasoconstriction
(2) Release of renin from juxtaglomerular cells
(3) Stimulation of adrenal cortex by angiotensin II
(4) Release of ANF from atrium and subsequent vasodilation

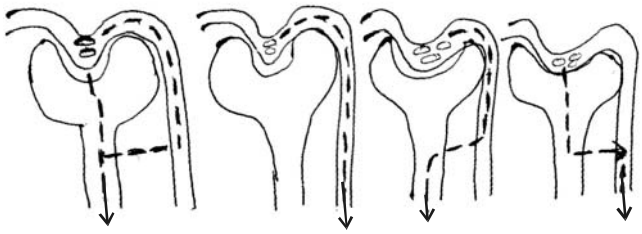
25. An adult human, on an average excretes 1 to 1.5 litres of urine per day. The total amount of urea excreted out in this process is approximately
(1) 10 - 18 mg (2) 25 - 30 g
(3) 30 - 35 mg (4) 180 mg

26. Presence of ketone bodies in urine is an indicative of
(1) Diabetes insipidus (2) Diabetes mellitus
(3) Alkaptonuria (4) Uremia

27. In Krebs-Hanseleit cycle, the enzyme that leads to production of urea is
(1) Uricase (2) Urease
(3) Arginase (4) Xanthine oxidase

28. Form of nitrogenous waste which is completely insoluble and does not require any water for its removal, it is the excretory product of spider?
(1) Hippuric acid (2) Creatinine
(3) Allantoin (4) Guanine

29. Ultrafiltration, reabsorption and tubular secretions are the steps of excretion. These have been diagrammatically represented (a,b,c and d). Find out the chemicals given in the box, which undergo these processes.



(a) (b) (c) (d)

Glucose, Inulin, PAH, Sulphate, Fat

(1) a – PAH ; b – Fat ; c – Sulphate ; d–Glucose
(2) a – Fat ; b – PAH ; c – Glucose ; d–Sulphate
(3) a – Glucose ; b – PAH ; c – Sulphate ; d–Fat
(4) a – Inulin ; b – Fat ; c – PAH ; d – Glucose

30. Which of the following is correct in case of dehydration?
(1) RPF will increase
(2) GFR will decrease
(3) FF will remain unchanged
(4) GFR and FF will increase

31. The part of nephron in which nephric filtrate is not isotonic to blood plasma is
(1) Bowman's capsule
(2) Proximal convoluted tubule
(3) Descending limb of loop of Henle
(4) All of these

32. In some marine fishes and desert amphibians, the nephrons lack a well developed glomerulus. So, formation of urine in them mostly occurs by
(1) Ultrafiltration
(2) Tubular secretion
(3) Tubular reabsorption
(4) Counter-current mechanism

33. During micturition
(1) Urinary bladder is relaxed and urethral sphincter contract
(2) Bladder contracts and urethral sphincters are relaxed
(3) Both urinary bladder & urethral sphincter contract
(4) Both urinary bladder & urethral sphincter relax

34. Find out the incorrect statement
(1) Human kidney can produce urine four times concentrated than the initial filtrate
(2) A fall in glomerular blood flow can activate the juxta glomerular cells to release renin
(3) ANF is vasoconstrictor and angiotensin is vasodilator
(4) ADH is synthesised by hypothalamus

35. Diluting segment of nephron is
(1) PCT
(2) DCT
(3) Ascending limb of nephron
(4) Descending limb of nephron

36. Maximum obligatory water reabsorption takes place in
(1) Loop of Henle (2) PCT
(3) DCT (4) Collecting duct

37. Which statement is **correct**
(1) Cortical nephrons are less in kidney than Juxta medullary nephron
(2) The descending limb of loop of Henle is permeable to salt but almost impermeable to water
(3) Tubular secretion of hydrogen and potassium ions occur in DCT
(4) The Henle's loop and vasa recta play a significant role in dilution of urine

38. Presence of RBC in urine is
(1) Glycosuria (2) Uraemia
(3) Haematuria (4) Polyuria

39. Duct of Bellini is formed by the union of several
(1) Junctional tubules (2) Collecting ducts
(3) Efferent arterioles (4) Pars recta

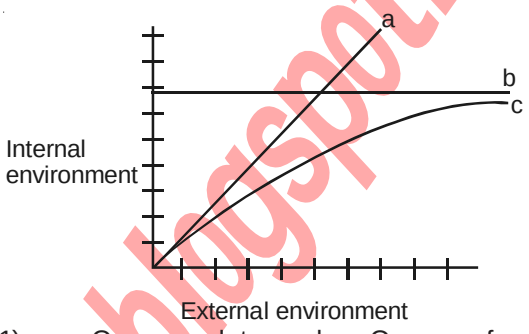
40. Which of the following can't be taken as a differentiating point for cortical nephrons when compared with Juxtamedullary nephrons?
(1) They are more abundant than Juxtamedullary nephrons
(2) They control plasma volume when water supply is normal while Juxtamedullary nephrons function when water supply is short
(3) Their loop of Henle is shorter than that of Juxta-medullary nephrons
(4) Their vasa recta is longer than that of Juxtamedullary nephrons

41. During Ultrafiltration water and many dissolved substances are filtered into the lumen of Bowman's capsule through its walls. Which of the following is not a part of glomerular filtrate?
(1) Na^+ (2) Amino acids
(3) Glucose (4) Proteins

42. The release by ADH takes place from hypothalamus when
(1) The osmolarity of blood increases
(2) The osmolarity of blood decreases
(3) Blood volume increases
(4) Urine becomes hypertonic

43. Consider the following
a. Release of aldosterone from adrenal gland
b. Absorption of more Na^+ and water from DCT
c. Release of renin from JG cells
d. Conversion of angiotensinogen to angiotensin II
Select the proper sequence of event taking place during operation of RAAS
(1) d, c, a & b (2) c, d, a & b
(3) c, a, d & b (4) a, c, d & b

44. Identify the organisms a, b and c according to their ability to adjust osmolarity of body fluid as compared to the external medium.



(1) a – Osmoregulators ; b – Osmoconformers ; c – Partially osmoregulators
(2) a – Osmoregulators ; b – Partially osmoregulators; c – Osmoconformers
(3) a – Osmoconformers ; b – Osmoregulators ; c – Partially osmoregulators
(4) a – Partially osmoregulators ; b – Osmoconformers; c – Osmoregulators

45. The parietal layer of Bowman's capsule consists of
(1) Non-specialised simple squamous epithelium
(2) Podocytes
(3) Brush bordered cuboidal epithelium
(4) Brush bordered columnar epithelium

46. Which part of nephron is impermeable to water but permeable to K^+, Cl^- and Na^+ and partially permeable to urea?
(1) PCT
(2) DCT
(3) Descending limb of loop of Henle
(4) Ascending limb of loop of Henle

47. Which of the following component of glomerular filterate are reabsorbed by secondary active transport in PCT?
(1) Sodium and potassium
(2) Glucose and amino acid
(3) Water
(4) Sulphates

48. In a man, a tumour is pressing on and obstructing the left ureter, what effect might this have on GFR of both the kidneys?
(1) GFR falls in both the kidneys
(2) GFR increases in both the kidneys
(3) GFR decreases in left kidney and GFR in right kidney remain normal
(4) GFR decreases in left kidney and increases in right kidney

49. Sympathetic stimulation
(1) Increases GFR (2) Decreases GFR
(3) GFR remains same (4) Increases micturition

50. Which of the following step of urine formation is non selective process?
(1) Glomerular filteration (2) Tubular reabsorption
(3) Tubular secretion (4) Both (2) & (3)

51. Hormones that cause vasodilation and increased renal blood flow tends to
(1) Decrease GFR
(2) Decrease glomerular hydrostatic pressure
(3) Increase capsular hydrostatic pressure
(4) Increase GFR

52. Choose the correct statement
(1) During summers when there is high temperature there is more sweating and loss of water so there is less urine output
(2) Cartilaginous fishes retain urea in blood, so that the osmolarity of body fluids is almost the same as that of sea water
(3) In adult person, voluntary control of micturition is developed
(4) All statements are correct

53. Tubular reabsorption involve all the following features except
(1) It involves the reabsorption of high & low threshold substances like glucose, amino acids
(2) It decreases volume of glomerular filtrate
(3) It takes place by only active transport
(4) All of these

54. Inflammation of urinary bladder is
(1) Renal calculi (2) Cystitis
(3) Bright's disease (4) Polynephritis

55. Podocytes are present in the
(1) Visceral layer of Bowman's capsule
(2) Parietal layer of Bowman's capsule
(3) Wall of peritubular capillary
(4) Wall of glomerulus

56. When a person is suffering from poor renal absorption, which one of the following will not help in maintenance of blood volume?
(1) Decreased glomerular filtration
(2) Increased ADH secretion
(3) Decreased arterial pressure in kidney
(4) Increased arterial pressure in kidney

57. In which part of the excretory system of mammals you can first use the term urine?
(1) Bowman's capsule (2) Loop of Henle
(3) Collecting tubule (4) Urinary bladder

58. Which part of brain is supposed to be damaged if in an accident a person has lost control of water balance, hunger and body temperature?
(1) Cerebellum (2) Cerebrum
(3) Hypothalamus (4) Medulla

59. Excessive secretion of renin may lead to
(1) Hypertension
(2) Excessive water loss
(3) Excessive salt loss
(4) Excessive glucose lose

[Chapter- 8 : Locomotion and Movement]

1. Mark the phosphagen involved in the muscle contraction in case of invertebrates
(1) Creatine phosphate
(2) Arginine phosphate
(3) Calcium phosphate
(4) Magnesium phosphate

2. During muscle contraction following events occur
a. Binding of Ca^{++} with troponin C of actin filaments and thereby remove the masking of active sites for myosin
b. Release of acetylcholine at neuromuscular junction which generate action potential in the sarcolemma
c. By utilising the energy from hydrolysis of ATP myosin head binds to exposed active site of actin forming the cross bridge
d. Releasing the ADP and P_i from myosin it goes back to relaxed state
Mark the correct sequence
(1) b, a, c, d (2) b, c, a, d
(3) a, b, c, d (4) b, c, d, a

3. Mark the **incorrect** statement
(1) Pushing an immovable object is an example of isometric contraction
(2) Striated muscle fibres follow, 'All or None Law'
(3) When we apply repeated stimuli to single muscle fibre the kymograph records a staircase like graph is called treppe
(4) Reduction in the force of contraction of a muscle after prolonged stimulation is called oxygen debt

4. Which of the following is incorrect?
(1) Atlas - Odontoid facet
(2) Deltoid ridge - Humerus
(3) Olecranon process - Humerus
(4) Glenoid cavity - Scapula

5. Time period between recieving the stimulus and beigning of contraction is called
(1) Contraction time (2) Relaxation time
(3) Latent period (4) Refractory period

6. Muscles are able to convert
(1) Chemical energy into light energy
(2) Chemical energy into mechanical energy
(3) Chemical energy into electrical energy
(4) Mechanical energy into chemical energy

7. Mark the **incorrect** match
(1) Tetany - Rapid spasm (wild contraction) in muscle due to high Ca^{++} in body fluid
(2) Muscular dystrophy - Progressive degeneration of skeletal muscle mostly due to genetic disorder
(3) Myasthenia gravis - Autoimmune disorder affecting neuromuscular junction leading to fatigue weakning and paralysis of skeletal muscle
(4) Bursitis - Bursa of joints often become inflamed

8. In case of hypertrophy there is increase in muscle mass due to increase in
(1) Number of myofibrils in muscle fibres
(2) Number of muscle fibre
(3) In amount of sarcoplasm
(4) Both (1) & (3)

9. In a muscle fibre, Ca^{++} is stored in
(1) Sarcoplasm
(2) Sarcosome
(3) Sarcoplasmic reticulum
(4) Troponin protein

10. Match the column I with column II

	Column I		**Column II**
a.	Vertebra prominens	(i)	Humerus
b.	Olecranon process	(ii)	Ulna
c.	Odontoid process	(iii)	Axis vertebra
d.	Deltoid ridge	(iv)	7^{th} cervical vertebra

(1) a(iv), b(iii), c(ii), d(i) (2) a(iii), b(iv), c(ii), d(i)
(3) a(iv), b(ii), c(iii), d(i) (4) a(i), b(ii), c(iii), d(iv)

11. Obturator foramen, the characteristic feature of pelvic girdle lying below the acetabulum is bounded by
(1) Ilium, Ischium and Pubis
(2) Ischium and Pubis
(3) Ilium and Pubis
(4) Pubis only

12. Which part of a sarcomere is formed only by myosin myofilament in a relaxed state?
(1) Isotrophic band (2) Anisotrophic band
(3) O band (4) H zone

13. Mark the **correct** statement w.r.t. isometric contraction
(1) There is no change in length of muscle, due to stretching of elastic fibres
(2) Length of the muscle remains the same but force of contraction keeps on increasing
(3) Pushing the immovable object is an example of isometric contraction
(4) All are correct

14. Which of the following is incorrect w.r.t. red muscle fibre when compared to white muscle fibre?
(1) They are dark red due to the presence of myoglobin
(2) They are rich in mitochondria
(3) These muscle fibres have fast rate of contraction
(4) Muscles on the back of human body are rich in red muscle fibre

15. During relaxation of the muscle which of the following do not occur?
(1) Ca^{++} ions pumped back to sarcoplasmic reticulum
(2) Actomyosin breaks down to form actin and myosin
(3) Return of Z lines back to the original position
(4) Decrease in the length of thin myofilaments

16. A person suffering from myasthenia gravis an auto immune disorder affecting neuromuscular junction leading to fatigue, weakening and paralysis of skeletal muscle. To increase the muscle strength he/she should be treated by
(1) Acetycholinesterase inhibitor
(2) Calmodulin
(3) Colchicine
(4) Both (2) & (3)

17. Gap junction between fibres will be present in
(1) Skeletal muscle (2) Smooth muscle
(3) Cardiac muscle (4) Both (2) & (3)

18. At the time of tetanic contraction in skeletal muscle fibre which of the following ions increases and remains at high level in intracellular fluid?
(1) Na^{+} (2) K^{+}
(3) Ca^{++} (4) Calmodulin

19. Which of the following acts as a shock absorber to cushion the joint between tibia and the femur?
(1) Cartilage (2) Ligament
(3) Tendon (4) Disc

20. Human body resting on toes is an example of second class lever. Mark the **correct** choice representing fulcrum, effort and resistance, in this
(1) Fulcrum – Resistance – Effort
(2) Resistance – Fulcrum – Effort
(3) Resistance – Effort – Fulcrum
(4) None of the above is correct

21. Match the column I with column II

	Column I		**Column II**
a.	Deltoid ridge	(i)	Ulna
b.	Odontoid process	(ii)	Axis vertebra
c.	Olecranon process	(iii)	Humerus
d.	Greater trochanter	(iv)	Femur

(1) a(ii), b(i), c(iii), d(iv) (2) a(iv), b(ii), c(i), d(iii)
(3) a(iii), b(i), c(ii), d(iv) (4) a(iii), b(ii), c(i), d(iv)

22. Costal cartilage of vertebro chondral ribs are attached with
(1) Sternum
(2) 7^{th} vertebro sternal rib
(3) Thoracic vertebrae
(4) 11^{th} rib (floating rib)

23. Which of the following diseases is diagnosed by presence of IgM and involve inflammation of synovial membrane?
(1) Osteoarthritis (2) Rheumatoid arthritis
(3) Gouty arthritis (4) Bursitis

24. Which of the following bone is not a component of olfactory capsule?
(1) Nasal bone (2) Vomer bone
(3) Zygomatic bone (4) Maxillary bone

25. According to sliding filament model of muscle contraction, the structure that slides to shorten a sarcomere are
(1) Actin (2) Collagen
(3) Myosin (4) Creatine phosphate

26. Which of the following statement is **not** correct in respect to muscular contraction in smooth muscles?
(1) Latent period is long and contraction process is slow, relaxation is also slow
(2) Smooth muscles have comparatively short muscle twitch period i.e. about 1 to 3 seconds
(3) The Ca^{+2} ion are also obtained from the extracellular fluid
(4) Calmodulin functions like Ca^{++} receptor in binding with it

27. During muscle contraction according to the sliding filament mechanism, the part of sarcomere which increases in size/length is
(1) A-band (2) I-band
(3) O-band (4) H-zone

28. Sutures are the end-to-end fusions of flat cranial bones. Structurally, they belong to the category of
(1) Synovial joints (2) Fibrous joints
(3) Amphiarthrose joints (4) Cartilaginous joints

29. An autoimmune disorder affecting neuromuscular junctions and leading to fatigue, weakening and paralysis of muscles is
(1) Muscular dystrophy (2) Muscular tetany
(3) Myasthenia gravis (4) Poliomyelitis

30. Overactivity of xanthine oxidase enzyme will lead to a type of arthritis known as
(1) Osteoarthritis (2) Rheumatoid arthritis
(3) Gouty arthritis (4) Both (1) & (2)

31. Foramen transversarium is a pore present in the transverse processes of cervical vertebrae and is meant for the passage of vertebral artery. The cervical vertebra which lacks this foramen is
(1) Axis
(2) Atlas
(3) Seventh cervical vertebra
(4) Sixth cervical vertebra

32. Which of the following is **incorrect** match?
(1) Pivot joint : Between atlas and axis
(2) Saddle joint : Between carpal and metacarpal of thumb
(3) Hinge : Between first vertebra *i.e.*, atlas and occipital condyles
(4) Gliding : Between the carpals

33. Attached to the inner surface of the tympanic membrane is _____
(1) Head of malleus
(2) Handle of malleus
(3) Incus, serving as pivot point
(4) Stapes

34. The myosin heads in skeletal muscles bind to the exposed active sites on actins to form cross bridges. Active sites on actins become free when Ca^{2+} ions bind to a unit of _____, removing the inhibitory complex
(1) Troponin (2) Tropomyosin
(3) Calmodulin (4) Calsequestrin

35. If a small piece of bone breaks off fully from the bone but remains attached to the ligament, it is
(1) Comminuted fracture
(2) Evulsive fracture
(3) Compound fracture
(4) Green stick fracture

36. Which of the following ions play a key role in muscle contraction?
(1) Na^+, Ca^{++} (2) Na^+, K^+
(3) Ca^{++}, K^+ (4) Ca^{++}, Mg^{++}

37. Which of the following is correct vertebral formulae of human?
(1) $C_7T_{12}L_5S_{(4)}C_{(3)}$ (2) $C_8T_{12}L_5S_{(4)}C_{(5)}$
(3) $C_7T_{12}L_5S_{(5)}C_{(4)}$ (4) $C_7T_{12}L_5S_{(5)}C_{(5)}$

38. Type of joint present between two zygapophyses of adjacent vertebrae is
(1) Gliding joint (2) Cartilaginous joint
(3) Hinge joint (4) Fibrous joint

39. Which of the following curves of spinal cord are called as secondary curves?
(1) Cervical, thoracic (2) Thoracic, lumbar
(3) Thoracic, pelvic (4) Cervical, lumbar

40. The joint between atlas and axis is
(1) Gliding joint (2) Hinge joint
(3) Pivot joint (4) Saddle joint

41. Number of floating ribs in human are
(1) 2 (2) 4
(3) 12 (4) 24

42. Dicondylic skull is found in
(1) Birds, Amphibians (2) Amphibians, Fishes
(3) Amphibians, Mammals (4) Birds, Reptiles

43. Number of sacral bones in embryo are
(1) 4 (2) 5
(3) 1 (4) 26

44. The ion that must be present to initiate binding of the cross bridges in muscle fibre is
(1) Ca^{2+} (2) Na^{+}
(3) Fe^{2+} (4) Mn^{2+}

45. Obturator foramen is found in
(1) Pectoral girdle (2) Pelvic girdle
(3) Humerus bone (4) Femur bone

46. Name the type of joint between pubic bones in the pelvic girdles
(1) Fibrous joint (2) Cartilaginous joint
(3) Hinge joint (4) Pivot joint

47. Choose the **incorrect** statement w.r.t. smooth muscle
(1) They are involuntary, non-striated and innervated by autonomic nervous system
(2) Gap junction between fibres are present in multiunit smooth muscle
(3) The regulatory proteins for contraction are calmodulin and myosin light chain kinase
(4) Transverse tubules are absent in smooth muscle

48. Which of the following binds to the myosin head during its detachment from actin?
(1) Ca^{2+} (2) Mg^{2+}
(3) ATP (4) ADP

49. Thick myofilament, myosin consist of_____ polypeptide chains
(1) 2 (2) 4
(3) 6 (4) 8

50. Motor end plate is related to
(1) Sarcosome (2) Sarcoplasm
(3) Sacroplasmic reticulum (4) Sarcolemma

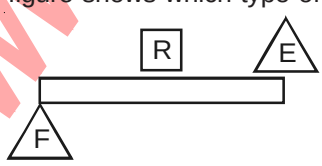
51. Which of the following is **incorrect** w.r.t. cardiac muscles?
(1) Autorhythmicity
(2) Long refractory period
(3) Considerable capacity for regeneration
(4) Gap junctions

52. Cori's cycle occurs between
(1) Liver and kidney (2) Kidney and muscles
(3) Liver and heart (4) Muscles and liver

53. Cori's cycle is associated with
(1) Lactic acid metabolism
(2) Fatty acid metabolism
(3) Protein metabolism
(4) Steroid metabolism

54. Which of the following is a synarthroses type of joint?
(1) Shoulder joint
(2) Gomphoses
(3) Joint in between carpals
(4) Joint between sternum and clavicle

55. Following figure shows which type of lever system?



(1) First class lever (2) Second class lever
(3) Third class lever (4) Zero class lever

56. Mark the mismatched pair
(1) Ellipsoid joint - Metacarpo - Phalangeal Joint
(2) Pivot joint - Radio - Ulnar joint
(3) Hinge joint - Elbow joint
(4) Saddle joint - Carpometacarpal joint of index finger

57. Number of unpaired bones in the cranium is
(1) 1 (2) 2
(3) 3 (4) 4

58. Which of the following is not the correct set of antagonistic muscle?
(1) Adductors and abductors
(2) Pronators and supinators
(3) Elevators and levators
(4) Sphincters and dilators

59. The inability of a muscle to maintain force of contraction after prolonged activity is called
(1) Muscle tone (2) Muscle tetanus
(3) Muscle fatigue (4) Muscle twitch

60. Even when muscle are at rest a certain amount of contraction/tautness usually remains. This is called
(1) Muscle treppe (2) Muscle twitch
(3) Muscle tetany (4) Muscle tone

61. The number of T-tubules per sarcomore in striated muscle are
(1) 2 (2) 4
(3) 8 (4) 16

62. The figure shows different types of centra of vertebrae. Identify them and relate them with the animals in which such centra are found.

(1) (a) – 9th vertebra of frog, (b) – Vertebra of rat, (c)– Vertebra of Salamander, (d) – 8th vertebra of frog
(2) (a) – 8th vertebra of frog, (b) – Typical vertebra of mammal, (c) – Typical vertebra of Salamander, (d) – 9th vertebra of frog
(3) (a) – Typical vertebra of fish, (b) – Typical vertebra of Salamander, (c) – 8th vertebra of frog, (d) – Typical vertebra of frog
(4) (a) – Typical vertebra of frog, (b) – Typical vertebra of mammal, (c) – 8th vertebra of frog, (d) – 9th vertebra of frog

63. The foraman magnum is present in inferior part of which cranial bone?
(1) Sphenoid bone (2) Ethmoid bone
(3) Temporal bone (4) Occipital bone

1. Visual for near objects accommodation involves
   (1) Increased tension on the lens ligaments
   (2) A decrease in the curvature of the lns
   (3) Relaxation of the sphincter muscle of the iris
   (4) Contraction of the ciliary muscle
2. Scala vestibuli is connected with scala tympani by
   (1) Fenestra rotundus (2) Fenestra ovalis
   (3) Helicotrema (4) Lamina spiralis
3. Which of the following is cholinergic and unmyelinated?
   (1) Pre-ganglionic parasympathetic fibres
   (2) Post-ganglionic parasympathetic fibres
   (3) Pre-ganglionic sympathetic nerves
   (4) Post-ganglionic sympathetic nerves
4. Each sympathetic ganglion is connected to the spinal nerve by
   (1) Gray ramus communicans
   (2) White ramus communicans
   (3) Ramus dorsalis
   (4) Ramus ventralis
5. Which is the neurotransmitter within the ganglia for sympathetic and parasympathetic nervous system?
   (1) Nor-adrenaline and acetylcholine respectively
   (2) Acetylcholine for both
   (3) Acetylcholine and adrenaline respectively
   (4) Adrenaline for both
6. Which of the following areas in cerebral cortex are responsible for complex functions like intersensory associations, memory and communication and makes maximum part of cortex?
   (1) Motor areas
   (2) Sensory areas
   (3) Somato-sensory areas
   (4) Association areas
7. In case of inhibitory chemical synapse or generation of inhibitory post synaptic potential (IPSP), which of the following channels are never open?
   (1) Na^+ channels (2) K^+ channel
   (3) Cl^- channel (4) Both (2) & (3)
8. Which of the following cranial nerve can protect us by warning about harmful chemicals in the air?
   (1) Olfactory (2) Trigeminal
   (3) Vagus (4) Seventh
9. Lack of green cone in an individual is known as
   (1) Protanopia (2) Deuteranopia
   (3) Tritanonopia (4) Chloranopia
10. An inhibitory post-synaptic potential
    (1) Depolarises the post-synaptic membrane by opening of Na^+ channels
    (2) Depolarises the post-synaptic membrane by opening of K^+ channels
    (3) Hyperpolarises the post-synaptic membrane by opening of Ca^{2+} channels
    (4) Hyperpolarises the post-synaptic membrane by opening of Cl^- channels
11. A fight or flight response in the body is controlled by the
    (1) Sympathetic division of the nervous system
    (2) Parasympathetic division of the nervous system
    (3) Release of ACh from post-ganglionic neuron
    (4) Somatic nervous system
12. Pacinian corpuscles which occur in the skin are
    (1) Free sensory nerve endings
    (2) Specialised cells at the end of the sensory nerve fibre
    (3) A type of gland
    (4) Encapsulated pressure and vibration receptors deep in the dermis
13. Which of the following is not involved in accommodation process for near objects?
    (1) Curvature of the lens increases
    (2) Size of the pupil is reduced
    (3) Radius of curvature of the lens decreases
    (4) Focal length of the lens is increased
14. Synaptic delay results from
    (1) An exhaustion in neurotransmitter
    (2) The time taken in releasing the neurotransmitter and stimulating the next neuron
    (3) Divergence of impulse
    (4) Repeated transmission of the impulse at the synapse
15. Where are the taste-buds for tasting chillies, black pepper and 'hot' sauces are present?
    (1) Tip of the tongue
    (2) Vallate papillae
    (3) Fungiform papillae
    (4) No taste buds for tasting 'chillies'
16. All the following statements are correct, but one is wrong. Which one is **wrong**?
    (1) The neurotransmitter within the ganglion is acetylcholine for both sympathetic and parasympathetic nerves
    (2) Pre-ganglionic sympathetic fibre directly supplies the medulla and is cholinergic
    (3) The post-ganglionic sympathetic fibre that terminates on sweat gland is adrenergic
    (4) The post-ganglionic parasympathetic fibre are cholinergic

17. Which of the following cells can sharpen the perception of contrast between light and dark patterns falling on the retina?
(1) Purkinje cells (2) Muller cells
(3) Amacrine cells (4) Cone cells

18. The oily secretion from _____ glands helps to keep the eyelids from adhering to each other
(1) Moll (2) Meibomian
(3) Zeis (4) Harderian

19. The membrane that gives us the ability to discriminate different pitches of sound is the
(1) Round window (2) Tympanic membrane
(3) Tectorial membrane (4) Basilar membrane

20. Which part of the ear is mainly related to sense of dynamic equilibrium?
(1) Utriculus (2) Sacculus
(3) Semicircular ducts (4) Cochlea

21. Cranial nerve having gasserian ganglia is
(1) Trochlear nerve (2) Trigeminal nerve
(3) Vagus nerve (4) Facial nerve

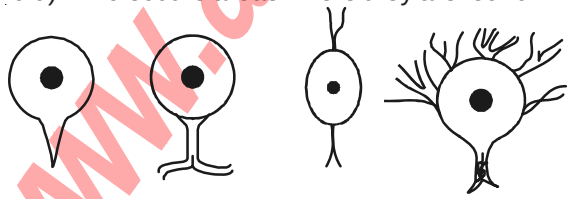
22. Ascending nerve tracts conduct sensory impulses towards brain through
(1) Dorsal funiculi (2) Lateral funiculi
(3) Ventral funiculi (4) Both (2) & (3)

23. If Bowman's gland is removed, the persons may suffer from
(1) Ageusia (2) Anosmia
(3) Agnosia (4) Alexia

24. Speed of nerve impulse can be increased by the following except one, mark the except one
(1) Increase in diameter of axon
(2) Increase in temperature
(3) Wrapping of insulation cover like myelin sheath
(4) Removing the insulation cover like myelin sheath

25. A nerve fibre can transmit impulse in response to threshold stimulus at about
(1) 10 impulse per second
(2) 100 impulse per second
(3) 1000 impulse per second
(4) 10000 impulse per second

26. Following figures show different types of neurons (a,b,c and d). Find out the areas where they are found.



(a) (b) (c) (d)

(1) a – Retina ; b – Olfactory epithelium ; c – CNS ; d– Ganglia of ANS
(2) a – Ganglia of ANS ; b – CNS ; c – Retina d– Schneiderian membrane
(3) a – Early embryo ; b – Dorsal root ganglion of spinal cord ; c – Retina ; d–CNS
(4) a – Taste bud ; b – Schneiderian membrane ; c – Retina ; d– CNS

27. Mark the correct sequence showing the flow of cerebrospinal fluid
(1) Diocoel → Paracoel → metacoel → Subarachnoid space
(2) Paracoel → Diocoel → Subarachnoid space → metacoel
(3) Diocoel → metacoel → foramen of Magendie → subarachnoid space
(4) Diocoel → metacoel → foramen of magnum → sub arachnoid space

28. Mark the correct match
(1) Ruffini corpuscles – Respond to cold
(2) Krause's corpuscles – Excited by heat
(3) Pacinian corpuscles – Sensitive to pressure
(4) Merkel's disc – Sensitive to pain

29. In which of the following period a stimulus, whatever may be its strength, will not excite the nerve fibre?
(1) Absolute refractory period
(2) Relative refractory period
(3) Normal refractory period
(4) Latent period

30. Hormones which interact with membrane-bound receptors normally, and do not enter the target cell, but generate second messengers which in turn regulate cellular metabolism are all, **except**
(1) Insulin (2) FSH
(3) Cortisol (4) Epinephrine

31. The atrial wall of our heart secretes a very important peptide hormone called atrial natriuretic factor (ANF). Which of the following is not a function of ANF?
(1) Dilation of the afferent arteriole to increase GFR
(2) Decrease in blood pressure
(3) Vasoconstriction
(4) Decrease in blood volume

32. Which of the following serves as a second messenger, slowing muscle contraction in response to acetylcholine?
(1) c-AMP (2) c-GMP
(3) Calcium (4) DG

33. Which of the following method is applied during origin of nervous system in invertebrates?
(1) Cell splitting and migration method
(2) Cell migration and invagination method
(3) Invagination process
(4) Both (1) & (2)

34. Which of the following lobe of brain is associated with decoding and interpretation of sound, language comprehension, smell, memory and emotion?
(1) Frontal lobe (2) Parietal lobe
(3) Temporal lobe (4) Occipital lobe

35. Which of the following disease is caused due to degeneration of GABA secreting neurons of corpus striatum and acetylcholine secreting neurons of other parts?
(1) Paralysis agitans
(2) Parkinson's disease
(3) Huntington's chorea
(4) Multiple sclerosis

36. Which of the following is **not** correctly matched?
(1) Ataxia — Lacks of muscle co-ordination
(2) Dyslexia — Inability of an individual to comprehend written language
(3) Wilson's disease — Hepatico-lenticular disease
(4) Alzheimer's disease — An inability to speak influent sentences although the person has no problem in understanding written or spoken words

37. Which of the following is not the characteristic of chemical synapse?
(1) Commonest type of synapse
(2) Requires neurotransmitter
(3) It cannot be regulated
(4) Does not allow the two way transmission of impulses

38. Which one of the following is **correct** w.r.t. travelling of sound in ear?
(1) External sound → Malleus → Stapes → Incus → Fenestra ovalis → Scala media → Scala vestibuli → Scala tympani → Fenestra rotunda → Middle ear → Out
(2) External sound → Tympanic membrane → Ear ossicles → Fenestra ovalis → Scala vestibuli → Helicotrema → Scala Tympani → Fenestra rotunda → Middle ear → Out
(3) External sound → Ear ossicles → Fenestra rotunda→ Scala vestibuli → Scala Tympani → Scala media → Fenestra rotunda → Middle ear → Out
(4) Both (1) & (3)

39. Ventral root of spinal cord is composed of
(1) Somatic motor and visceral sensory fibres
(2) Somatic sensory and visceral sensory fibres
(3) Somatic motor and visceral motor fibres
(4) Somatic sensory and visceral motor fibres

40. Which of the following is called as thoraco-lumbar outflow?
(1) Autonomic nervous system
(2) Sympathetic nervous system
(3) Parasympathetic nervous system
(4) Somatic neural system

41. Which of the following is **not** a part of knee jerk reflex?
(1) Afferent pathway (2) Muscle spindle
(3) Efferent pathway (4) Interneuron

42. During depolarisation there is
(1) Closure of voltage gated Na^+ and K^+ channels
(2) Opening of voltage gated Na^+ channel and voltage gated K^+ channel still closed
(3) Opening of voltage gated K^+ ion channel and closure of Na^+ channel
(4) Exit of K^+ ions

43. Which of the following is incorrect regarding Huntington's chorea?
(1) Loss of intrastriatal GABAergic system and cholinergic system of nigra striata
(2) Autosomal dominant mutation
(3) Loss of dopamine secretion
(4) Lack of huntingtin protein

44. Striated muscle fibres for eyeball movements are inserted into the sclera; nerve fibres of which cranial nerves control them to move the eyeball for looking at different directions?
(1) II^{nd}, IV^{th} and VI^{th} (2) III^{rd}, IV^{th} and VI^{th}
(3) III^{rd}, IV^{th} and VII^{th} (4) IV^{th}, VII^{th} and IX^{th}

45. The excess movement of K^+ ions from axoplasm to extracellular fluid leads to
(1) Depolarization
(2) Hyperpolarization
(3) Repolarization
(4) Threshold value for nerve impulse

46. Arbor vitae is found in
(1) Cerebrum (2) Medulla
(3) Cerebellum (4) Hypothalamus

47. Temperature regulatory centre is present in
(1) Cerebrum (2) Medulla
(3) Hypothalamus (4) Cerebellum

48. In ear, eustachian tube connects
(1) Middle ear with internal ear
(2) Middle ear with external ear
(3) Middle ear with pharynx
(4) Internal ear with pharynx

49. Which part of brain participate in expression of rage, aggression, pain, pleasure and the behaviour pattern related with sexual arousal?
(1) Cerebrum (2) Hypothalamus
(3) Medulla oblongata (4) Pons varoli

50. Middle ear is responsible for amplification of signal due to
(1) Presence of 4,000 ceruminous gland
(2) Vibrations of tympanic membrane
(3) Leverage system of ossicles
(4) Utriculus and sacculus

51. In case of non-mammals *i.e.* amphibians, reptiles, birds, the number of ear ossicle is/are
(1) 1 in amphibian, 2 in reptiles and 3 in birds
(2) 1 in amphibian and reptiles and 3 in birds
(3) 1 in amphibian, reptiles and birds
(4) 1 in amphibian and 2 in reptiles and birds

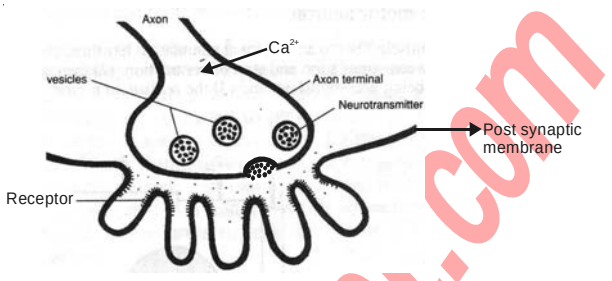
52. The glands which are present in between the bases of eyelashes are
(1) Glands of Moll (2) Glands of Zeis
(3) Meibomian gland (4) Ceruminous gland

53. Cerebrospinal fluid moves from paracoel to diocoel through
(1) Iter/aqueduct of sylvius
(2) Interventricular foramen/foramen of monro
(3) Obturator foramen
(4) Choroid plexus

54. The spinal cord extends down upto first lumbar vertebra where it tapers to end but meninges of the spinal cord continue upto coccygeal region. These meanings are known as
(1) Conus medullaris (2) Filum terminale
(3) Piamater (4) Duramater

55. Spinal cord conducts impulses to and from the brain. Which funiculus is involved in conducting motor impulses from brain to spinal cord?
(1) Dorsal grey horn
(2) Lateral and ventral funiculi
(3) Dorsal and ventral funiculi
(4) Dorsal and lateral funiculi

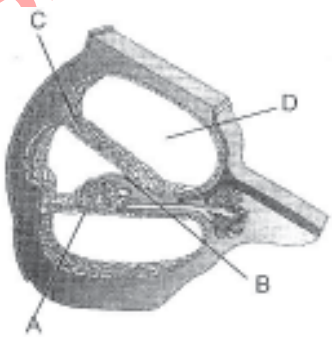
56. In the following diagram showing chemical conduction at synapse, if Ca^{2+} channels are blocked what will happen to the conduction?



(1) Release of neurotransmitter will be inhibited
(2) Binding of neurotransmitter will be blocked
(3) Both (1) and (2)
(4) Depolarization of presynaptic membrane would not occur

57. Which of the following is correct for the thalamus?
(1) It acts as relay centre
(2) It is the centre of crude sensation
(3) It has RAS
(4) All of the above

58. Given below is a diagrammatic representation of sectional view of cochlea



Read the following paragraph carefully
The eardrum vibrates in response to sound waves and these vibrations are transmitted through ear ossicles to oval window which are transferred to the fluid of cochlea, where they generate waves in lymphs. The waves in the lymph induce a ripple in the (i). The movement of the (ii) bend the hair cells, pressing them against the (iii). Choose the option which correctly fills the graph w.r.t. labelled structures in diagram.
(1) (i)D, (ii)B, (iii)A (2) (i)A, (ii)B, (iii)C
(3) (i)A, (ii)B, (iii)D (4) (i)A, (ii)A, (iii)B

[Chapter 10 : Chemical Coordination and Integration]

1. Which of the following disease is characterised by severe mental retardation, low intelligence quotient, abnormal skin, deaf, mutism and stunted growth in child?
(1) Nanism (2) Cretinism
(3) Grave's disease (4) Myxoedema

2. Tumor of parathyroid gland causes
(1) Parathyroid tetany
(2) Grave's disease
(3) Osteitis fibrosa cystica
(4) Hypocalcemic tetany

3. Individuals with type-I diabetes
(1) Lack β-cells in the islets of Langerhans
(2) Produce enough insulin but lack functional receptors on their cells
(3) Can control their diabetes with diet and exercise
(4) All of these are correct

4. Both adrenaline and cortisol are secreted in response to stress. Which of the following statement is also true for both of these hormones?
   (1) They act to increase blood glucose
   (2) They are secreted by the adrenal cortex
   (3) Their secretion is stimulated by adrenocorticotropin
   (4) They are secreted into the blood within seconds of the onset of stress

5. Which of the following hormone enters into nucleus and binds to receptors and stimulates the translation?
   (1) T_4 (2) T_3
   (3) Steroid hormone (4) All of these

6. Excess of which of the following hormone can result in diabetes mellitus condition?
   (1) Insulin (2) Prolactin
   (3) Growth hormone (4) Aldosterone

7. Which of the following is not transported through hypothalmo-hypophysial portal vein?
   (1) Somatostatin
   (2) Thyotrophin releasing hormone
   (3) Prolactin releasing hormone
   (4) Somatotropin

8. Pituitary secretes many hormones. Which one of the following is case of hypopituitarism?
   (1) Midget (2) Simmond's disease
   (3) Acromegaly (4) Both (1) & (2)

9. Glucocorticoids are involved in carbohydrate, lipid and protein metabolism. But are not involved in
   (1) Anti inflammatory function
   (2) Immunosuppressive function
   (3) Increase the WBC count
   (4) Increase the RBC count

10. Which of the following set shows antagonistic effect?
   (1) Prolactin and oxytocin
   (2) Oxytocin and prostaglandins
   (3) cAMP and cGMP
   (4) Thyroxine end GH

11. Which of the following endocrine gland secretes catecholamines?
   (1) Pituitary (2) Thyroid
   (3) Adrenal medulla (4) Pancreas

12. A boy has undeveloped and non-functional secondary sex organs like prostate, seminal vesicles and penis, lacks external sex characters such as beard, moustache and low pitch voice and does not produce sperms. These are the symptoms of which disease?
   (1) Sexual pseudoprecocity of boys
   (2) Sexual pseudoprecocity of girls
   (3) Eunuchoidism
   (4) Adrenal virilisin

13. Life saving corticoid hormones are secreted by
   (1) Pituitary (2) Pineal
   (3) Adrenal (4) Thyroid

14. Mark the correct statements w.r.t. thyroid gland
   A. T_3 is about 4 times as potent as T_4
   B. Endostyle of protochordates (*Herdmania*) is forerunner of thyroid gland of vertebrates
   C. Grave's disease occurs due to hypothyrodism
   D. Grave's disease is an example of autoimmune disorder
   (1) A & C (2) A, B & D
   (3) A, B, C & D (4) A & D

15. Find odd one out w.r.t. amount of secretion
   (1) Conn's disease (2) Cushing's disease
   (3) Plummer's disease (4) Simmond's disease

16. Which part of adrenal gland secretes cortisol?
   (1) Zona glomerulosa (2) Zona reticularis
   (3) Zona fasciaulata (4) Adrenal medulla

17. Mark the incorrect w.r.t. cortisol
   (1) Anti-insulin (2) Stress-hormone
   (3) Immuno-active (4) Anti-allergic

18. Cushing's syndrome is related to
   (1) Mineralocorticoids
   (2) Glucocorticoids
   (3) Somatomedins
   (4) Angiotensin converting enzyme (ACE)

19. Mark the **incorrect** statement w.r.t. insulin?
   (1) Secreted by β-cells of islets of Langerhans of pancreas
   (2) Lowers glucose level by promoting synthesis of fats from glucose by adipose tissue
   (3) Polypeptide hormone
   (4) Lowers glucose level by inhibiting uptake of amino-acids by liver and muscle cells

20. Somatostatin is secreted by
   (1) Phaeochromocytes
   (2) Hypothalamus
   (3) δ-cells of islets of langerhans
   (4) Both (2) & (3)

21. Hormones which increase alertness, pupilary dilation, piloerection, sweating is/are
   (1) Adrenaline
   (2) Secreted by Adrenal cortex
   (3) Nor-adrenaline
   (4) Both (1) & (3)

22. IP_3 and DG are secondary messenger involved in the action of
   (1) Acetylcholine (2) Thyroxine
   (3) Insulin (4) Nor–adrenaline

23. Find the incorrect match
(1) Huntington chorea – Degeneration GABA secreting neurons of corpus striatum
(2) Parkinson disease – Destruction of substantia nigra
(3) Osteitis fibrosa cystica – Hypoparathyroidism
(4) Sexual pseudoprecocity in boys – Excess of testosterone produced by tumour of testes and adrenals

24. Match the Column-I with Column-II

	Column-I		Column-II
a.	Exopthalmic goitre	(i)	Corpus luteum
b.	Thymus	(ii)	Kidney
c.	Inhibin	(iii)	Autoimmune disorder
d.	Calcitriol	(iv)	Hassall's corpuscles

(1) a(iii), b(ii), c(i), d(iv) (2) a(iv), b(iii), c(i), d(ii)
(3) a(iii), b(iv), c(i), d(ii) (4) a(iii), b(iv), c(ii), d(i)

25. Bronze-like pigmentation is characteristic of
(1) Collip's disease (2) Conn's disease
(3) Cushing's disease (4) Addison's disease

26. Phaeochromocytes are found in
(1) Parathyroid (2) Thyroid matrix
(3) Adrenal medulla (4) Pineal gland

27. Mark the **incorrect** match w.r.t. hormone source
(1) Secretin - duodenal mucosa
(2) Enterogastrone - stomach
(3) Pancreozymin - duodenal mucosa
(4) Gastrin - stomach

28. Herring bodies are found in
(1) Pancrease (2) Thymus
(3) Pituitary gland (4) Ovary

29. Following are the examples of secondary messengers **except**
(1) cAMP (2) DG
(3) Sodium (4) IP_3

30. Adrenalin shows the following activity **except**
(1) Dilation of arterioles of heart and skeletal muscles
(2) Increased consumption of O_2
(3) Glycogenolysis
(4) Constriction of pupil

31. Biological clock of body is
(1) Thyroid gland (2) Pancreas
(3) Pituitary gland (4) Pineal gland

32. In adult hyposecretion of thyroxine hormone causes
(1) Cretinism disease (2) Dwarfism
(3) Myxedema disease (4) Acromegaly

33. Find out **incorrect** statement
(1) Insulin stimulates glycogenesis
(2) Glucagon enhances release of glucose into the blood
(3) Prolonged hyperglycemia leads to a complex disorder called diabetes mellitus
(4) Insulin reduces glucose uptake by liver cells

34. Main child birth hormone is
(1) Progesterone (2) Oxytocin
(3) Relaxin (4) Prolactin

35. Which hormones play a very important role in the regulation of a 24 hour (diurnal) rhythm of our body?
(1) Thyroxine (2) Melatonin
(3) Adrenalin (4) Growth hormone

36. Find the **correct** match
(1) Melatonin – Tetany
(2) PTH – Dwarfism
(3) Growth hormone – Acromegaly
(4) Thyroxine – Gigantism

37. The condition of gynaecomastia in males can arise due to
(1) Disturbance of estrogen to androgen ratio
(2) Temporary increase in circulating estrogen in neonatal period and during puberty
(3) Decreased testosterone in later life
(4) All of these

38. The hormone which inhibits secretion of glucagon and insulin as well as decreases motility and absorption in the digestive tract is
(1) Glucocorticoid (2) Adrenaline
(3) Nor-adrenaline (4) Somatostatin

39. Addison's disease and Conn's syndrome are associated with abnormal secretion of
(1) Mineralocorticoids (2) Glucocorticoids
(3) Sexcorticoids (4) Endorphin

40. The hormone which is regularly abused by the milkmen to get more milk from their cows and buffaloes is
(1) Pitressin (2) Pitocin
(3) GnRH (4) Somatotropin

41. Which of the following hormone stimulate phospholipase activity in cell membrane of liver cell and cause formation of DAG and IP_3?
(1) Adrenaline (2) Noradrenaline
(3) Insulin (4) Parathormone

42. Which of the following is/are not a steroid hormone?
(1) Progesterone (2) Placental estradiol
(3) Relaxin (4) Cortisol

43. Match the following

Column I	Column II
a. Thyroxine	(i) Tryptophan
b. Melatonin	(ii) Protein
c. Insulin	(iii) Steroid
d. Estradiol	(iv) Tyrosine

(1) a(i), b(iii), c(ii), d(iv) (2) a(iv), b(i), c(ii), d(iii)
(3) a(iii), b(i), c(iv), d(ii) (4) a(ii), b(iv), c(i), d(iii)

44. Which of the following is available in drug stores and is being used to haster the recovery from jet lag?
(1) TSH (2) Collip's hormone
(3) Melatonin (4) Adrenaline

45. Disorder caused due to thyroid hormone deficiency includes
a. Cretinism b. Gull's disease
c. Graves disease d. Simple goitre
(1) b & d (2) b & c
(3) a, b, d (4) b, c, d

46. Hormone which increases the concentration of calcium ions in the blood plasma by mobilising more calcium from bones to the plasma. It is released from
(1) Thyroid gland (2) Parathyroid gland
(3) Adrenal gland (4) Pituitary gland

47. Which hormone lowers blood glucose level by stimulating transport of glucose from blood to muscle and adipose cells?
(1) GH (2) Glucocorticoids
(3) Insulin (4) Thyroxine

48. Which endocrine gland is also known as "the throne of immunity"?
(1) Pineal (2) Thyroid
(3) Parathyroid (4) Thymus

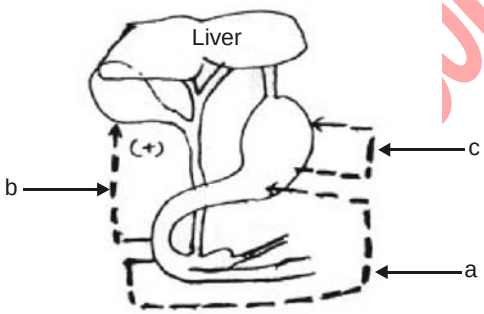
49. All the hormone of adrenal cortex is synthesised from
(1) Tyrosine (2) Glycoprotein
(3) Cholesterol (4) Tryptophan

50. Calcitonin is a thyroid gland secretion and its function is to
(1) Increase Ca^{2+} level in the blood
(2) Increase PO_4^- level in the blood
(3) Decrease Ca^{2+} level in the blood
(4) No effect on Ca^{2+} level of blood

51. Which cells of islet of Langerhans gets damaged when treated with alloxan or streptozocin?
(1) α-cell (2) β-cell
(3) δ-cell (4) F-cell

52. Which hormone produces anti-inflammatory reactions and suppresses the immune response?
(1) PTH (2) Thyroxine
(3) Cortisol (4) Adrenaline

53. In the diagram given below hormones released have been shown as broken lines (a,b,c). Identify them



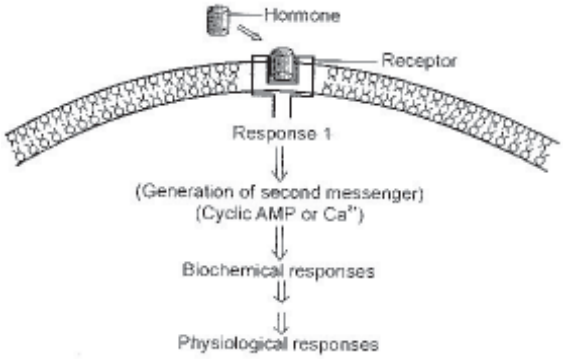
(1) a – Secretin ; b – Gastrin ; c – CCK
(2) a – Enterogasteron ; b – Gastrin ; c – CCK
(3) a – Enterogasteron ; b – CCK ; c – Gastrin
(4) a – Motilin ; b – Duocrinin ; c – GIP

54. Which of the following is called as neurohypophysis?
(1) Adrenal cortex (2) Anterior pituitary
(3) Posterior pituitary (4) Pineal body

55. Life saving corticoid hormones are secreted by
(1) Pituitary (2) Pineal
(3) Adrenal (4) Thyroid

56. The correct combination is
(i) α-cell : Glucagon
(ii) β-cell : Insulin
(iii) γ-cell : Somatostatin
(iv) δ-cell : Gastrin
(1) (i) and (ii) only (2) (i), (ii) and (iii) only
(3) (ii) and (iii) only (4) (i), (ii), (iii) and (iv)

57. Given below is a diagrammatic representation of the mechanism of hormone action



Which of the following hormone acts by the given mechanism ?
(1) Follicle stimulating hormone
(2) Estrogen
(3) Testosterone
(4) All of these

❑ ❑ ❑

ANSWERS

[PHYSICS]

Chapter 9 : Thermal Properties of Matter

1.	(1)	2.	(1)	3.	(2)	4.	(4)	5.	(4)	6.	(2)	7.	(3)
8.	(2)	9.	(4)	10.	(1)	11.	(3)	12.	(1)	13.	(4)	14.	(3)
15.	(1)	16.	(2)	17.	(2)	18.	(4)	19.	(1)	20.	(3)	21.	(4)
22.	(1)	23.	(3)	24.	(2)	25.	(3)	26.	(2)	27.	(3)	28.	(2)
29.	(1)	30.	(1)										

Chapter 10 : Thermodynamics

1.	(1)	2.	(1)	3.	(2)	4.	(1)	5.	(3)	6.	(1)	7.	(3)
8.	(2)	9.	(3)	10.	(1)	11.	(1)	12.	(2)	13.	(2)	14.	(1)
15.	(3)	16.	(3)	17.	(2)	18.	(3)	19.	(1)	20.	(3)	21.	(4)
22.	(3)	23.	(2)	24.	(3)	25.	(1)	26.	(2)	27.	(1)	28.	(3)
29.	(4)	30.	(2)	31.	(1)	32.	(2)	33.	(3)	34.	(4)	35.	(3)
36.	(1)	37.	(3)	38.	(2)	39.	(3)	40.	(4)	41.	(2)	42.	(1)
43.	(3)	44.	(4)	45.	(3)	46.	(1)						

Chapter 11 : Kinetic Theory

1.	(1)	2.	(3)	3.	(3)	4.	(2)	5.	(4)	6.	(2)	7.	(1)
8.	(4)	9.	(1)	10.	(3)	11.	(4)	12.	(1)	13.	(3)	14.	(3)
15.	(4)	16.	(2)	17.	(2)	18.	(1)	19.	(4)	20.	(1)	21.	(3)
22.	(4)												

Chapter 12 : Oscillation

1.	(2)	2.	(3)	3.	(4)	4.	(2)	5.	(1)	6.	(2)	7.	(3)
8.	(3)	9.	(1)	10.	(4)	11.	(1)	12.	(1)	13.	(4)	14.	(1)
15.	(2)	16.	(1)	17.	(2)	18.	(4)	19.	(3)	20.	(1)	21.	(4)
22.	(1)	23.	(2)	24.	(2)	25.	(1)	26.	(3)	27.	(2)	28.	(4)
29.	(2)	30.	(2)	31.	(3)	32.	(2)	33.	(4)	34.	(2)	35.	(3)
36.	(1)	37.	(3)	38.	(2)	39.	(2)	40.	(2)	41.	(4)	42.	(4)
43.	(3)	44.	(3)	45.	(1)	46.	(1)	47.	(3)	48.	(2)	49.	(1)
50.	(2)	51.	(3)	52.	(2)	53.	(3)	54.	(4)	55.	(4)	56.	(3)
57.	(2)	58.	(2)	59.	(3)	60.	(3)	61.	(3)				

Chapter 13 : Waves

1.	(2)	2.	(4)	3.	(3)	4.	(1)	5.	(3)	6.	(2)	7.	(2)
8.	(1)	9.	(1)	10.	(4)	11.	(1)	12.	(4)	13.	(1)	14.	(4)
15.	(3)	16.	(2)	17.	(2)	18.	(3)	19.	(2)	20.	(2)	21.	(2)
22.	(1)	23.	(1)	24.	(2)	25.	(3)	26.	(1)	27.	(3)	28.	(1)
29.	(3)	30.	(2)	31.	(1)	32.	(2)	33.	(3)	34.	(2)	35.	(3)
36.	(2)	37.	(1)	38.	(4)	39.	(1)	40.	(1)	41.	(1)	42.	(1)
43.	(2)	44.	(1)	45.	(1)	46.	(2)	47.	(2)	48.	(1)	49.	(3)
50.	(3)												

[CHEMISTRY]

Chapter 12 : Organic Chemistry

1.	(3)	2.	(3)	3.	(4)	4.	(2)	5.	(3)	6.	(4)	7.	(2)
8.	(2)	9.	(2)	10.	(2)	11.	(1)	12.	(3)	13.	(2)	14.	(2)
15.	(2)	16.	(1)	17.	(4)	18.	(4)	19.	(2)	20.	(3)	21.	(4)

22.	(4)	23.	(2)	24.	(2)	25.	(1)	26.	(1)	27.	(2)	28.	(4)
29.	(2)	30.	(3)	31.	(3)	32.	(4)	33.	(4)	34.	(1)	35.	(2)
36.	(3)	37.	(2)	38.	(1)	39.	(4)	40.	(2)	41.	(1)	42.	(2)
43.	(4)	44.	(2)	45.	(3)	46.	(2)	47.	(2)	48.	(4)	49.	(1)
50.	(2)	51.	(1)	52.	(2)	53.	(1)	54.	(4)	55.	(2)	56.	(3)

Chapter 13 : Hydrocarbons & Environmental Chemistry

1.	(2)	2.	(4)	3.	(3)	4.	(3)	5.	(4)	6.	(4)	7.	(1)
8.	(2)	9.	(1)	10.	(1)	11.	(3)	12.	(1)	13.	(4)	14.	(3)
15.	(1)	16.	(1)	17.	(3)	18.	(3)	19.	(4)	20.	(2)	21.	(4)
22.	(2)	23.	(3)	24.	(3)	25.	(1)	26.	(1)	27.	(4)	28.	(2)
29.	(3)	30.	(2)	31.	(1)	32.	(3)	33.	(2)	34.	(2)	35.	(4)
36.	(4)												

[BOTANY]

Chapter 9 : Mineral Nutrition

1.	(3)	2.	(2)	3.	(2)	4.	(4)	5.	(4)	6.	(1)	7.	(4)
8.	(3)	9.	(3)	10.	(1)	11.	(3)	12.	(2)	13.	(2)	14.	(2)
15.	(2)	16.	(4)	17.	(2)	18.	(3)	19.	(2)	20.	(1)	21.	(3)
22.	(1)	23.	(1)	24.	(4)	25.	(3)	26.	(4)	27.	(3)	28.	(4)
29.	(2)	30.	(2)	31.	(4)	32.	(3)	33.	(4)	34.	(4)	35.	(2)
36.	(3)	37.	(4)	38.	(2)								

Chapter 10 : Photosynthesis in Plants

1.	(1)	2.	(2)	3.	(3)	4.	(2)	5.	(2)	6.	(2)	7.	(3)
8.	(4)	9.	(2)	10.	(4)	11.	(3)	12.	(2)	13.	(2)	14.	(3)
15.	(1)	16.	(3)	17.	(4)	18.	(2)	19.	(3)	20.	(4)	21.	(1)
22.	(1)	23.	(4)	24.	(4)	25.	(1)	26.	(3)	27.	(1)	28.	(1)
29.	(4)	30.	(4)	31.	(2)	32.	(1)	33.	(2)	34.	(4)	35.	(3)
36.	(4)	37.	(1)	38.	(4)	39.	(4)	40.	(4)	41.	(2)	42.	(2)
43.	(4)	44.	(2)	45.	(1)	46.	(2)	47.	(1)	48.	(2)	49.	(3)
50.	(4)	51	(2)										

Chapter 11 : Respiration in Plants

1.	(3)	2.	(2)	3.	(3)	4.	(3)	5.	(3)	6.	(1)	7.	(4)
8.	(1)	9.	(1)	10.	(1)	11.	(2)	12.	(3)	13.	(3)	14.	(1)
15.	(1)	16.	(3)	17.	(3)	18.	(1)	19.	(2)	20.	(1)	21.	(4)
22.	(4)	23.	(4)	24.	(2)	25.	(2)	26.	(1)	27.	(1)	28.	(3)
29.	(4)	30.	(2)	31.	(1)	32.	(4)	33.	(2)	34.	(3)	35.	(2)
36.	(2)	37.	(1)	38.	(2)	39.	(1)	40.	(1)	41.	(1)	42.	(3)
43.	(1)	44.	(4)	45.	(4)	46.	(2)	47.	(4)	48.	(3)	49.	(4)

Chapter 12 : Plant Growth & Development

1.	(4)	2.	(1)	3.	(1)	4.	(1)	5.	(3)	6.	(3)	7.	(2)
8.	(3)	9.	(3)	10.	(1)	11.	(4)	12.	(2)	13.	(1)	14.	(4)
15.	(2)	16.	(1)	17.	(3)	18.	(3)	19.	(3)	20.	(4)	21.	(4)
22.	(1)	23.	(4)	24.	(2)	25.	(3)	26.	(2)	27.	(4)	28.	(4)
29.	(4)	30.	(1)										

[ZOOLOGY]

Chapter 6 : Body Fluids and Circulation

1.	(2)	2.	(3)	3.	(1)	4.	(3)	5.	(3)	6.	(3)	7.	(3)
8.	(2)	9.	(4)	10.	(2)	11.	(2)	12.	(4)	13.	(1)	14.	(2)
15.	(4)	16.	(2)	17.	(2)	18.	(2)	19.	(1)	20.	(1)	21.	(2)
22.	(3)	23.	(3)	24.	(2)	25.	(3)	26.	(1)	27.	(2)	28.	(3)
29.	(3)	30.	(3)	31.	(3)	32.	(2)	33.	(3)	34.	(1)	35.	(1)
36.	(2)												

Chapter 7 : Excretory Products and their Elimination

1.	(4)	2.	(2)	3.	(4)	4.	(2)	5.	(2)	6.	(3)	7.	(4)
8.	(3)	9.	(3)	10.	(4)	11.	(3)	12.	(3)	13.	(4)	14.	(2)
15.	(3)	16.	(2)	17.	(3)	18.	(2)	19.	(2)	20.	(2)	21.	(4)
22.	(4)	23.	(2)	24.	(4)	25.	(2)	26.	(2)	27.	(3)	28.	(4)
29.	(1)	30.	(2)	31.	(3)	32.	(2)	33.	(2)	34.	(3)	35.	(3)
36.	(2)	37.	(3)	38.	(3)	39.	(2)	40.	(4)	41.	(4)	42.	(1)
43.	(2)	44.	(3)	45.	(1)	46.	(4)	47.	(2)	48.	(3)	49.	(2)
50.	(1)	51.	(4)	52.	(4)	53.	(3)	54.	(2)	55.	(1)	56	(2)
57.	(3)	58.	(3)	59.	(1)								

Chapter 8 : Locomotion and Movement

1.	(2)	2.	(1)	3.	(4)	4.	(3)	5.	(3)	6.	(2)	7.	(1)
8.	(4)	9.	(3)	10.	(3)	11.	(2)	12.	(4)	13.	(4)	14.	(3)
15.	(4)	16.	(1)	17.	(4)	18.	(3)	19.	(1)	20.	(1)	21.	(4)
22.	(2)	23.	(2)	24.	(3)	25.	(1)	26.	(2)	27.	(3)	28.	(2)
29.	(3)	30.	(3)	31.	(3)	32.	(3)	33.	(2)	34.	(1)	35.	(2)
36.	(4)	37.	(3)	38.	(1)	39.	(4)	40.	(3)	41.	(2)	42.	(3)
43.	(2)	44.	(1)	45.	(2)	46.	(2)	47.	(2)	48.	(3)	49.	(3)
50.	(4)	51.	(3)	52.	(4)	53.	(1)	54.	(2)	55.	(2)	56	(4)
57.	(4)	58.	(3)	59.	(3)	60.	(4)	61.	(1)	62.	(2)	63.	(4)

Chapter 9 : Neural Control and Coordination

1.	(4)	2.	(3)	3.	(2)	4.	(1)	5.	(2)	6.	(4)	7.	(1)
8.	(2)	9.	(2)	10.	(4)	11.	(1)	12.	(4)	13.	(4)	14.	(2)
15.	(4)	16.	(3)	17.	(3)	18.	(2)	19.	(4)	20.	(3)	21.	(2)
22.	(1)	23.	(2)	24.	(4)	25.	(3)	26.	(3)	27.	(3)	28.	(3)
29.	(1)	30.	(3)	31.	(3)	32.	(2)	33.	(1)	34.	(3)	35.	(3)
36.	(4)	37.	(3)	38.	(2)	39.	(3)	40.	(2)	41.	(4)	42.	(2)
43.	(3)	44.	(2)	45.	(2)	46.	(3)	47.	(3)	48.	(3)	49.	(2)
50.	(3)	51.	(3)	52.	(1)	53.	(2)	54.	(2)	55.	(2)	56	(1)
57.	(4)	58.	(4)										

Chapter 10 : Chemical Coordination and Integration

1.	(2)	2.	(3)	3.	(1)	4.	(1)	5.	(3)	6.	(3)	7.	(4)
8.	(4)	9.	(3)	10.	(3)	11.	(3)	12.	(1)	13.	(3)	14.	(2)
15.	(4)	16.	(3)	17.	(3)	18.	(2)	19.	(4)	20.	(4)	21.	(4)
22.	(3)	23.	(3)	24.	(3)	25.	(4)	26.	(3)	27.	(2)	28.	(3)
29.	(3)	30.	(4)	31.	(4)	32.	(3)	33.	(4)	34.	(2)	35.	(2)
36.	(3)	37.	(4)	38.	(4)	39.	(1)	40.	(2)	41.	(3)	42.	(3)
43.	(2)	44.	(3)	45.	(3)	46.	(2)	47.	(3)	48.	(4)	49.	(3)
50.	(3)	51.	(2)	52.	(3)	53.	(3)	54.	(3)	55.	(3)	56	(1)
57.	(1)												

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CONTENTS

2012-13

PHYSICS

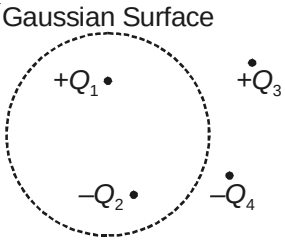
[Chapter-14 : Electric Charges and Field]

1. On each of the three corners of an equilateral triangle of side D three equal charges Q are placed. The coulombic force experienced by one charge due to the other two charges is

(1) Zero (2) $\frac{\sqrt{2}Q^2}{4\pi\varepsilon_0 D^2}$

(3) $\frac{\sqrt{3}Q^2}{4\pi\varepsilon_0 D^2}$ (4) $\frac{2Q^2}{4\pi\varepsilon_0 D^2}$

2. If we apply Gauss' Law $\oint \vec{E}\cdot\vec{dS} = \frac{Q_{net}}{\varepsilon_0}$ for a spherical Gaussian surface shown below, then the $\vec{E}$ in the expression is due to



(1) All the charges collectively
(2) All positive charges only
(3) All negative charges only
(4) Net charges inside the Gaussian surface

3. Two short electric dipoles at a certain distance R apply a force F on each other. If the separation is doubled, then the force of interaction between the dipoles, will become approximately

(1) $\frac{F}{2}$ (2) $\frac{F}{4}$

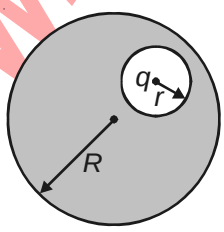
(3) $\frac{F}{8}$ (4) $\frac{F}{16}$

4. Two equal point charges are kept a distance R apart. A third charged particle kept on the perpendicular bisector at a distance r from the centre will experience maximum electrostatic force when

(1) r = ±R (2) $r = \pm\frac{R}{\sqrt{2}}$

(3) $r = \pm\frac{R}{2\sqrt{2}}$ (4) $r = \pm R\sqrt{2}$

5. A metal sphere of radius R contains a spherical cavity of radius r (r < R). A point charge q is kept at the centre of the cavity. The electric field inside the cavity is



(1) Zero
(2) Spherically symmetrical
(3) Constant
(4) Directed towards the centre of the metal sphere

6. A particle of mass M and charge Q is at rest in a uniform electric field E and then released. The kinetic energy acquired by the particle after moving a distance x is

(1) MQ^2Ex (2) MQE^2x
(3) $MQEx^2$ (4) QEx

7. The electric field in a region is radially outward with magnitude E = Ar, where A is constant and r is distance from origin. The charge inside a sphere of radius r at the origin is

(1) $\varepsilon_0 Ar^3$ (2) $4\pi\varepsilon_0 Ar^2$
(3) $2\pi\varepsilon_0 Ar^3$ (4) $4\pi\varepsilon_0 Ar^3$

8. A charge Q is given a displacement $\vec{s} = x\hat{i} + y\hat{j} + z\hat{k}$ in an electric field $\vec{E} = \hat{i}E_x + \hat{j}E_y + \hat{k}E_z$. The work done is

(1) $Q\sqrt{(xE_x)^2 + (yE_y)^2 + (zE_z)^2}$

(2) $Q(E_x + E_y + E_z)\sqrt{x^2 + y^2 + z^2}$

(3) $\sqrt{(xE_x)^2 + (yE_y)^2 + (zE_z)^2}$

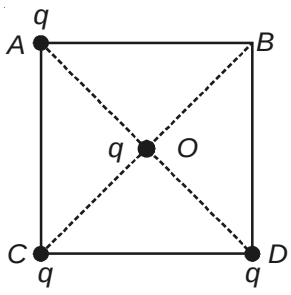
(4) $Q(xE_x + yE_y + zE_z)$

9. A cube of side D has charge Q at each of its eight vertices. The electric field at the centre of the cube is

(1) $\frac{8Q}{4\pi\varepsilon_0\left(\frac{D}{2}\right)^2}$ (2) $\frac{8Q}{4\pi\varepsilon_0(D\sqrt{2})^2}$

(3) $\frac{8Q}{4\pi\varepsilon_0\left(\frac{D}{\sqrt{2}}\right)^2}$ (4) Zero

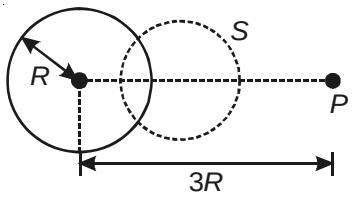
10. Four point charges each of magnitude q are kept as shown. ABCD is a square of side $a\sqrt{2}$. The electrostatic force on the charge at the centre O is



(1) $\frac{kq^2}{a^2}$ (2) $\frac{kq^2}{2a^2}$

(3) $\frac{\sqrt{2}kq^2}{2a^2}$ (4) Zero

11. A negative point charge – Q is kept at point P near a neutral conducting sphere as shown. The electric flux linked with the gaussian surface S (shown dotted) is ϕ, then one can conclude that



(1) $\phi = 0$

(2) $\phi < 0$

(3) $\phi > 0$

(4) $\phi > 0$, if sphere is solid and $\phi < 0$ if the sphere is hollow

12. A point charge moving with velocity $\vec{v} = (3 \text{ m/s})\,\hat{i}$ is released in a uniform electric field $\vec{E} = (a\hat{i} + b\hat{j})$. The subsequent trajectory of the particle will be

(1) A parabola

(2) An ellipse

(3) A rectangular hyperbola

(4) A straight line

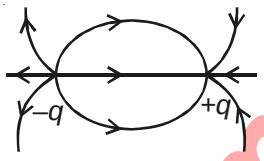
13. An electric dipole experiences a torque 'x' when kept in a uniform electric field with angle $\theta = 60^\circ$ between electric field and dipole moment. What is the potential energy of the dipole?

(1) – x (2) $\frac{x}{2}$

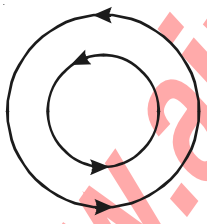
(3) $-\frac{x}{\sqrt{3}}$ (4) 2x

14. Which of the following pattern of electrostatic field lines is possible?

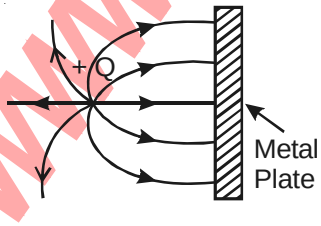
(1)



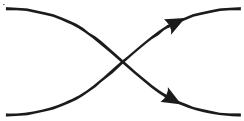
(2)



(3)



(4)

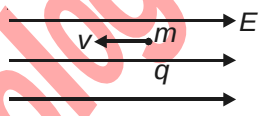


15. When an electric dipole is perpendicular to a uniform electric field, the torque acting on it is W. If the dipole is released from this position, the K.E. acquired by the dipole till it reaches in the position of stable equilibrium is

(1) $\frac{W}{2}$ (2) W

(3) 1.5 W (4) 2 W

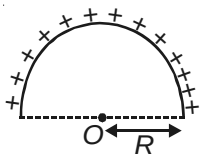
16. A positively charged particle is projected with speed v in a uniform electric field E as shown. After what time the particle will have same K.E. as initial?



(1) $\frac{2mv}{qE}$ (2) $\frac{mv}{qE}$

(3) $\frac{mv}{2qE}$ (4) $\frac{mv}{4qE}$

17. What is the value of electric field at the centre of curvature O of the semicircular ring as shown in figure?The total charge is Q, which is uniformly distributed



(1) $\frac{Q}{2\pi\varepsilon_0 R}$ (2) $\frac{Q}{2\pi^2\varepsilon_0 R}$

(3) $\frac{Q}{2\pi^2\varepsilon_0 R^2}$ (4) $\frac{Q}{4\pi\varepsilon_0 R^2}$

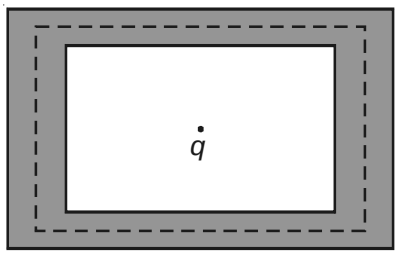
18. At the centre of a neutral square frame made of copper, there is a point charge q as shown. The electric flux linked with the surface of frame is

(1) $\frac{q}{6\,\varepsilon_0}$

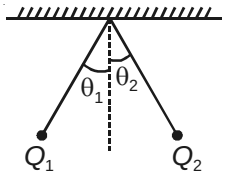
(2) $\frac{q}{2\,\varepsilon_0}$

(3) $\frac{q}{\varepsilon_0}$

(4) Zero



19. Two identical simple pendulums have different charges Q_1 and Q_2 on their bobs. When they are suspended from the same point, their strings make angle θ_1 and θ_2 from the vertical as shown, hence $(Q_1 > Q_2)$

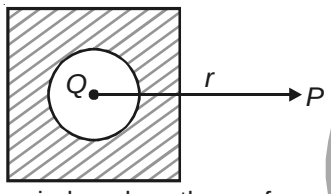


(1) $\theta_1 > \theta_2$ (2) $\theta_1 < \theta_2$
(3) $\theta_1 = \theta_2$ (4) $Q_1\theta_1 = Q_2\theta_2$

20. If the electric flux entering and leaving a closed surface are ϕ_1 and ϕ_2 respectively then the electric charge enclosed by the volume of the surface is

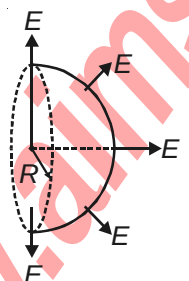
(1) $(\phi_1 + \phi_2)\varepsilon_0$ (2) $(\phi_2 - \phi_1)\varepsilon_0$
(3) $\frac{(\phi_1+\phi_2)}{\varepsilon_0}$ (4) $\frac{(\phi_2-\phi_1)}{\varepsilon_0}$

21. A point charge +Q is placed at the centre of a spherical cavity inside a metal block. Now choose the correct statement



(1) Charge induced on the surface of the cavity is –Q
(2) Charge induced on the outer surface of the block is +Q
(3) Electric field intensity at the outside point P is $\frac{Q}{4\pi\varepsilon_0 r^2}$
(4) All of these

22. A hemispherical surface is kept in a radial electric field $\vec{E}$ normal to curved surface as shown. Electric flux linked with the curved surface will be



(1) $4\pi R^2E$ (2) πR^2E
(3) $\frac{\pi R^2 E}{2}$ (4) $E2\pi R^2$

23. A charge Q is placed at the origin. Electric flux through the first quadrant of the x-y plane is

(1) $\frac{Q}{4\varepsilon_0}$ (2) $\frac{Q}{2\varepsilon_0}$
(3) $\frac{Q}{\varepsilon_0}$ (4) Zero

24. A positive charge Q is placed in front of a conducting solid cube at a distance d from its centre. Magnitude of electric field at the centre of the cube due to charges appearing on its surface is

(1) $\frac{Q}{4\pi\varepsilon_0 d^2}$ (2) $\frac{2Q}{4\pi\varepsilon_0 d^2}$
(3) Zero (4) Indeterminate

25. A positive point charge q is placed in between two negative charges of unit magnitude each along a straight line. The system of these three charges will be in equilibrium if q equals

(1) 1 C (2) 0.5 C
(3) 0.25 C (4) 0.2 C

26. A short electric dipole is placed pointing towards x-axis at origin O. A point P is at a large distance R from O such that OP makes an angle $\frac{\pi}{3}$ with the x-axis. If electric field at P makes an angle β with x-axis, then β is

(1) $\frac{\pi}{3}$ (2) $\frac{\pi}{3} + \tan^{-1}\left(\frac{\sqrt{3}}{2}\right)$
(3) $\tan^{-1}\left(\frac{\sqrt{3}}{2}\right)$ (4) $\frac{3\pi}{2}$

27. In a region uniform electric field $\vec{E}$ exists along +x axis. If work done by electric field in moving a charge 0.2 C through a distance 2 m along a line making 60° with +x axis is 4 joule, then the magnitude of E is

(1) $\sqrt{3}$ N/C (2) 4 N/C
(3) 5 N/C (4) 20 N/C

28. Electric field strength at an internal point of a uniformly charged non-conducting solid sphere of radius R at a distance x(x < R) from the centre is proportional to

(1) x (2) $\frac{1}{x}$
(3) x^2 (4) Independent of x

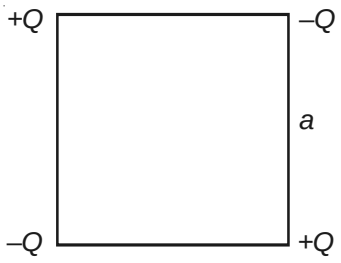
29. A free point charge Q of mass m is kept at the mid-point of two stationary point charges distant 2l and having charge Q each. If the free charge Q is slightly displaced along the line joining stationary charges then the angular frequency of resulting SHM will be

$\left(K = \frac{1}{4\pi\varepsilon_0}\right)$

(1) $\sqrt{\frac{KQ^2}{ml^3}}$ (2) $\sqrt{\frac{KQ^2}{2ml^3}}$

(3) $\sqrt{\frac{KQ^2}{4ml^3}}$ (4) $\sqrt{\frac{4KQ^2}{ml^3}}$

30. Work done by electric field in placing four charges at the corners of the square of side a is $\left(K = \frac{1}{4\pi\varepsilon_0}\right)$



(1) $\frac{\left(4-\sqrt{2}\right)KQ^2}{a}$ (2) $\left(4+\sqrt{2}\right)\frac{KQ^2}{a}$

(3) $\frac{\left(4-\sqrt{2}\right)KQ^2}{\sqrt{2}a}$ (4) $\frac{\left(4+\sqrt{2}\right)KQ^2}{\sqrt{2}a}$

31. A short electric dipole of moment p and moment of inertia I is kept in a uniform electric field E in stable equilibrium position. If the dipole is given a very small angular deflection from stable position, then it

(1) Undergoes circular motion

(2) Undergoes SHM with time period $2\pi\sqrt{\frac{I}{pE}}$

(3) Undergoes SHM with time period $2\pi\sqrt{\frac{pE}{I}}$

(4) Doesn't undergo SHM

32. The electric field in a region is $\vec{E} = (2\hat{i} + 4\hat{j} + 3\hat{k})$ V/m. The electric flux (in Vm) through the surface $x^2 + y^2 = 4$ is

(1) Zero (2) 8π

(3) 12π (4) 16π

33. If two concentric conducting shells have radii r_1 and r_2 ($r_1 > r_2$) and outer shell is given a charge +q, then magnitude of charge that will appear on outer surface of inner shell will be

(1) Zero (2) $-\frac{qr_1}{r_2}$

(3) $-\frac{qr_2}{r_1}$ (4) –q

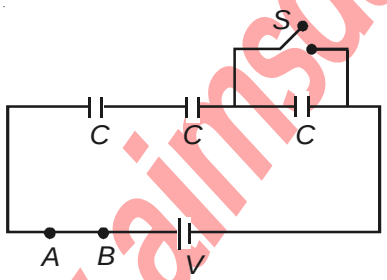
[Chapter-15 : Electrostatics Potential and Capacitance]

1. A charged spherical liquid drop having potential V breaks into 8 identical droplets. The potential at each droplet will be (Assuming charge gets equally divided among droplets)

(1) V (2) $\frac{V}{2}$

(3) $\frac{V}{4}$ (4) $\frac{V}{8}$

2. Initially switch S is open. When it is closed?



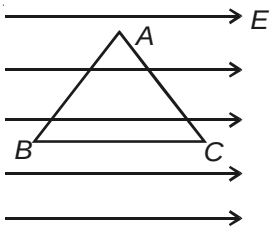
(1) Charge $\frac{CV}{3}$ flows from B to A

(2) There is no flow of charge

(3) Charge $\frac{CV}{6}$ flows from A to B

(4) Charge $\frac{CV}{6}$ flows from B to A

3. ABC is an equilateral triangle and a uniform electric field $\vec{E}$ exists in its plane. A charge q is taken from A to C directly and work done is W_1. Then it is taken from A to C via B and work done is W_2, then



(1) $W_1 = W_2$ (2) $W_1 > W_2$

(3) $W_1 < W_2$ (4) $W_2 = 2W_1$

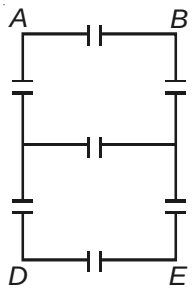
4. In given arrangement each capacitor has capacitance C. The equivalent capacitance between A and D is

(1) C

(2) $\frac{C}{2}$

(3) $\frac{C}{4}$

(4) $\frac{3C}{4}$



5. Two charges +q each are placed at the two vertices of an equilateral triangle. The charge that must be placed at the third vertex to have total energy of configuration zero, will be

(1) $\frac{-q}{2}$ (2) $\frac{+q}{2}$

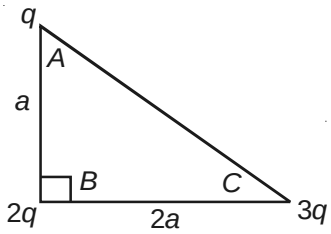
(3) – 2q (4) + 2q

6. A charge q is kept at origin, another identical charge is shifted from (3a, 0) to (a, 0). The work done in doing so, is

(1) $\frac{kq^2}{a}$ (2) $\frac{kq^2}{3a}$

(3) $\frac{2kq^2}{3a}$ (4) Zero

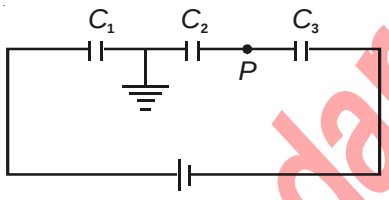
7. In the given arrangement, the energy required to interchange the position of charges at A and C, will be



(1) Zero (2) $\frac{2kq^2}{a}$

(3) $\frac{3kq^2}{a\sqrt{5}}$ (4) $\frac{kq^2}{a\sqrt{5}}$

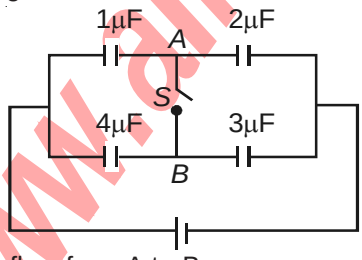
8. In the given circuit, if $C_1 : C_2 : C_3 :: 2 : 3 : 5$, then the potential at P is



(1) 6 V (2) 10 V

(3) – 10 V (4) – 16 V

9. In the given circuit diagram, when switch S is closed the charges



(1) Will flow from A to B

(2) Will flow from B to A

(3) Will not flow

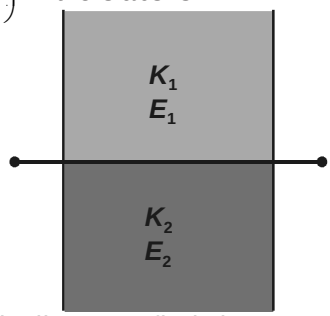
(4) May flow from A to B or B to A, depends on the potential difference of battery

10. Four identical metal plates each of area A are arranged at equal separation d as shown. Equivalent capacitance between A and B will be

(1) $\frac{2A\varepsilon_0}{3d}$ (2) $\frac{A\varepsilon_0}{2d}$

(3) $\frac{3A\varepsilon_0}{2d}$ (4) $\frac{5A\varepsilon_0}{2d}$

11. The space between the plates of a charged parallel plate capacitor is shared by two different slabs of same dimensions as shown in the figure. The ratio of electric field $\left(\frac{E_1}{E_2}\right)$ in the slabs is



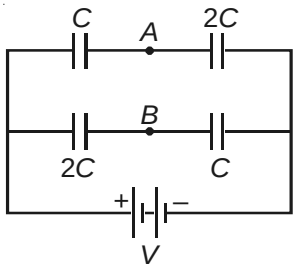
(1) $\frac{K_1}{K_2}$

(2) $\frac{K_2}{K_1}$

(3) 1

(4) $\left(\frac{K_1}{K_2}\right)^2$

12. In the given circuit diagram, find the potential difference between the two points, A and B $(V_A - V_B)$



(1) $-\frac{V}{3}$ (2) $\frac{V}{3}$

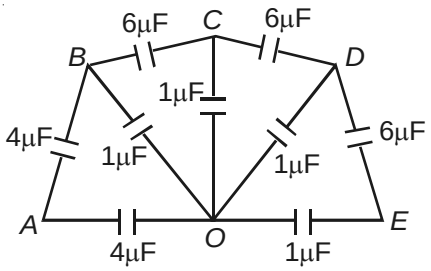
(3) $\frac{V}{9}$ (4) $-\frac{V}{9}$

13. Two identical capacitors are separately charged with batteries of potential difference V_1 and V_2 $(V_1 > V_2)$. Batteries are disconnected and the oppositely charged plates of capacitors are joined together. The common potential will be

(1) $\frac{V_1+V_2}{2}$ (2) $\frac{V_1-V_2}{2}$

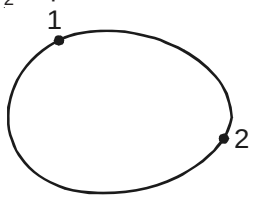
(3) $\frac{V_1}{2}$ (4) $\frac{V_2}{2}$

14. In given circuit, if a battery of potential difference of 12 V is connected across O and E, then the potential difference between O and D will be



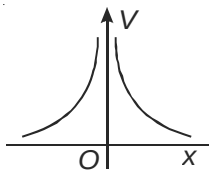
(1) 4 V (2) 8 V
(3) 12 V (4) 2 V

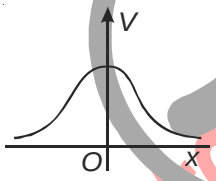
15. An egg shaped conductor shown in the diagram is given some charge. The charge densities σ_1, σ_2 and potentials V_1, V_2 at points '1' and '2' are related as

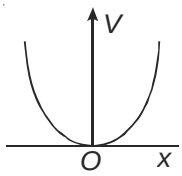


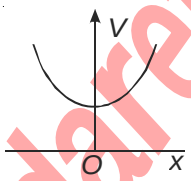
(1) $\sigma_1 = \sigma_2$, $V_1 = V_2$ (2) $\sigma_1 > \sigma_2$, $V_1 > V_2$
(3) $\sigma_1 < \sigma_2$, $V_1 = V_2$ (4) $\sigma_1 < \sigma_2$, $V_1 < V_2$

16. A point charge is kept at origin. The electric potential V on x-axis varies with x-coordinate as

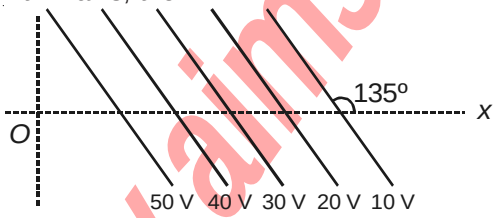
(1) 

(2) 

(3) 

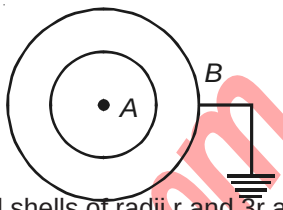
(4) 

17. In the following diagram equipotential surfaces are shown. The direction of the electric makes an angle θ with x-axis, then



(1) θ = 30° (2) θ = 45°
(3) θ = 90° (4) θ = 135°

18. Two concentric shells A and B are shown in the diagram. A is given 20 μC of charge and B is earthed. The charge appearing on B is

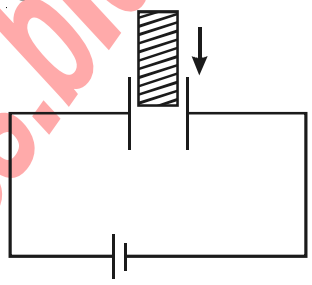


(1) – 10 μC
(2) – 20 μC
(3) 10 μC
(4) Zero

19. Two conducting spherical shells of radii r and 3r are kept at large separation. Both the shells contain equal charges. The electrostatic force between the shells is F. If the two shells are connected by a thin wire, the force between the shells become F', then the ratio $\frac{F'}{F}$ is

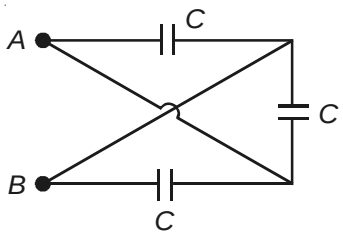
(1) 1 : 1 (2) 1 : 3
(3) 3 : 4 (4) 3 : 1

20. The diagram shows a capacitor connected with a battery. When a dielectric slab is moved inside the space between the plates of the capacitor, which of the following is incorrect?



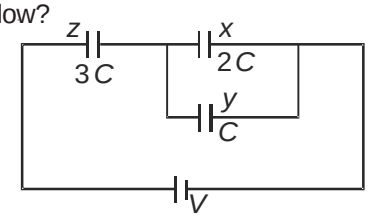
(1) Charge on the capacitor will increase
(2) Capacitance of the capacitor will increase
(3) Energy stored in the capacitor will increase
(4) Potential of the capacitor will increase

21. What is the equivalent capacitance between the points A and B?



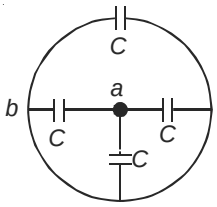
(1) 3 C (2) $\frac{2C}{3}$
(3) $\frac{C}{3}$ (4) C

22. What is the charge on the capacitor y in the network shown below?



(1) $\frac{1}{2}$ CV (2) CV
(3) $\frac{2}{3}$ CV (4) $\frac{3}{2}$ CV

23. The equivalent capacitance between the points a and b is



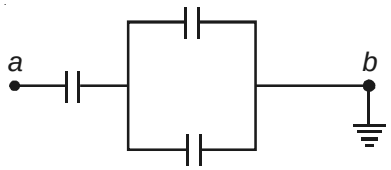
(1) 3 C

(2) $\frac{3C}{4}$

(3) $\frac{4C}{3}$

(4) C

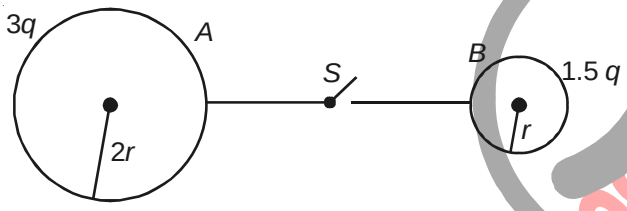
24. Three identical capacitors each with breakdown voltage of 12 V are arranged as shown, the maximum potential of the point 'a' can be



(1) 24 V (2) 18 V

(3) 12 V (4) 36 V

25. The two metallic spherical shells A and B are arranged at very large distance as shown below. When the switch S is closed, the amount of charge that will flow through the switch will be



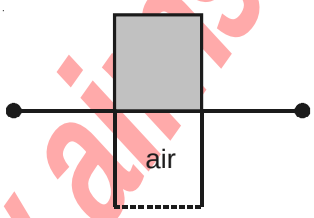
(1) 2 q

(2) 1.5 q

(3) 0.5 q

(4) Zero

26. An air filled capacitor has capacitance C. When a dielectric medium of dielectric constant K is filled in half space between the plates as shown, the capacitance becomes 3C. The value of K is



(1) 2 (2) 3

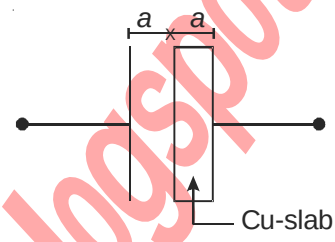
(3) 5 (4) 6

27. The plates of a parallel plate capacitor of capacitance C are circular in shape of radius R each. If a circular hole of radius $\frac{R}{2}$ is made in one plate, then the capacitance of the capacitor will become

(1) $\frac{4}{3}$C (2) C

(3) $\frac{3}{4}$C (4) $\frac{1}{2}$C

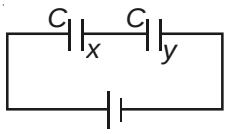
28. The capacitance of a parallel plate capacitor is C when the entire space between the plates has air. If a copper slab is put as shown in figure, which touches one plate, the capacitance becomes C' then the ratio $\frac{C'}{C}$ is



(1) 4 (2) 2

(3) 1 (4) 0.5

29. Two identical parallel plate capacitors are connected across a cell as shown below. If the separation between the plates of capacitor x is increased then charge on the capacitor y will



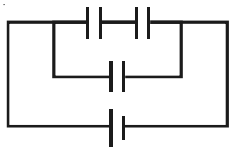
(1) Increase

(2) Decrease

(3) Remain the same

(4) Depend on the emf of the cell

30. The breakdown voltage of each of the capacitors is 24 V. The maximum emf of the battery so that the capacitors remain safe is



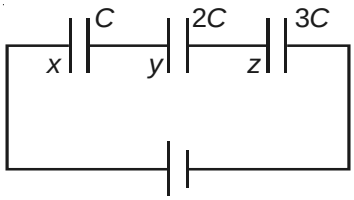
(1) 48 V

(2) 36 V

(3) 24 V

(4) 12 V

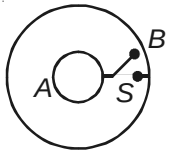
31. What is the ratio of the charge stored on the capacitors x, y and z in the diagram shown below?



(1) 1 : 2 : 3 (2) 3 : 2 : 1

(3) 6 : 3 : 2 (4) 1 : 1 : 1

32. The conducting shells A and B kept concentrically have charge q and 3q as shown. If the switch S is closed, the new values of the charges on A and B respectively will be



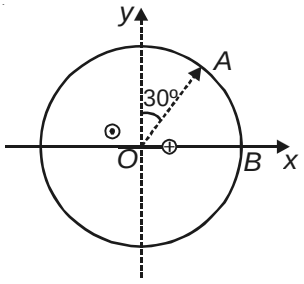
(1) 2q, 2q

(2) 3q, q

(3) 0, 4q

(4) 4q, 0

33. At the centre of a conducting shell short electric dipole is kept as shown. The ratio of potential at point A and B on the shell is



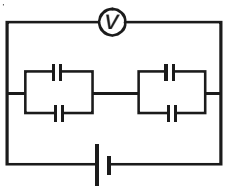
(1) 0.5

(2) 2

(3) $\frac{1}{\sqrt{2}}$

(4) 1

34. Four capacitors each of 100 μF are connected as shown in the following circuit :



A DC voltmeter reads 50 volts. The charge on each plate of the capacitors is

(1) 1.25 mC (2) 2.5 mC

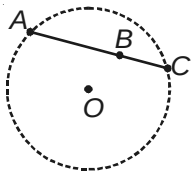
(3) 5.0 mC (4) 7.5 mC

35. A α-particle; proton and electron accelerated through the same potential difference. The ratio of their kinetic energy is

(1) 1 : 1 : 4 (2) 1 : 1836 : 7344

(3) 4 : 1 : 1 (4) 2 : 1 : 1

36. Figure shows a spherical equipotential surface work done by the electric field in moving a charge Q from A to B is W_1 and from B to C is W_2 then



(1) $W_1 > W_2$ (2) $W_1 - W_2 = 0$

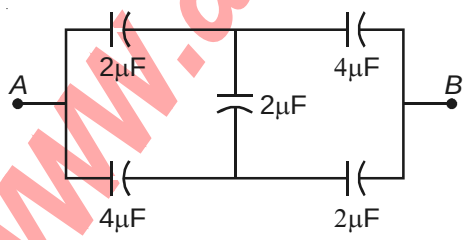
(3) $W_1 < W_2$ (4) $W_1 + W_2 = 0$

37. Charges 2Q, –Q and –Q are kept at the three vertices of an equilateral triangle. If E and V denote the electric field and potential respectively, then at the centroid

(1) E = 0, V = 0 (2) E ≠ 0, V = 0

(3) E = 0, V ≠ 0 (4) E ≠ 0, V ≠ 0

38. In the network shown below, equivalent capacitance between points A and B is



(1) 7 μF (2) 5 μF

(3) $\frac{14}{5}$ μF (4) $\frac{10}{7}$ μF

39. A parallel plate capacitor of capacitance C is charged to potential V after which the battery is disconnected. Now if an additional charge +Q is sprayed on the positive plate of the capacitor then the new potential difference between the capacitor plates will be

(1) V (2) $V + \frac{Q}{2C}$

(3) $V + \frac{Q}{C}$ (4) $\frac{Q}{C}$

40. Two capacitors each having capacitances 4 μF and breakdown voltages 20 V are joined in series. The capacitance and breakdown voltage of the combination are respectively

(1) 2 μF and 25 V (2) 2 μF and 10 V

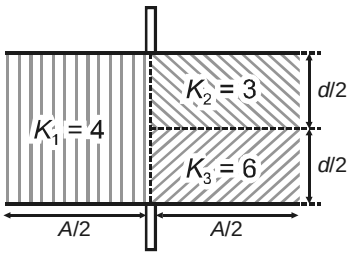
(3) 2 μF and 20 V (4) 2 μF and 40 V

41. A charge +Q is given to the outer conducting sphere of radius R_2 and the inner conducting concentric sphere of radius R_1 ($R_1 < R_2$) is grounded. Charge on the inner sphere will be

(1) –Q (2) $\frac{-QR_2}{R_1}$

(3) $\frac{-QR_1}{R_2}$ (4) Zero

42. A parallel plate air capacitor has capacitance C. Now, it is filled with three dielectrices as shown below



The equivalent capacitance of the new capacitor is

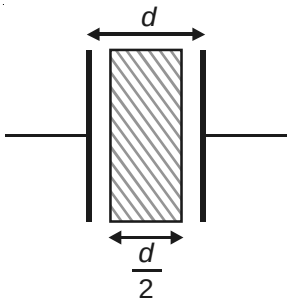
(1) 6C

(2) 4C

(3) $\frac{18C}{11}$

(4) $\frac{36C}{13}$

43. A metal slab of thickness $\frac{d}{2}$ is inserted between the plates of an air parallel plate capacitor of plate area A and plate separation d. Capacitance of the capacitor is



(1) $\frac{\varepsilon_0 A}{d}$ (2) $\frac{2\varepsilon_0 A}{d}$

(3) $\frac{\varepsilon_0 A}{2d}$ (4) Zero

44. Two concentric sphere have radii R_1 and R_2 ($R_1 < R_2$). If inner sphere is grounded then capacitance of the system is

(1) $\frac{4\pi\varepsilon_0 R_1^2}{(R_2 - R_1)}$ (2) $\frac{4\pi\varepsilon_0 R_2^2}{(R_2 - R_1)}$

(3) $\frac{4\pi\varepsilon_0 R_1 R_2}{(R_2 - R_1)}$ (4) $4\pi\varepsilon_0 R_2$

45. A capacitor of capacitance C is completely charged to potential V and then the battery is disconnected. Now this capacitor is joined to another uncharged capacitor of capacitance 2C. New potential difference across the capacitor of capacitance C is

(1) V (2) $\frac{V}{2}$

(3) $\frac{V}{3}$ (4) $\frac{V}{4}$

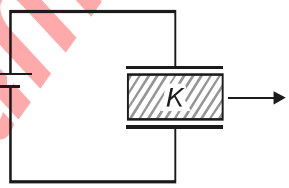
46. After charging completely the capacitor shown, the dielectric slab is pulled out while the battery remains connected. Charge flown through the battery during dielectric pulling is (C - capacitance of the capacitor without dielectric)

(1) CV(K – 1)

(2) CV

(3) CKV

(4) Zero



47. A capacitor of capacity 100 μF is being charged at a constant rate of 10 μC/s. Time taken to charge the capacitor upto 5 V will be (in second)

(1) 50 (2) 100

(3) 150 (4) 200

48. Two capacitors C_1 = 2μF and C_2 = 4μF are connected in parallel to a supply of 12 V and charged completely. Now the battery is removed and a dielectric slab of constant K = 2 is filled completely into the gap between plates of capacitor C_1. New potential drop across the capacitors will be

(1) 9 V (2) 18 V

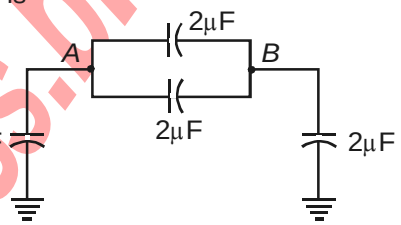
(3) 12 V (4) 24 V

49. Two identical capacitors of capacitance 4μF are charged to potential 20 V and 40 V respectively. After disconnecting from voltage source the two capacitors are joined such that plates of similar polarity are connected together. Decrease in electrostatic energy due to joining is

(1) 200 μJ (2) 400 μJ

(3) 500 μJ (4) 800 μJ

50. Equivalent capacitance of the circuit shown between A and B is



(1) 4 μF (2) 5 μF

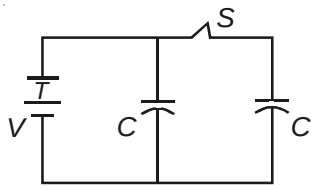
(3) 6 μF (4) $\frac{4}{5}$ μF

51. Identical charges –Q each are placed at 8 corners of a cube of side b. Electrostatic potential energy of a charge +Q placed at the centre of the cube will be

(1) $\frac{-4\sqrt{3}Q^2}{\pi\varepsilon_0 b}$ (2) $\frac{-8\sqrt{3}Q^2}{\pi\varepsilon_0 b}$

(3) $\frac{-4Q^2}{\sqrt{3}\pi\varepsilon_0 b}$ (4) $\frac{-8\sqrt{3}Q^2}{2\pi\varepsilon_0 b}$

52. In the circuit shown below, after charging both the identical capacitor, switch S is opened. Now both the capacitors are filled with a dielectric of constant K = 3. Ratio of total energy of capacitors before and after insertion of the dielectric is



(1) $\frac{2}{5}$ (2) $\frac{5}{2}$

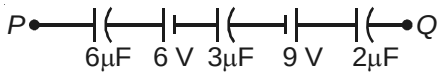
(3) $\frac{3}{5}$ (4) $\frac{5}{3}$

53. Two infinitely large conducting plates charged to $+Q_1$ and $+Q_2$ ($Q_1 > Q_2$) are brought closer to form a parallel plate capacitor of capacitance C. Potential difference between the two plates is

(1) $\frac{Q_1 - Q_2}{2C}$ (2) $\frac{Q_1 - Q_2}{C}$

(3) $\frac{Q_1 - Q_2}{4C}$ (4) $\frac{2(Q_1 - Q_2)}{C}$

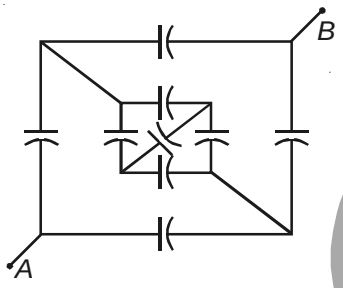
54. In the circuit shown below, electric potential of point P is greater than potential of point Q by 3 volt. Potential difference across the 3μF capacitor is



(1) 1 V (2) 2 V

(3) 3 V (4) 6 V

55. In the circuit shown below, capacitance of each capacitor is C. The effective capacitance between points A and B is



(1) $\frac{C}{2}$ (2) C

(3) 2C (4) 4C

56. A large hollow conducting sphere of radius R has a small opening at the top. Very small liquid drops each of radius r and charged to potential V fall into the sphere one by one. Potential of the sphere becomes V′ after N drops fall into it. If V′ = V then N equals

(1) $\left(\frac{R}{r}\right)^2$ (2) $\left(\frac{R}{r}\right)^3$

(3) $\left(\frac{r}{R}\right)$ (4) $\left(\frac{R}{r}\right)$

57. Choose the correct statement regarding electrostatic field E and potential V of electric dipole

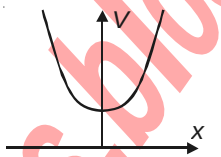
(1) If V = 0 then E must be zero

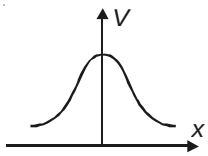
(2) If E = 0 then V must be zero

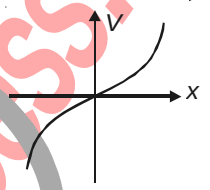
(3) If V = 0 then E must be non-zero

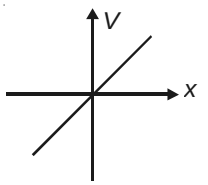
(4) If V = 0 then E must be constant

58. Two identical positive point charges Q are placed on the x-axis at x = –a and x = +a. Variation of electric potential V along the x-axis between x = –a to x = +a is

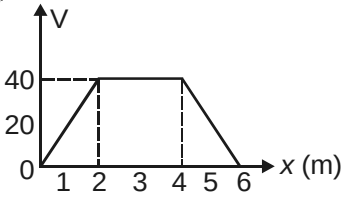
(1) 

(2) 

(3) 

(4) 

59. Variation of electric potential V as a function of position x(in metre) is shown below. The electric field at x = 5 m is



(1) 20 N/C towards +x axis

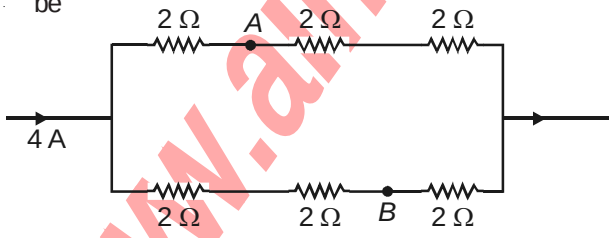
(2) 20 N/C towards –x axis

(3) 10 N/C towards +x axis

(4) 10 N/C towards –x axis

[Chapter-16 : Current Electricity]

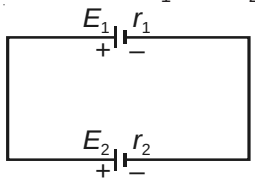
1. A current of 4 A flows in a system of conductors shown in figure. The potential difference $V_A - V_B$ will be



(1) –4 volt (2) 4 volt

(3) –2 volt (4) 2 volt

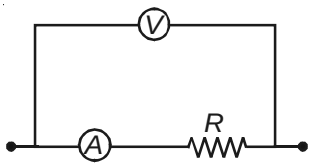
2. In given circuit, $E_2 > E_1$ and $r_1 > r_2$. If V_1 and V_2 are terminal voltages across E_1 and E_2 respectively then



(1) $V_1 = V_2$ (2) $V_1 > V_2$

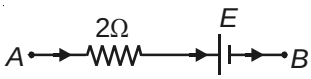
(3) $V_2 > V_1$ (4) $\frac{V_1}{V_2} = \frac{E_1}{E_2}$

3. An ammeter and a voltmeter are connected as shown in the given circuit. If voltmeter reads 12 V and ammeter reads 3 A, value of R should be



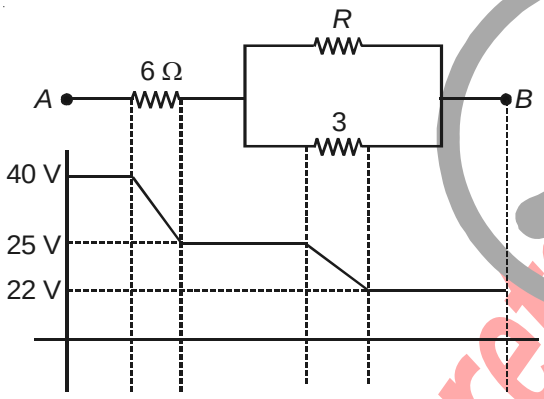
(1) Equal to 4 Ω
(2) Less than 4 Ω
(3) More than 4 Ω
(4) More than or less than 4 Ω depending upon the direction of current

4. The rate of 5 joule/second when a current of 1 ampere passes through it in the indicated direction. If the cell has no internal resistance, its emf (E) is



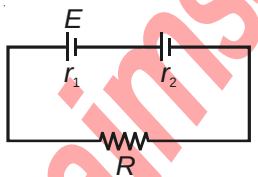
(1) 2 V (2) 3 V
(3) 5 V (4) $\sqrt{10}$ V

5. For the given circuit, potential variation is shown in the graph. The value of R is



(1) 1 Ω (2) 2 Ω
(3) 3 Ω (4) 6 Ω

6. In the given circuit, one cell has emf E as shown. If terminal voltage across both the cells are equal, the emf of other cell is

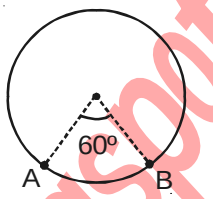


(1) $\frac{Er_1}{r_2}$ (2) $\frac{E(R+2r_2)}{(R+2r_1)}$
(3) $\frac{E(R+2r_1)}{(R+2r_2)}$ (4) $\frac{E(R+2r_1)}{(R+r_2)}$

7. A cell of e.m.f. E is connected across a resistance r. The potential difference between the terminals of the cell is found to be V. The internal resistance of the cell must be

(1) $\frac{2(E-V)V}{r}$ (2) $\frac{(E-V)r}{V}$
(3) $\frac{2(E-V)r}{E}$ (4) (E – V)r

8. A uniform wire of resistance R is looped as circle as shown. The equivalent resistance between A and B will be



(1) R (2) $\frac{R}{2}$
(3) $\frac{3R}{16}$ (4) $\frac{5R}{36}$

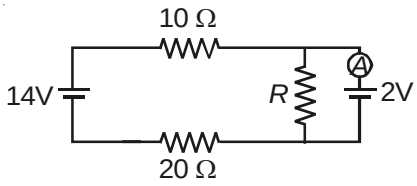
9. A current flows in a wire of circular cross-section with the free electrons travelling with a drift velocity v. If an equal current flows in a wire of the same material but of twice the radius, the new mean drift speed is

(1) $\frac{v}{4}$ (2) 4v
(3) v (4) 2v

10. In Joule's heating, if potential difference across a conductor having fixed dimension and a material of specific resistance ρ, remains constant then heat produced in the conductor is directly proportional to

(1) ρ^2 (2) ρ
(3) $\frac{1}{\sqrt{\rho}}$ (4) $\frac{1}{\rho}$

11. In the given circuit if ideal ammeter reads zero, potential difference across 10 Ω wire will be

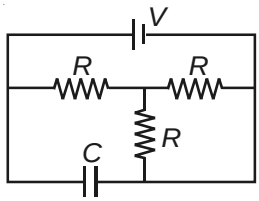


(1) 2 V (2) 4 V
(3) 8 V (4) 10 V

12. If two bulbs of wattage 40 W and 60 W respectively each rated at 110 V are connected in series with the supply of 220 V, which bulb will fuse?

(1) 40 W bulb (2) 60 W bulb
(3) Both the bulbs (4) No bulb will fuse

13. The charge on the capacitor at steady state, in given circuit will be



(1) CV (2) $\frac{CV}{3}$

(3) $\frac{2CV}{3}$ (4) $\frac{CV}{2}$

14. The emf e of a Cu–Fe thermocouple varies with the temperature θ of the hot junction (Cold junction at 0°C) as

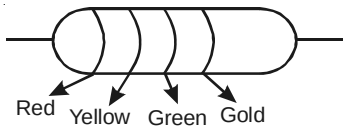
$$e(\mu V) = 14(\mu V/°C)\theta - 0.02\left(\mu V/°C^2\right)\theta^2$$

The neutral temperature is

(1) 175°C (2) 350°C

(3) 700°C (4) 87.5°C

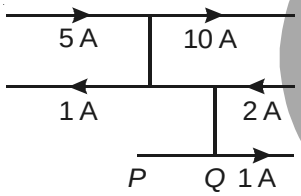
15. A carbon resistor has coloured rings as shown in figure. What is its resistance?



(1) $24 \times 10^5\ \Omega \pm 5\%$ (2) $35 \times 10^6\ \Omega \pm 5\%$

(3) $13 \times 10^4\ \Omega \pm 10\%$ (4) $36 \times 10^5\ \Omega \pm 10\%$

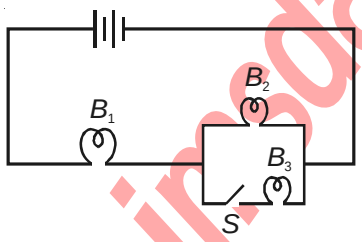
16. In the situation shown in figure, the current in arm PQ is



(1) 5 A from P to Q (2) 3 A from Q to P

(3) 5 A from Q to P (4) 3 A from P to Q

17. In the situation shown, B_1, B_2 and B_3 are identical bulbs. Which of the following change in their brightness will be noticed when switch S is closed?



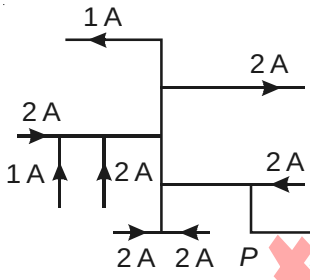
(1) B_1 remains the same, B_2 decreases

(2) B_1 increases, B_2 decreases

(3) B_1 decreases, B_2 increases

(4) B_1 decreases, B_2 decreases

18. What are the magnitude and direction of current i in the arm PQ of the portion of circuit shown below?



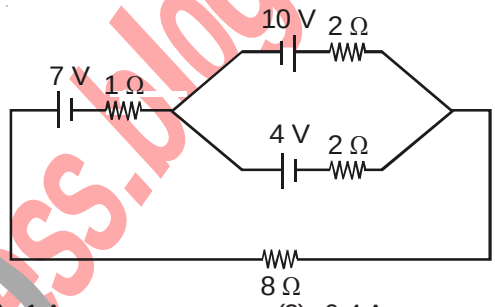
(1) 4 A (P to Q)

(2) 8 A (P to Q)

(3) 2 A (Q to P)

(4) 4 A (Q to P)

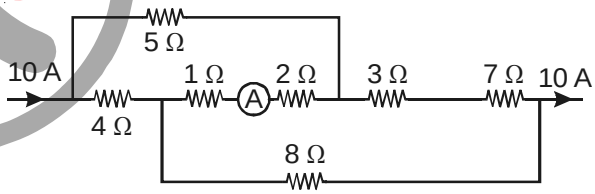
19. In the situation shown, find the current through 8 Ω resistance



(1) 1 A (2) 0.4 A

(3) 1.3 A (4) 0.3 A

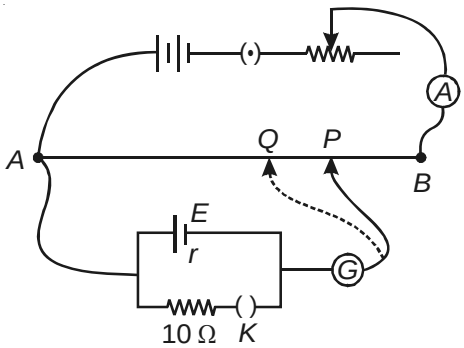
20. In the given circuit, the reading of the ammeter (resistance of ammeter = 0.01 Ω) is



(1) 10 A (2) 0.1 A

(3) Zero (4) Nearly 0.6 A

21. In the potentiometer experiment shown below, AB is potentiometer wire. When key K is closed, null point is obtained at Q (AQ = 100 cm) but when K is open, null point shifts to P (QP = 20 cm). The internal resistance r of the cell of emf E is

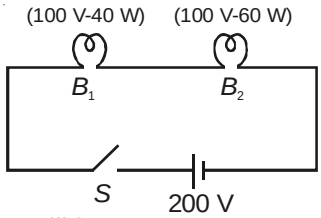


(1) 1.2 Ω (2) 2.0 Ω

(3) 0.6 Ω (4) 2.5 Ω

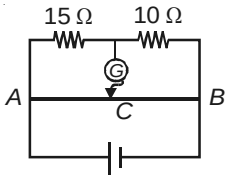
22. The potential difference across a circuit element is 50 V and the steady current through it is 5 A. Then the rate of
(1) Heat production in it may be less than or equal to 250 W
(2) Heat production in it may be greater than or equal to 250 W
(3) Power consumption in it must be 250 W
(4) Heat production must be less than 250 W

23. In the circuit shown, when switch S is closed, then



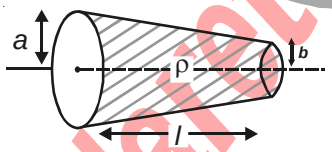
(1) Bulb B_1 will fuse
(2) Bulb B_2 will fuse
(3) Both B_1 and B_2 will fuse
(4) Neither B_1 nor B_2 will fuse

24. Wheatstone bridge AB is 100 cm long. What should be the length AC for which deflection in galvanometer is zero?



(1) 40 cm (2) 50 cm
(3) 60 cm (4) 70 cm

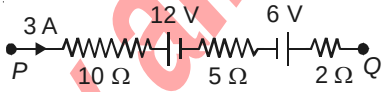
25. A conductor is in the shape of cylinder of non-uniform cross-section area. If constant current is flowing through it, then drift speed along the length



(1) Increase
(2) Decrease
(3) First increase then decrease
(4) Remain same

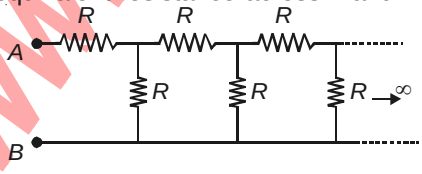
26. If length of conductor increases by x% by stretching then resistance increases by (x is small)
(1) 2x % (2) x %
(3) 4x % (4) 1.5x %

27. The potential difference across P & Q terminals of the circuit in volt is



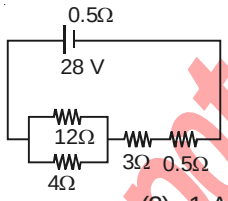
(1) 57 (2) 67
(3) 75 (4) 76

28. The equivalent resistance across A and B terminal is



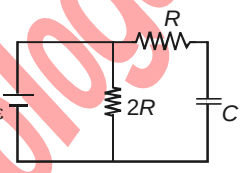
(1) $\left(\frac{\sqrt{3}+1}{2}\right)R$ (2) $\left(\frac{\sqrt{3}-1}{2}\right)R$
(3) $\left(\frac{\sqrt{5}+1}{2}\right)R$ (4) $\left(\frac{\sqrt{5}-1}{2}\right)R$

29. The current in 12 Ω resistance is



(1) 4 A (2) 1 A
(3) 3 A (4) 2 A

30. The time constant in the given circuit is

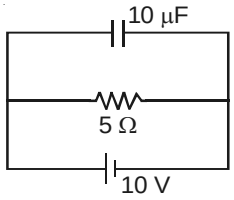


(1) $\tau = RC$ (2) $\tau = 2RC$
(3) $\tau = 3RC$ (4) $\tau = \frac{3RC}{2}$

31. Two electric bulbs have tungsten filaments of same length. One of them 60 watt and other 100 watt. Then
(1) 100 watt bulb has thicker filament
(2) 60 watt bulb has thicker filament
(3) Both filaments are of same thickness
(4) Both filament are of same resistance

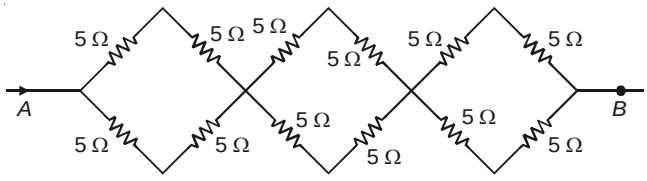
32. A wire has resistance of 12 Ω. If is bent in the form of an equilateral triangle, the effective resistance between any two corner's of the triangle is
(1) $\frac{9}{4}$ Ω (2) 12 Ω
(3) 6 Ω (4) $\frac{8}{3}$ Ω

33. If the internal resistance of the cell shown in the following diagram is 5 Ω, then charge stored on the capacitor will be



(1) 100 μC
(2) 50 μC
(3) 25 μC
(4) 12.5 μC

34. In the network of resistor shown in the figure, the equivalent resistance between A & B



(1) 15 Ω (2) 30 Ω
(3) 45 Ω (4) 60 Ω

CHEMISTRY

[Chapter-14 : Solid State]

1. In normal spinel structure there is closed packed array of O^{--} ions. The trivalent cations are present in

   (1) 75% of octahedral voids

   (2) 50% of octahedral voids

   (3) 12.5% of tetrahedral voids

   (4) 25% of octahedral voids

2. A crystalline compound AB adopts sodium chloride type structure with edge length of the unit cell as 745 pm and formula mass 74.5 g. The density of the crystalline compound is nearly

   (1) 0.16 g cm^{-3} (2) 12.0 g cm^{-3}

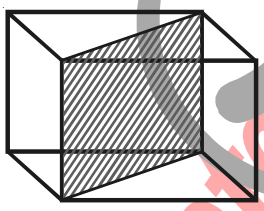
   (3) 19.9 g cm^{-3} (4) 1.20 g cm^{-3}

3. The ionic radii of K^+ and Cl^- ions are 133 and 136 pm respectively. The distance between K^+ and Cl^- in KCl is

   (1) 269 pm (2) 13.5 pm

   (3) 136 pm (4) 300 pm

4. How many such diagonals can be present in a cubic unit cell?

   (1) 2

   (2) 4

   (3) 8

   (4) 6

5. Atoms of element x form hcp lattice and those of element y occupy two third of tetrahedral voids and one thrid of octahedral voids. The formula of the compound formed by the elements x and y will be

   (1) xy (2) x_3y_4

   (3) x_2y_3 (4) x_3y_5

6. Ionic solid having molecular formula XY_2O_4, oxide ions forms C.C.P X atoms are present in octahedral void whereas Y atoms are equally distributed between octahedral and tetrahedral voids, percentage of tetrahedral voids left are

   (1) 25% (2) 87.5%

   (3) 75% (4) 12.5%

7. A solid is made up of 3 type of atoms of X, Y and Z. X atoms occupies alternate corner of the cube, Y atoms occupies alternate face centre of the cube, Z atoms occupies alternate edge centre of the cube. The formula of the compound is

   (1) $X\ Y_3\ Z_6$ (2) $X\ Y_2\ Z_2$

   (3) $X\ Y_3\ Z_3$ (4) X Y Z

8. In a solid compound x atoms are present at the corner y atoms are present at the body centre. Coordination number of x and y are respectively

   (1) 8, 8 (2) 8, 6

   (3) 6, 8 (4) 6, 6

9. What is true about the f.c.c. unit cell?

   (1) Each corner atom is surrounded by 12 face centre atom

   (2) Each face centre atoms is surrounded by four corner atom, 4 face centre atom above the plane and four face centre atom below the plane

   (3) Distance between next nearest neighbour is "a"

   (4) All of these

10. An ionic solid MCl is dopped with 10^{-3}mol of MCl_2, then the number of cationic vacancies per mole is

    (1) 10^{-3} (2) 2×10^{-3}

    (3) 6.022×10^{20} (4) $2 \times 6.02 \times 10^{20}$

11. Solid MX have rock salt structure if its molecular mass is "a" then the number of unit cell in 1 g of it is [N – Avogadro's number]

    (1) $\frac{N}{a}$ (2) $\frac{4 \times N}{a}$

    (3) $\frac{N}{4}$ (4) $\frac{N}{4 \times a}$

12. What is true about the semiconductor?

    (1) They behaves like a insulator in pure state

    (2) Conductivity of semiconductor can be increase by increasing temperature

    (3) In semiconductor the gap between valency bond and conduction bond is finite

    (4) All of these

13. FeO have rock salt structure if all the atoms along one of the body diagonal plane are removed then the number of Fe^{+2} and O^{-2} ions per unit cell are respectively

    (1) 1, 1 (2) $\frac{5}{2}, \frac{5}{2}$

    (3) 4, 4 (4) $\frac{4}{3}, \frac{3}{2}$

14. Frenkel defect in crystal is observed when

    (1) An ion leaves its normal site and occupies an interstitial site

    (2) Unequal number of cations and anions are missing from the lattice

    (3) Density of the crystal is increased

    (4) Equal number of cations and anions are missing from the lattice

15. In an ionic solid X atoms are present at the corner and face centre Y atoms are present at the edge centre and body centre. The formula of compound is
(1) XY_4 (2) X_2Y
(3) X_3Y_4 (4) XY

16. Pure Ge is doped with Al. Which type of semiconductor will form?
(1) n-type (2) p-type
(3) n, p-type (4) Intrinsic

17. Which of the following is an example of spinel structure?
(1) CsCl (2) $MgAl_2O_4$
(3) Fe_3O_4 (4) Fe_2O_3

18. In a compound AB, ionic radii of A^+ and B^- are 88 pm and 200 pm respectively then coordination number of A^+ will be?
(1) 4 (2) 8
(3) 6 (4) 12

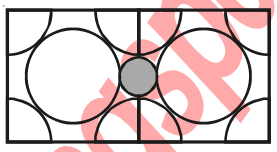
19. Which of the following is an example of antifluorite structure?
(1) Na_2O (2) CaF_2
(3) H_2O (4) Fe_2O_3

20. Co-ordination number of Na^+ and O^{--} ion in Na_2O are respectively
(1) 4, 8 (2) 8, 4
(3) 6, 6 (4) 8, 12

21. No of effective atom in H.C.P. unit cell is
(1) 4 (2) 6
(3) 8 (4) 12

22. Which of the following is/are example of two dimensional lattice?
(1) Square (2) Rectangle
(3) Rhombus (4) All of these

23. As shown in the diagram a metal M crystallizes in a f.c.c. manner if the edge length is 4 Å then the radii of the atom that could just fit into the voids is



(1) 4 Å (2) 2 Å
(3) 0.586 Å (4) 1.172 Å

24. In a crystal $a = b \neq c$, $\alpha = \beta = 90°$, $\gamma = 120°$. It is
(1) Cubic (2) Monoclinic
(3) Tetragonal (4) Hexagonal

25. Most unsymmetrical crystal system is
(1) Hexagonal (2) Triclinic
(3) Cubic (4) Orthorhombic

26. Co-ordination number Mg^{2+}, Al^{3+} in mineral spinel ($MgAl_2O_4$) are respectively
(1) 3 and 4 (2) 4 and 3
(3) 4 and 6 (4) 6 and 4

[Chapter-15 : Solution]

1. When solid HgI_2 is added to aqueous solution of KI then
(1) Vapour pressure is raised
(2) Vapour pressure is lowered
(3) Osmotic pressure increased
(4) Boiling point is raised

2. An aqueous solution of certain non-volatile non-electrolyte solute (molar mass = 150 g mol^{-1}) boils at 373.26 K (K_b for H_2O = 0.52) at 1 atm pressure. The mass % of solution is
(1) 7.5% (2) 14%
(3) 25% (4) 20%

3. Henry law constants for four gases are given below at 293 K. Which is more soluble in water at that temperature?
(1) A (K_H = 34.86 K bar)
(2) B (K_H = 69.16 K bar)
(3) C (K_H = 144.97 K bar)
(4) D (K_H = 88.84 K bar)

4. At 300 K, the two solutions of glucose A and B with respective concentration of 0.01 M and 0.001 M are separated by semipermeable membrane. How much external pressure need to be applied and on which solution so as to prevent osmosis?
(1) 0.2463 atm pressure is applied on solution B
(2) 0.2214 atm pressure is applied on solution A
(3) 0.0246 atm pressure is applied on solution B
(4) 0.0217 atm pressure is applied on solution A

5. Mole fraction of the component A in vapour phase is x_1 and mol fraction of component A in liquid mixture is x_2. (If P_A° = vapour pressure of pure A; P_B° = vapour pressure of pure B), then total vapour pressure of the liquid mixture is
(1) $\frac{P_A^\circ x_2}{x_1}$ (2) $\frac{P_A^\circ x_1}{x_2}$
(3) $\frac{P_B^\circ x_1}{x_2}$ (4) $\frac{P_B^\circ x_2}{x_1}$

6. The mole fraction of solute in 2.5 m aqueous solution is
(1) 0.043 (2) 0.43
(3) 55.5 (4) 0.55

7. Water and perchloric acid (boiling point 383 K) form constant boiling mixture at 71.6% of perchloric acid. The boiling point of the solution is
(1) > 373 K but < 383 K (2) = 373 K
(3) > 383 K (4) < 737 K

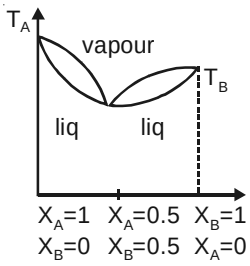
8. The values of observed and theoretical molecular masses of certain electrolyte XY are 65.4 and 114.45 respectively. The electrolyte XY in the solution is dissociated to the extent of
(1) 75% (2) 80%
(3) 50% (4) 90%

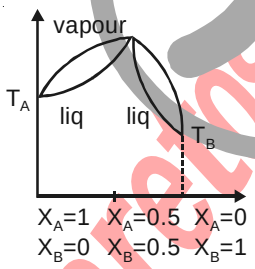
9. K_f for dioxane is 4.9, the depression in freezing point of 0.001 m solution of a solute x in dioxane is
(1) 0.49°C (2) 4.9°C
(3) 4.9×10^{-2}°C (4) 0.0049°C

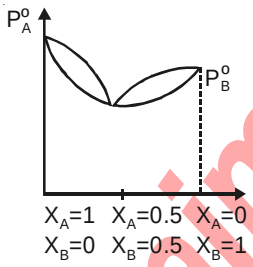
10. 25 g of ethylene glycol is added in the 100 g of H_2O. How much ice will separate if solution is cooled to –10°C (k_f = 1.86)?
(1) 25 (2) 50
(3) 75 (4) 17

11. Which will form maximum boiling azeotrope?
(1) Benzene + Toluene (2) Hexane + Heptane
(3) $H_2O + H_2SO_4$ (4) $H_2O + C_2H_5OH$

12. Which curve represents minimum boiling azeotrope?

(1)


(2)


(3)


(4) Both (1) & (3)

13. Which solids will have maximum boiling points?
(1) Atomic solid (2) Covalent solid
(3) Molecular solid (4) Metallic solid

14. Which of the following is independent from the temperature?
(1) Molality
(2) Normality
(3) Percentage by $\frac{\text{Weight}}{\text{Volume}}$
(4) Molarity

15. Which of the following is colligative property?
(1) Osmotic pressure (2) Boiling point
(3) Freezing point (4) All of these

16. Which of the following is correct statement about azeotropic solutions?
(1) Neither of the component can be purified by fractional distillation
(2) Only one component can be purified
(3) Both the component can be purified above their boiling point
(4) Both the component can be purified below their boiling point

17. Which of the following will show negative deviation from Raoults law?
(1) Hexane + Heptane (2) $H_2O + H_2SO_4$
(3) $H_2O + C_2H_5OH$ (4) $H_2O + CH_3OH$

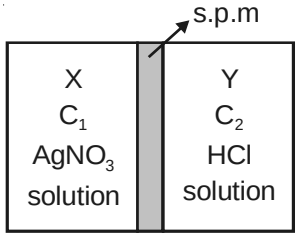
18. Van't Hoff factor i, for 0.5 M $AlCl_3$ solution if it is 40% dissociate
(1) 0.40 (2) 1.20
(3) 2.2 (4) 4

19. Phenol associates in toluene forms dimer. To what degree phenol associates if its Van't hoff factor is 0.54?
(1) 0.92 (2) 0.52
(3) 0.54 (4) 0.46

20. Which of the following aqueous solution has highest freezing point?
(1) 0.01 M Na_2SO_4 (2) 0.1 M K_2SO_4
(3) 0.25 M $FeCl_3$ (4) 0.2 M Na_3PO_4

21. 1.23 g of $Ca(NO_3)_2$ is added in 10 g of water, if elevation in boiling point is 0.975 C. Its percent ionisation will be (K_b = 0.512)
(1) 25% (2) 50%
(3) 77% (4) 33.33%

22. As shown in the diagram if $C_1 < C_2$ then white ppt of AgCl will form in



(1) X compartment (2) Y compartment
(3) Both (1) & (2) (4) No ppt. will be formed

23. 12.2 g of benzoic Acid in 100 g Benzene has ΔT_f, 2.60 if it forms dimer in the solution then its degree of association will be $k_f = 5.12$

(1) 1 (2) 0.5

(3) 0.25 (4) 0.4

24. A solution contains 58.5 g NaCl in 54 g of H_2O if relative lowering in V.P. is 0.4 then % ionisation of NaCl is

(1) 40% (2) 50%

(3) 60% (4) 100%

25. An aq V solution contains two salts MX and MX_2 if MX is 80% ionised and MX_2 is 50% ionised then Van't Hoff factor of solution will be

(1) 1.3 (2) 3.3

(3) 3.8 (4) 5.0

26. On mixing 20 ml of acetone with 20 ml of chloroform the total volume of solution is

(1) < 40 ml (2) > 40 ml

(3) = 40 ml (4) Unpredictable

27. Which of the following aqueous solutions has highest freezing point?

(1) 0.1 M KCl (2) 0.1 M $BaCl_2$

(3) 0.1 M $AlCl_3$ (4) 0.1 M Na_2SO_4

28. Two substance A and B forming ideal solutions have $P_A^\circ : P_B^\circ = 1 : 2$ and mole fractions in liquid phase as $X_A : X_B = 1 : 2$, then mole fraction of 'A' in vapour phase will be

(1) 0.33 (2) 0.25

(3) 0.52 (4) 0.2

29. Which of the following is not a characteristic of interstitial compounds?

(1) They have high melting point higher than those of pure metals

(2) They are very hard

(3) They retain metallic conductivity

(4) They are chemically active

30. A solution of W gram of urea in 500 g water is cooled to –0.5°C. The amount of ice separated is 128 g. Then value of ω will be ($K_{f(H_2O)} = 1.86$)

(1) 8 g (2) 6 g

(3) 5 g (4) 3 g

[Chapter-16 : Electrochemistry]

1. A current of 9.65 A is passed for 3 hours between nickel electrodes in 0.5 L of a 2 M solution of $Ni(NO_3)_2$. The molarity of the solution after electrolysis would be (atomic mass of Ni = 58)

(1) 0.46 M (2) 0.625 M

(3) 0.92 M (4) 1.25 M

2. Equivalent conductance of $BaCl_2$, H_2SO_4 and HCl are x_1, x_2 and x_3 S cm^2 $equiv^{-1}$ at infinite dilution. If specific conductance of saturated $BaSO_4$ solution is y S cm^{-1}, then K_{sp} of $BaSO_4$ is

(1) $\frac{10^3 y}{2(x_1 + x_2 - 2x_3)}$ (2) $\frac{10^6 y^3}{(x_1 + x_2 - 2x_3)^2}$

(3) $\frac{10^6 y^2}{(2x_1 + 2x_2 - 2x_3)^2}$ (4) $\frac{x_1 + x_2 - 2x_3}{10^6 y^2}$

3. Given standard electrode potentials

$Fe^{2+} + 2e^- \rightarrow Fe$; $E^o = -0.44$ V

$Fe^{3+} + 3e^- \rightarrow Fe$; $E^o = -0.036$ V

The standard electrode potential (E^o) for

$Fe^{3+} + e^- \rightarrow Fe^{2+}$ is

(1) – 0.476 V (2) – 0.404 V

(3) 0.404 V (4) + 0.772 V

4. Given: $E^o_{Fe^{+2}/Fe}$ = a volt, $E^o_{Fe^{+3}/Fe}$ = b volt

What is the value of $E^o_{Fe^{+3}/Fe^{+2}}$?

(1) b – a (2) b + a

(3) 2a + 3b (4) 3b – 2a

5. If hydrogen electrodes dipped in two solution of pH = 3 and pH = 6 are connected by a salt bridge, the e.m.f of the resulting cell is

(1) 0.177 V (2) 0.3 V

(3) 0.052 V (4) 0.104 V

6. A molten solution contains Fe^{2+}, Ag^+, Bi^{3+} and Pb^{2+} ions in same concentration. The value of redox potential are-Ag^+/Ag = 0.8 V, Fe^{2+}/Fe = –0.44 V, Bi^{3+}/Bi = +0.21, Pb^{2+}/Pb = –0.13 V. If sufficient voltage is applied to deposit metal then sequence of deposition will be

(1) Ag, Bi, Pb, Fe (2) Fe, Pb, Bi, Ag

(3) Bi, Pb, Ag, Fe (4) Pb, Ag, Bi, Fe

7. Given electrode potential are

$Fe^{3+} + e \rightarrow Fe^{2+}$; $E^\circ = 0.771$ V, $I_2 + 2e \rightarrow 2I^-$; $E^\circ = 0.536$ V, E^o_{cell} for the cell reaction

$2Fe^{3+} + 2I^- \rightarrow 2Fe^{2+} + I_2$ is

(1) $2 \times 0.771 - 0.536 = 1.006$ V

(2) $0.771 - 0.5 \times 0.536 = 0.503$ V

(3) $0.771 - 0.536 = 0.235$ V

(4) $0.536 - 0.771 = -0.235$ V

8. A student made the following observation in the lab
   a. Clean copper metal did not react with molar $Pb(NO_3)_2$ solution
   b. Clean lead metal dissolved in a 1 molar $AgNO_3$ solution and crystals of Ag metal appeared
   c. Clean silver metal did not react with 1 molar $Cu(NO_3)_2$ solution.

   The order of decreasing reducing character of the three metals is
   (1) Cu, Pb, Ag (2) Cu, Ag, Pb
   (3) Pb, Cu, Ag (4) Pb, Ag, Cu

9. Following are some facts about electrolytic conduction
   I. Λ_m decreases with dilution due to increase in interionic attraction between ions
   II. For weak electrolytes, there is rapid increase in degree of ionisation with dilution hence interionic attraction decreases and Λ_m increases rapidly
   III. Λ_m^∞ of KCl can be obtained by extra polation to $\sqrt{C} = 0$. Then the correct statements are
   (1) I, II, III (2) I, III
   (3) III (4) II, III

10. $Al^{3+} + 3e^- \rightarrow Al(s)$; $E^o = -1.66$ V
    $Cu^{2+} + 2e^- \rightarrow Cu(s)$; $E^o = +0.34$ V
    What voltage is produced under standard conditions to give a spontaneous reactions by combination of these two half cells?
    (1) 1.32 V (2) – 1.32 V
    (3) 2.00 V (4) – 2.00 V

11. $pt\,|H_2\ (P_1\ atm)|H^+(C_1)\|H^+(C_2)|H_2(P_2\ atm)|\,pt$
    The cell reaction is always spontaneous if
    (1) $P_1 > P_2$ & $C_1 > C_2$ (2) $P_1 < P_2$ & $C_1 > C_2$
    (3) $P_1 > P_2$ & $C_2 > C_1$ (4) $P_1 < P_2$ & $C_2 > C_1$

12. Two galvanic cells were set up, one with 2M $ZnSO_4$ and 2M $CuSO_4$, the other with 4M $ZnSO_4$ and 4M $CuSO_4$. The emf's are E_1 and E_2 respectively. Then
    (1) $E_1 = 2E_2$ (2) $E_2 = 2E_1$
    (3) $E_2 = 4E_1$ (4) $E_1 = E_2$

13. If the standard electrode potential of Cu^{2+}/Cu electrode is 0.34 V, what is the electrode potential of 0.1 M concentration of Cu^{2+}?
    (1) 3.99 V (2) 0.3105 V
    (3) 0.222 V (4) 0.176 V

14. Specific conductance of 0.1 M nitric acid is 3.6×10^{-2} $ohm^{-1}cm^{-1}$. The molar conductance of the solution is
    (1) 360 ohm^{-1} cm^2 (2) 630 ohm^{-1} cm^2
    (3) 100 ohm^{-1} cm^2 (4) 3600 ohm^{-1} cm^2

15. The resistance of 0.1 N solution of a salt is found to be 1.5×10^3 ohms. The equivalent conductance of the solution is (cell constant = 1.10 cm^{-1})
    (1) 4.6 (2) 5.6
    (3) 7.3 (4) 6.6

16. A current of strength 1.5 amp was passed through $CuSO_4$ solution for 3 minutes 21 seconds. The amount of copper deposited is [At. wt. of Cu=63.5]
    (1) 0.3175 g (2) 0.0635 g
    (3) 0.099 g (4) 6.35 g

17. A certain current liberates 1.0 g of hydrogen in 4 hrs. The amount of copper deposited from a solution of copper sulphate by the same current flowing for the same time would be nearly [At. wt. of Cu = 63.5]
    (1) 63.6 g (2) 127.2 g
    (3) 31.75 g (4) 12.72 g

18. From the solution of an electrolyte, two mole of electron will deposit at cathode
    (1) 31.75 g of Cu (2) 12 g of Mg
    (3) 23 g of Na (4) 18 g of Al

19. A current of 9.65 ampere flowing for 10 minutes deposits 3.0 g of the metal which is trivalent. The atomic mass of the metal is
    (1) 30 (2) 150
    (3) 90 (4) 289.5

20. On electrolysis, which of the following doesn't give out oxygen?
    (1) Acidic water using Pt-electrodes
    (2) Fused KOH using Pt-electrodes
    (3) Dilute H_2SO_4 using Pt-electrolytes
    (4) Dilute H_2SO_4 using Cu-electrodes

21. Iron can be protected by coating with zinc or tin. If coating is broken
    (1) Iron will corrode faster if coated with zinc
    (2) Iron will corrode faster if coated with tin
    (3) Iron will corrode faster in both cases
    (4) Iron will not undergo any corrosion in both cases

22. The given concentration cell
    $Pt\,|Cl_2\,|Cl^-_{C_1}\,\|\,Cl^-_{C_2}\,|Cl_2\,|Pt$
    The cell is spontaneous when
    (1) $C_2 > C_1$ (2) $C_1 = C_2$
    (3) $C_1 > C_2$ (4) Data insufficient

23. The number of faradays needed to reduce 8 g-equivalent of Zn^{2+} to Zn metal will be
    (1) 2 (2) 4
    (3) 1 (4) 8

24. In which one of the following, one Faraday of electricity will liberate $\frac{1}{2}$ g-atom of the metal?
    (1) $CrCl_3$ (2) $CoCl_3$
    (3) $ZnSO_4$ (4) NaCl

25. If three faradays of electricity is passed through the solutions of $AgNO_3$, $ZnSO_4$ and $CrCl_3$, the molar ratio of the cations deposited at the cathodes will be

(1) 1 : 1 : 1 (2) 1 : 2 : 3

(3) 3 : 2 : 1 (4) 6 : 3 : 2

26. At what pH of HCl solution will hydrogen gas electrode show electrode potential of –0.118 V?

(1) 2 (2) 1

(3) 3 (4) 4

27. The maximum possible electrical work that can be obtained from the following cell under the standard conditions at 25ºC, Zn | Zn^{2+} (aq) || Ni^{2+} (aq) | Ni will be [given, $E^{o}_{Zn^{2+}/Zn} = -0.76$ V, $E^{o}_{Ni^{2+}/Ni} = -0.25$ V]

(1) 98.43 kJ (2) 27.92 kJ

(3) 81.45 kJ (4) 96.5 kJ

28. The molar conductivity of acetic acid solution at infinite dilution is 390.7 $ohm^{-1}\ cm^2\ mol^{-1}$. What will be the molar conductivity of 0.01 M acetic acid solution? (given that the dissociation constant of acetic acid is 1.8×10^{-5})

(1) 6.17 $ohm^{-1}\ cm^2$ (2) 16.57 $ohm^{-1}\ cm^2$

(3) 20.33 $ohm^{-1}\ cm^2$ (4) 39.07 $ohm^{-1}\ cm^2$

29. The electrical resistance of a column of 0.05 M NaOH solution of diameter 1 cm and length 50 cm is 5.55×10^3 ohm. Its resistivity will be

(1) 0.01148 S cm^{-1} (2) 87.135 ohm × cm

(3) 229.6 S $cm^2\ mol^{-1}$ (4) 0.0018 ohm × cm

30. How many grams of chlorine can be produced by the electrolysis of molten NaCl with a current of 1.00 A for 15 min?

(1) 0.331 g (2) 0.662 g

(3) 0.151 g (4) 0.355 g

31. In electrochemical reaction

$$2Fe^{+3} + Zn \rightleftharpoons Zn^{+2} + 2Fe^{+2}$$

Increasing concentration of Fe^{+2} will

(1) Increase cell emf (2) Increase current flow

(3) Decrease cell emf (4) Alters pH of solution

32. Electrochemical equivalent of a divalent metal is 3×10^{-4}. The approximate atomic mass of the metal is

(1) 107.8 (2) 63.6

(3) 57.9 (4) 55.8

33. $Zn\,|\,Zn^{2+}_{(C_1)}\,||\,Zn^{2+}_{(C_2)}\,|\,Zn\,(s)$. The ΔG is –ve if

(1) $C_1 = C_2$ (2) $C_1 > C_2$

(3) $C_2 > C_1$ (4) $C_1 > 2C_2$

34. Select correct statement.

(1) If salt bridge is removed, potential falls to zero

(2) KCl cannot be used as electrolyte in salt bridge in case of silver electrode

(3) Cell reaction is spontaneous if emf is positive

(4) All of these

35. Which of the following solutions will have highest value of molar conductance of CH_3COOH?

(1) 1 M CH_3COOH (2) 0.5 M CH_3COOH

(3) 0.3 M CH_3COOH (4) 0.1 M CH_3COOH

36. The measured potential for

$$Mg^{2+} + 2e^- \rightleftharpoons Mg\ (s)$$

does not depend upon

(1) Raising the temperature

(2) Increasing the concentration of Mg^{2+} ion

(3) Making the magnesium plate bigger

(4) Decreasing the concentration of Mg^{2+} ion

37. The time required to coat a metal surface of 80 cm^2 with 5×10^{-3} cm thick layer of silver (density 1.05 g cm^{-3}) with the passing of 3 A current through silver nitrate solution is

(1) 115 s (2) 125 s

(3) 135 s (4) 145 s

38. If a spoon of silver metal is placed in a solution of ferrous sulphate

(1) Ag will oxidise

(2) Iron will precipitate

(3) Ag and Fe will precipitate

(4) No reaction will take place

39. The ionic conductance of Al^{3+} and SO_4^{2-} ions at infinite dilution are x and y $ohm^{-1}\ cm^2\ mol^{-1}$ respectively. If Kohlrausch's law is valid, then molar conductance of aluminium sulphate at infinite dilution will be

(1) 3x + 2y (2) 3y + 2x

(3) 2x + 2y (4) 3x + 3y

40. If emf of following reaction is x_1 volt

$8Al + 3Fe_3O_4 \longrightarrow 4Al_2O_3 + 9Fe$, $E^o = x_1$ volt

then, what will be the ΔG^o of following reaction?

$$Al + \frac{3}{8}Fe_3O_4 \longrightarrow \frac{1}{2}Al_2O_3 + \frac{9}{8}Fe$$

(1) $-3x_1$ F (2) $3x_1$ F

(3) $-\frac{3}{8}x_1$ F (4) $-24x_1$ F

41. Two moles of electrons were transferred from anode to cathode in an experiment on electrolysis of water. The total volume of H_2 and O_2 (dry) at STP produced will be

(1) 33.6 L (2) 11.2 L

(3) 22.4 L (4) 44.8 L

42. The standard reduction potential E^o for OCl^-/Cl^- and $Cl^- / \frac{1}{2}Cl_2$ respectively are 0.90 V and – 1.24 V. The E^o of $OCl^- / \frac{1}{2}Cl_2$ will be

(1) 2.14 V (2) 0.56 V

(3) – 0.17 V (4) 0.34 V

43. The two aqueous solutions; A $[Cu(NO_3)_2]$ and B [NaCl] were electrolysed using platinum electrodes. The pH of the resulting solutions will

(1) Increase in both

(2) Decrease in both

(3) Increase in A and decrease in B

(4) Decrease in A and increase in B

44. The electrolysis of aqueous solution of $CuBr_2$ using platinum electrode would lead to the evolving deposition of

(1) O_2 gas at anode

(2) Cu at cathode

(3) H_2 gas at cathode

(4) Br_2 gas at anode and O_2 gas at cathode

45. Find the minimum potential difference needed to reduce Al_2O_3 at 500°C. The free energy change for the decomposition reaction: $\frac{2}{3}Al_2O_3 \longrightarrow \frac{4}{3}Al + O_2$ is ΔG = 960 kJ

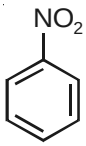
(1) – 3.623 V (2) – 2.487 V

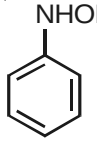
(3) – 4.356 V (4) – 0.248 V

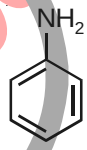
46. The standard reduction potential of Ag^+/Ag electrode at 298 K is 0.799 V. Find the potential of the Ag^+/Ag electrode in a saturated solution of AgI. (K_{sp} of AgI = 2.5×10^{-17})

(1) 0.309 V (2) 0.151 V

(3) 0.569 V (4) 0.432 V

47..  is reduced by 4 Faradays of charge. The species formed would be

(1)  (2) 

(3)  (4) 

[Chapter-17 : Chemical Kinetics]

1. In the first order reaction the concentration of reactant decreases from 2 M to 0.50 M in 20 minutes. The value of specific rate constant is

(1) 69.32 min^{-1} (2) 6.932 min^{-1}

(3) 0.6932 min^{-1} (4) 0.06932 min^{-1}

2. The rate of gaseous reaction is given by the expression $K[A]^2[B]^3$. The volume of reaction vessel is suddenly reduced to one half of the initial volume. The reaction rate relative to the original rate will be

(1) $\frac{1}{24}$ (2) $\frac{1}{32}$

(3) 32 (4) 24

3. The first order decomposition of H_2O_2 are written as

$$H_2O_{2(l)} \rightarrow H_2O_{(l)} + \frac{1}{2}O_2 \quad : \quad \text{rate} = K.[H_2O_2]$$

$$2H_2O_{2(l)} \rightarrow 2H_2O_{(l)} + O_2 \quad : \quad \text{rate} = K'[H_2O_2]$$

Which of the following relationship is true?

(1) K = K′ (2) K > K′

(3) K > 2K′ (4) 2K = K′

4. The inversion of cane sugar proceeds with half life of 600 minutes at pH = 5 for any concentration of sugar. However if pH = 6, the half life changes to 60 minutes. The rate law expression for sugar inversion can be written as

(1) $r = K[sugar]^2[H^+]^0$ (2) $r = K[sugar]^1[H^+]^0$

(3) $r = K[sugar]^1[H^+]^1$ (4) $r = K[sugar]^0[H^+]^1$

5. A gaseous reaction,

$$A_{2(g)} \longrightarrow B_{(g)} + \frac{1}{2}C_{(g)}$$

shows increase in pressure from 200 mm to 250 mm in 10 minutes. The rate of disappearance of A_2 is

(1) 10 mm min^{-1} (2) 20 mm min^{-1}

(3) 50 mm min^{-1} (4) 100 mm min^{-1}

6. For which of the following reactions K_{310}/K_{300} would be maximum?

(1) A + B → C; E_a = 50 kJ

(2) X + Y → Z; E_a = 40 kJ

(3) P + Q → R; E_a = 60 kJ

(4) E + F → G; E_a = 100 kJ

7. For decomposition of $N_2O_{5(g)}$ dissolved in CCl_4

$$2N_2O_{5(g)} \rightarrow 4NO_{2(g)} + O_{2(g)}$$

The following data at 300 K is given

Concentration of Reactant	Rate of Decomposition
0.170 M	0.050 M hr^{-1}
0.340 M	0.100 M hr^{-1}
0.680 M	0.200 M hr^{-1}

The rate equation for the reaction is

(1) rate = $K[N_2O_5]^2$ (2) rate = $K[N_2O_5]$

(3) rate = $K[N_2O_5]^3$ (4) rate = $K[N_2O_5]^0$

8. The half life period of the first order reaction $PCl_5 \rightarrow PCl_3 + Cl_2$ is 10 min. The time in which the concentration of PCl_5 would be reduced to 10% of the original concentration will be

(1) 26 minutes (2) 33 minutes

(3) 71 minutes (4) 90 minutes

9. For a zero order reaction, the plot of concentration Vs time is linear with

(1) +ve slope and zero intercept

(2) –ve slope and zero intercept

(3) +ve slop and non zero intercept

(4) –ve slop and non zero intercept

10. The rate constant of forward and backward reactions for certain hypothetical reaction are 1.1×10^{-2} and 1.5×10^{-3} respectively. The equilibrium constant for the reaction is

(1) 7.33 (2) 0.733

(3) 73.3 (4) 733

11. The rate of disappearance of $AB_3(g)$ in the reaction

$2AB_3(g) \underset{K_2}{\overset{K_1}{\rightleftharpoons}} A_2(g) + 3B_2(g)$ would be

(1) $2K_1[AB_3]^2 - 2K_2[A_2][B_2]^3$

(2) $2K_1[AB_3] - K_2[A_2][B_2]^3$

(3) $K_1[AB_3]^2 - 2K_2[A_2][B_2]^3$

(4) $K_1[AB_3] - K_2[A_2][B_2]^3$

12. For any hypothetical reaction

$2A + 3B + C \rightarrow$ Products

Experiment	[A]M	[B]M	[C]M	Rate in M sec^{-1}
1	0.5	0.5	0.5	6×10^{-4}
2	1.5	0.5	0.5	1.8×10^{-3}
3	0.5	2.0	0.5	1.2×10^{-3}
4	1.5	0.5	1.5	1.8×10^{-3}

Order of the reaction is

(1) 3 (2) 4

(3) 2 (4) 1.5

13. For the decomposition of N_2O_5 at 200°C,

$$N_2O_5(g) \rightarrow N_2O_4(g) + \frac{1}{2}O_2(g),$$

If the initial pressure is 114 mm and after 25 minutes of the reaction, total pressure of the gaseous mixture is 133 mm, the average rate of reaction in atm. min^{-1} will be

(1) 0.001 atm min^{-1} (2) 0.002 atm min^{-1}

(3) 0.003 atm min^{-1} (4) 0.004 atm min^{-1}

14. A chemical reaction $2A \rightarrow 4B + C$ in gas phase occurs in a closed vessel. The concentration of B is found to be increased by 5×10^{-3} mol L^{-1} in 10 seconds. The rate of disappearance of A will be

(1) 5×10^{-4} mol L^{-1} s^{-1}

(2) 10^{-3} mol L^{-1} s^{-1}

(3) 2.5×10^{-4} mol L^{-1} s^{-1}

(4) 1.25×10^{-4} mol L^{-1} s^{-1}

15. The rate law for a reaction is found to be

rate = $K[NO_2^-][I^-][H^+]^2$

How would the rate of reaction change when, concentration of each of NO_2^-, I^- and H^+ are tripled?

(1) 27 times (2) 39 times

(3) 8 times (4) 81 times

16. The rate of a gaseous reaction is halved when the volume of the vessel is doubled. The order of the reaction is

(1) 1 (2) 2

(3) 3 (4) Zero

17. The decomposition of NH_3 on platinum surface follows zero order kinetics with rate constant $k=2.5\times10^{-4}Ms^{-1}$. The rate of production of N_2 is

(1) 1.25×10^{-4} Ms^{-1} (2) 3.75×10^{-4} Ms^{-1}

(3) 2.5×10^{-4} Ms^{-1} (4) 15×10^{-4} Ms^{-1}

18. The rates of a reaction starting with initial concentrations of 2×10^{-3} M and 1×10^{-3} M are equal to 2.40×10^{-4} Ms^{-1} and 0.60×10^{-4} Ms^{-1} respectively. The order of the reaction with respect to the reactant is

(1) 1 (2) 2

(3) 3 (4) 1.5

19. A first order reaction is 40% complete in 50 minutes. In what time will the reaction be 80% complete?

(1) 105.2 min (2) 97.4 min

(3) 157.5 min (4) 50 min

20. The half-life period of a first order reaction is 60 minutes. What percentage of the reactant will be left behind after 120 minutes?
(1) 25% (2) 50%
(3) 75% (4) 100%

21. The three-fourth of a first order reaction is completed in 32 minutes. What is the half-life period of the reaction?
(1) 8 min (2) 16 min
(3) 4 min (4) 64 min

22. In a reaction, 5 g ethylacetate is hydrolysed per litre in the presence of dil. HCl in 300 minutes. If the reaction is of first order and the initial concentration of ethyl acetate is 20 g/L, calculate the rate constant of the reaction [log 2 = 0.301, log 3 = 0.477]
(1) 3.2×10^{-4} min^{-1} (2) 1.6×10^{-4} min^{-1}
(3) 9.6×10^{-4} min^{-1} (4) 4.3×10^{-2} min^{-1}

23. For a reaction, the energy of activation is zero. What is the value of rate constant at 300 K, if $K = 1.6 \times 10^6$ s^{-1} at 280 K?
(1) 3.2×10^6 s^{-1} (2) 1.6×10^6 s^{-1}
(3) 4.8×10^6 s^{-1} (4) 6.4×10^6 s^{-1}

24. For a first order reaction, time taken for half-life of the reaction to complete is t_1, whereas that for 3/4th of the reaction to complete is t_2. How are t_1 and t_2 related to each other?
(1) $t_2 = 2t_1$ (2) $2t_2 = t_1$
(3) $t_2 \times t_1 = 1$ (4) $t_2 = t_1$

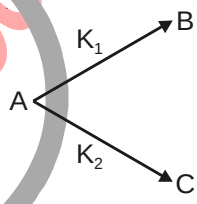
25. Two first order reactions proceed at the same rate at 25ºC, when started with same initial concentrations. The temperature coefficient of the first reaction is 2 while that of the second reaction is 3. What will be the ratio of the rates of the second reaction to the first at 55ºC?
(1) $\frac{27}{8}$ (2) $\frac{9}{8}$
(3) $\frac{81}{8}$ (4) 1 : 1

26. For a zero order reaction, starting with initial concentration Co, how long will it take for the reaction to go to completion?
(1) $\frac{Co}{2K}$ (2) Infinite
(3) $\frac{Co}{K}$ (4) Co

27. Which of the following reactions ends in finite time?
(1) Zero order (2) 1st order
(3) 2nd order (4) 3rd order

28. The half-life of a reaction is halved as the initial concentration of the reactant is doubled. The order of the reaction is
(1) 0.5 (2) 1
(3) 2 (4) 0

29. A substance undergoes first order decomposition as follows



$K_1 : K_2 = 3 : 5$
Then % distribution of B and C are
(1) 37.5% B and 62.5% C
(2) 30% B and 70% C
(3) 40% B and 60% C
(4) 20% B and 80% C

[Chapter-18 : Surface Chemistry]

1. In colloidal sulphur, molecules are held together by
(1) Hydrogen bonding
(2) Strong attraction forces
(3) van der Waal's forces
(4) Strong electrical forces

2. Which one of the following electrolytes brings about the coagulation of a gold sol quickest and in least concentration?
(1) NaCl (2) $AlPO_4$
(3) $MgSO_4$ (4) Na_2SO_4

3. Lyophilic sols have _____ between disperse phase and dispersion medium
(1) Strong attractive interaction
(2) Little attraction interaction
(3) Repulsive interaction
(4) Hydrogen bonding

4. Surface tension of a lyophilic sol is generally _____ than that of the medium
(1) Equal (2) Less
(3) More (4) Twice

5. Flocculation value is expressed in terms of
(1) Millimoles of electrolyte per litre of solution
(2) Moles of electrolyte per litre of solution
(3) Grams of electrolyte per litre of solution
(4) Millimoles of electrolyte per millilitre of solution

6. Butter is a colloid containing
(1) Fat dispersed in water
(2) Fat dispersed in oil
(3) Water dispersed in fat
(4) Water dispersed in starch

7. Bredig's arc method used for the preparation of metallic sols involves
   (1) Dispersion
   (2) Condensation
   (3) Dispersion as well as condensation
   (4) Neither dispersion nor condensation
8. Zeolites are good shape selective catalyst due to their
   (1) Honey comb like structure
   (2) Two dimensional structure
   (3) Close packed structure
   (4) Orthorhombic structure
9. Excess KI solution is added to silver nitrate solution to prepare a silver iodide sol. The maximum precipitating power for this sol is possessed by
   (1) K_2SO_4 (2) $CaCl_2$
   (3) Na_3PO_4 (4) $Al_2(SO_4)_3$
10. Which of the following compound can form micelles?
   (1) R—COOH (2) RCOOR'
   (3) $(RCO)_2O$ (4) RCOONa
11. The correct expression for Freundlich adsorption isotherm is,
   (1) $\frac{m}{x} = KP^{1/n}$ (2) $\frac{x}{m} = KP^{1/n}$
   (3) $\frac{x}{m} = \frac{K}{P^{1/n}}$ (4) $xm = KP^{1/n}$
12. Methods used for the preparation of colloidal solutions are
   (1) Peptisation
   (2) Hydrolysis
   (3) Double decomposition
   (4) All of these
13. The correct decreasing order of the volumes of gases H_2, CH_4, CO_2 and NH_3 adsorbed by 1 g of charcoal at 288 K are in the order
   (1) $H_2 > CH_4 > CO_2 > NH_3$
   (2) $CH_4 > CO_2 > NH_3 > H_2$
   (3) $CO_2 > NH_3 > H_2 > CH_4$
   (4) $NH_3 > CO_2 > CH_4 > H_2$
14. Which of the following is correct?
   (1) Chemical adsorption decreases with increases of temperature
   (2) Chemical adsorption increases with increase of temperature
   (3) Chemical adsorption first increases and then decreases with increase of temperature
   (4) Chemical adsorption first decreases and then increases with increase of temperature
15. The potential difference between fixed charged layer and the diffused Layer having opposite charge is called
   (1) Zeta potential (2) Beta potential
   (3) Alpha potential (4) Gamma potential
16. Colloidal solution of gold in water is called
   (1) Aqua dag (2) Argyrol
   (3) Purple of cassius (4) Oil dag
17. For adsorption
   (1) ΔH is (–) ve (2) ΔS is (–)ve
   (3) ΔG is (–) ve (4) All of these
18. Which of the following colloidal dispersions is a true hydrophobic colloid?
   (1) Gelatin (2) Sulphur
   (3) Starch (4) Gum
19. Micelles are
   (1) Surfactant molecules (2) Non-polar molecules
   (3) Polar molecules (4) None of these
20. Collodion is a colloidal sol of
   (1) Cellulose nitrate in ethanol
   (2) Cellulose nitrate in benzene
   (3) Cellulose nitrate in water
   (4) None of these

BOTANY

[Chapter 13 : Reproduction in Organisms]

1. Match the following

	Column-I		Column-II
a.	*Gladiolus*	(i)	Bulb
b.	Sweet potato	(ii)	Bulbils
c.	*Agave*	(iii)	Radical buds
d.	*Narcissus*	(iv)	Corm

   (1) a(i), b(ii), c(iii), d(iv) (2) a(iv), b(iii), c(ii), d(i)
   (3) a(iii), b(i), c(ii), d(iv) (4) a(i), b(iii), c(iv), d(ii)
2. What is **incorrect** for zygote?
   (1) Vital link between organisms of two generations
   (2) Sexually reproducing organisms begin life as zygote
   (3) Its development does not depend on type of life-cycle of organisms
   (4) May be formed either outside or inside the body of organism
3. When diploid embryosac develops directly from diploid megaspore mother cell and the unreduced egg of this embryosac develops into embryo. This phenomenon is called
   (1) Apospory
   (2) Diplospory
   (3) Non-recurrent agamospermy
   (4) Apogamy

4. The ploidy level of hypophysis is
(1) 2 *n* (2) *n*
(3) 3 *n* (4) 6 *n*

5. In which of the following group generally syngamy does not occur inside the body?
(1) Bryophytes (2) Pteridophytes
(3) Algae (4) Gymnosperms

6. Which of the following is **incorrectly** matched w.r.t chromosome number in meiocyte?
(1) *Ophioglossum* – 630
(2) Onion – 16
(3) *Zea mays* – 20
(4) *Pisum sativum* – 14

7. Choose **correct** match
(1) Nucule – Male sex organs
(2) Gemmae – Female sex organ
(3) Bulbils – Vegetative propagules
(4) Turions – Non-perennating buds

8. How many new plants are formed from single gemma in *Marchantia*?
(1) One (2) Two
(3) Three (4) Four

9. When syngamy occurs inside the body of the organism, the process is called internal fertilization. It is observed in
(1) *Spirogyra* (2) *Ulothrix*
(3) *Chlamydomonas* (4) *Ectocarpus*

10. Asexual reproduction is different from sexual reproduction in
(1) Involvement of single parent
(2) Absence of mitosis
(3) Having slower method of multiplication
(4) Introduction of variation in population

11. The most vital event of amphimixis is the
(1) Fusion of gametes
(2) Meiosis for the formation of gametes
(3) Development of (+) and (–) strains on gametes
(4) Production of large number of male gametes

12. The end of juvenile phase in angiospermic plant is marked by
(1) Formation of flower
(2) Formation of fruit without seed
(3) Abscission of all leaves in autumn
(4) Initiation of axillary bud

13. During the budding in yeast
(1) Nucleus divides equally and cytoplasm unequally
(2) Nucleus divides unequally and cytoplasm equally
(3) Nucleus and cytoplasm both divide unequally
(4) Nucleus and cytoplasm both divide equally

14. All given statements are **correct** w.r.t. asexual reproduction, **except**
(1) Zoospores in *Chlamydomonas* are anteriorly biflagellated
(2) Gametes may or may not be involved during asexual reproduction
(3) Sterigmata represents the ultimate branch of conidiophore bearing conidia in *Penicillium*
(4) Asexual reproduction is common among single celled organisms

15. *Chara* is a thallophyte that exceptionally has multicelled sex organs. The male sex organ is
(1) Nucule and present above ♀ sex organ
(2) Nucule and present below ♀ sex organ
(3) Globule and present above ♀ sex organ
(4) Globule and present below ♀ sex organ

16. Which of the following is not a feature of artificial/ natural methods of vegetative reproduction?
(1) They are commonly practiced in plants having reduced power of sexual reproduction
(2) Superior varieties with poor root system can be propagated
(3) Yield of progeny is not uniform
(4) Dispersal is nearly absent

17. Read the following statement for sexual reproduction
a. Sexual reproduction occurs in all living organisms
b. Only sexual reproduction occurs in organisms with simple organization
c. Sexual reproduction results in offsprings that are not identical to the parants or amongst themselves
d. Formation of diploid zygote is universal in all sexually reproducing organisms
Select the **correct** statements
(1) a & b (2) b & c
(3) c & d (4) b & d

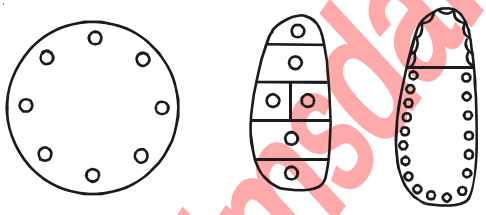
18. Which of the following is **incorrectly** matched?

a.	Syngamy	(i)	*Selaginella* species
b.	Tube cells	(ii)	Globule
c.	Shield cells	(iii)	Amphimixis
d.	Resting buds	(iv)	Nucule

(1) a(iii), b(ii), c(iv), d(i) (2) a(iii), b(i), c(iv), d(ii)
(3) a(i), b(iii), c(iv), d(ii) (4) a(iii), b(iv), c(ii), d(i)

19. The number of chromosomes in meiocyte of rice and apple are respectively
(1) 12, 34 (2) 24, 34
(3) 17, 12 (4) 10, 20

1. During microsporogenesis, in meiosis-I, karyokinesis is followed by cytokinesis, and in meiosis-II again karyokinesis is followed by cytokinesis. This type of cytokinesis which is taking place in two steps will lead to the formation of which of the following type of tetrad?
   (1) Isobilateral (2) Tetrahedral
   (3) Linear (4) Decussate
2. In which of the following pollination does not occur before opening of flowers?
   (1) *Pisum sativum* (2) *Triticum aestivum*
   (3) *Oryza sativa* (4) *Mirabilis*
3. Which of the following is **correct**?
   (1) When pollen tube enters the ovule through integuments called as porogamy
   (2) Hypohydrophily is observed in *Zostera*
   (3) Epihydrophily is observed in *Ceratophyllum*
   (4) Ornithophily is common in the members of family gramineae
4. When zygote divides by transverse division giving rise to, two unequal sized cells. The cell which is smaller is towards the _____
   (1) Chalazal region
   (2) Synergid region
   (3) Micropylar region
   (4) Integuments region
5. What would be the ploidy of PEN when hexaploid flowering plant is cross pollinated by pollen grains of tetraploid plant?
   (1) 10n (2) 5n
   (3) 8n (4) 7n
6. Select the **correct** order of endosperm types



   (1) Cellular, helobial, free nuclear
   (2) Free nuclear, cellular, helobial
   (3) Helobial, Free nuclear, cellular
   (4) Free nuclear, helobial, cellular
7. In a typical ovule the number of sporangia is
   (1) Generally 2
   (2) 4 or 2 or 1
   (3) Always 1
   (4) Generally 4
8. The female gamete in embryosac
   (1) Are 3 in number *i.e.* one egg and 2 polar nuclei
   (2) Has polarised cytoplasm
   (3) Has filiform apparatus
   (4) Is situated towards chalazal end in *Oenothera* type of embryosac
9. Select the **correct** statement w.r.t. mature male gametophyte of dicot plants
   (1) Only 2 male gametes are produced from tube cell
   (2) Generative cell gives rise to pollen tube
   (3) Antheridia is absent
   (4) Smallest cell is tube cell
10. Major difference between campylotropus and amphitropus type of ovule lies in
    (1) Non-bending of body and relative position of micropyle and funicle
    (2) Bending and non-bending of embryosac
    (3) Position of functional megaspore
    (4) Presence or absence of raphe
11. If the number of stamens in a flower of mustard is 6 and the number of microspore mother cells in each pollen sac is 100, then total number of male gametes produced per flower are
    (1) 1600 (2) 3200
    (3) 19200 (4) 2400
12. Select **incorrect** statement regarding structural and physiological characteristic of tapetum in anther
    (1) Secretes sporopollenin which make pollen grains sticky
    (2) Secretes pollenkitt which help in entomophily
    (3) Secretes proteins which are involved in pollen pistil interaction
    (4) Secretes some growth hormones and enzyme
13. Which of the following is **not** a post pollination development?
    (1) Swelling of tube cell and formation of pollen tube
    (2) Secretion of pectinase and other hydrolytic enzymes by pollen tube
    (3) Division of pollen cell into tube cell and generative cell
    (4) Formation of callose plugs in pollen tube
14. Select the **correct** statement w.r.t. *Zostera*
    (1) Shortest pollen grains
    (2) Longest pollen grains
    (3) Exine is well developed
    (4) Stigma is short
15. Select **correct** statement w.r.t. Geitonogamy
    (1) Requires pollinating agency like air etc
    (2) Produces variability in nature
    (3) May produce mosaic endosperm
    (4) Involves self sterility

16. Presence of a physical barrier between male and female organs to prevent self-pollination is called

(1) Cleistogamy (2) Herkogamy

(3) Dichogamy (4) Pseudocopulation

17. How many meiosis divisions are required to produce 200 male gametes and 200 female gametes respectively (w.r.t. higher plants) ?

(1) 50 and 100 (2) 25 and 200

(3) 50 and 200 (4) 50 and 300

18. Most common ovule among angiosperms is

(1) Resupinate ovule (2) 360° ovule

(3) Transverse ovule (4) Atropous ovule

19. Triple fusion is also called as

(1) Trophomixis

(2) Pseudo fertilization

(3) Generative fertilization

(4) More than one option is correct

20. X-bodies are two darkly stained bodies present in cytoplasm of

(1) Synergid cell before entry of pollen tube

(2) Degenerated synergid cell after entry of pollen tube

(3) Embryo sac before entry of pollen tube

(4) Pollen grain before germination

21. Which type of polyembryony is exhibited most commonly by *Citrus*?

(1) Cleavage polyembryony

(2) Simple polyembryony

(3) Mixed polyembryony

(4) Adventive polyembryony

22. A typical dicot embryo consists of

(1) Scutellum and epiblast

(2) Two cotyledons and tigellum

(3) Two cotyledons and epiblast

(4) Radicle and coleorrhiza

23. Presence of more than one embryo in a seed is called _____ when these develops from single proembryo.

(1) Cleavage polyembryony

(2) Simple polyembryony

(3) Adventive polyembryony

(4) Mixed polyembryony

24. Number of chromosomes in ♂ gamete of rice and maize are

(1) 12, 6 (2) 12, 10

(3) 19, 4 (4) 24, 20

25. Which is **not** a post-fertilization change?

(1) Integument → Seed coat

(2) Ovule → Seed

(3) Carpel → Megasporophyll

(4) Ovary → Fruit

26. How many male gametes/sperms will be produced from 10 pollen mother cells after microsporogenesis and microgametogenesis?

(1) 20 (2) 40

(3) 80 (4) 160

27. During pre-pollination development of pollen grain which one of the following events is absent?

(1) Size of pollen grain increases

(2) Migration of nucleus near pollen wall occurs

(3) Protoplast undergoes unequal mitosis

(4) Division of generative cell is inevitable in most of the flowering plants

28. Which of the following statement best describes an ovule?

(1) Integumented dehiscent megasporangium

(2) Integumented indehiscent microsporangia

(3) Integumented indehiscent megasporangium

(4) Non-integumented indehiscent megasporangium

29. Pollen grains represent

(1) The sporophytic generation

(2) The gametophytic generation

(3) The product of mitosis

(4) The future sporophyte

30. Megaspore mother cell in an ovule

(1) Is generally a hypodermal cell of nucellus near micropyle

(2) Is generally a epidermal cell of nucellus near chalaza

(3) Is generally a subhypodermal cell of nucellus near chalaza

(4) Is generally an epidermal cell of nucellus near micropyle

31. Pollen tube in angiosperms

(1) Is produced by exine

(2) Carries motile male gametes

(3) Is a sperm carrier

(4) Is produced by generative cell

32. Select the **incorrect** match
(1) Double fertilisation – Nawaschin
(2) Monocot embryo – 6-10 celled suspensor
(3) Central cell – Largest cell of embryo sac
(4) Antipodals – Absent in *Oenothera* type.

33. Anemophilous flowers do not show
(1) Nectarless and odourless flowers
(2) Pollen kitt and inserted sticky stigma
(3) Unwettable perianth and light pollen grains
(4) Large number of pollen grains and single ovule

34. In Orchidaceae, Podostemonaceae and Trapaceae
(1) Endosperm is triploid and starchy
(2) Double endosperm is found
(3) Endosperm have surface irregularity
(4) Endosperm is absent

35. Find out ploidy of endosperm when both male and female plants are hexaploid
(1) 9x (2) 15x
(3) 10x (4) 6x

36. Resemblance of flower of *Ophrys* (orchid) to female *Colpa* wasp, to attract pollinating agent is a phenomena called
(1) Co-evolution (2) Mimicry
(3) Pseudocopulation (4) Cross-pollination

37. Which group of the plant usually shows external fertilization?
(1) Algae (2) Bryophytes
(3) Pteridophytes (4) Both (1) & (2)

38. Which layer of anther wall is not derived from archaesporium?
(1) Middle layer (2) Tapetum layer
(3) Epidermis (4) Endothecium

39. Which one of the following is fore runner of male gamete?
(1) Ovule
(2) Middle layer
(3) Microspore mother cell
(4) Embryosac

40. The ovule of grasses derive its nutrition through
(1) Endothelium (2) Scutellum
(3) Placenta (4) Aleurone layer

41. In adventitive embryony, extra embryo develops directly from the cells of
(1) Nucellus (2) Integument
(3) Both (1) & (2) (4) Egg cell

42. Find out **incorrect** match
(1) Porogamy – Pollen tube enters through micropyle
(2) Basigamy – Pollen tube enters through funicle
(3) Mesogamy – Pollen tube enters through integument
(4) Acrogamy – Embryosac come out to micropyle to receive pollen tube

43. Extra embryos develop in *Citrus* seeds are
(1) Genetically identical among themselves as well as to mother plant
(2) Genetically identical among themselves but unidentical to mother plant
(3) Genetically non-identical among themselves as well as to mother plant
(4) Genetically identical to mother plant only

44. Which of the following is **not** the function of tapetum?
(1) Induce growth in ovary wall
(2) Regulate pollen germination and growth of pollen tube
(3) Pollen kit formation
(4) Secretion of callase

45. Night blooming flowers are generally pollinated by
(1) Honey bees (2) Butterfly
(3) Beetles (4) Moths

46. The unit of third whorl of floral appendages in most of the angiospermic plants is
(1) Petal (2) Microsporophyll
(3) Carpel (4) Tepal

47. Find the number of meiotic divisions occuring in anthers for the production of pollen grains required to fetilise female gametophytes developed from 1000 megaspore mother cells
(1) 100 (2) 25
(3) 250 (4) 1000

48. Find the **incorrect** statement w.r.t. tetrads of microspores
(1) Tetrahedral type of tetrads are formed in dicots
(2) Isobilateral type of tetrads are produced by successive type of cytokinesis

(3) Isobilateral type of tetrads are most common

(4) All types of tetrads are observed in *Aristolochia elegans*

49. Find the **correct** statement w.r.t. pollen grains

(1) Development of pollen grains start outside the microsporangium

(2) Pollen grains of wheat and rice maintain their viability for months

(3) Longest filamentous pollen grains are found in *Zostera*

(4) *Mirabilis* has smallest pollen grains

50. Pollen kitt is a yellow coloured, sticky layer present outside the pollen grains, which serves the purpose of

(1) Protection against UV rays

(2) Insect attractant

(3) Pollen germination

(4) More than one option is correct

51. In angiosperms pollen grains are shed at 2-celled stage in over

(1) 20% families (2) 40% families

(3) 60% families (4) 80% families

52. Ektexine is differentiated into 3 layers. The **correct** sequence of these layers from outer side to inner side is

(1) Foot layer → Baculum → Tectum

(2) Baculum → Tectum → Foot layer

(3) Tectum → Baculum → Foot layer

(4) Tectum → Foot layer → Baculum

53. Integumented indehiscent megasporangium of phanerogams is

(1) Nucellus (2) Stamen

(3) Carpel (4) Ovule

54. The ovule is attached to placenta by means of

(1) Chalaza (2) Funiculus

(3) Hilum (4) Integument

55. The *Polygonum* type embryo sac is

(1) 8-celled and 7-nucleated

(2) 4-nucleated and 4-celled

(3) 7-celled and 8-nucleated

(4) 7-celled and 5-nucleated

56. The only diploid structure in embryo sac is

(1) Nucellus (2) Integument

(3) Synergid cell (4) Secondary nucleus

57. In amphitropous ovule

(1) Body of ovule and embryo sac are curved

(2) Funiculus is coiled around the ovule

(3) Funicle, chalaza and micropyle lie in the same vertical line

(4) Body of ovule is straight

58. Chasmogamous bisexual flowers

(1) Are closed

(2) Show autogamy only

(3) May show cross pollination

(4) Are always homogamous

59. Embryo in most of the angiosperms develops at

(1) Chalazal end of ovule

(2) Centre of embryo sac

(3) Micropylar end of embryo sac

(4) Chalazal end of embryo sac

60. Primary endosperm cell (PEC) develops

(1) From any cell of embryo sac

(2) From central cell after triple fusion or pseudofertilisation

(3) Zygote after triple fusion

(4) From secondary nucleus after generative fertilisation

61. Bagging prevents contamination in

(1) Emasculated and unisexual flowers

(2) Emasculated flowers only

(3) Unisexual flowers only

(4) Non-emasculated flowers only

62. Gynoecium matures in comparison to androecium first in all, **except**

(1) *Ficus* (2) *Aristolochia*

(3) Sunflower (4) *Magnolia*

63. Find the **incorrect** statement w.r.t. pollination

(1) Anemophilous flowers produce enormous amount of pollens when compared to the number of ovules available for pollination

(2) Pollination by water is more common amongst abiotic pollinators

(3) Pollination by water is counted to about 30 genera, mostly monocotyledons

(4) Stigma is rough and sticky in entomophilous flowers

64. During megagametogenesis in most of the angiosperms

(1) Functional megaspore divides 4 times by mitosis

(2) Each nuclear division followed by wall formation

(3) Three cells arranged at chalazal pole, called egg apparatus

(4) Megaspore divides by free nuclear divisions

65. Choose **incorrect** statement regarding hybrid varieties

(1) Hybrid seeds have to be produced every year

(2) Production of hybrid seeds is costly

(3) They are made into apomictics to prevent segregation of characters

(4) Cultivation of hybrids has decreased productivity

66. Which one is **incorrect**?

(1) The smallest and lightest seed is that of *Orchis maculata*

(2) Legumes and cereals seeds are orthodox seeds

(3) Seed viability can be tested by 0.1% solution of TTC

(4) In dicots endospermic seeds are more common

67. Double fertilization involves

(1) 2 vegetative fertilization

(2) 2 syngamy

(3) 1 syngamy and one triple fusion

(4) 2 syngamy and one triple fusion

68. A tetraploid female plant is crossed with diploid male plant. What will be the ploidy of endosperm?

(1) 3n (2) 4n

(3) 5n (4) 6n

69. How many cells degenerate after fertilization in *Polygonum* type of embryo sac?

(1) 4 (2) 5

(3) 6 (4) 3

70. Pollen tube enters the embryo sac through _____ and releases its contents in _____.

(1) Degenerated synergid, synergid

(2) Degenerated synergid, antipodal cell

(3) Egg, synergid

(4) Synergid, zygote

71. Pollinium is a character of

(1) Mango and Orchid

(2) *Calotropis* and China rose

(3) Litchi and Mango

(4) Orchid and *Calotropis*

72. Mark the **correct** statement w.r.t. anther wall

(1) Tapetum is the outermost layer

(2) Exothecium is the innermost layer in *Arceuthobium*

(3) Cells of endothecium are nutritive in function

(4) Tapetal cells show increase in DNA contents by restitution nucleus formation, endomitosis and polyteny

73. During the development of isobilateral microspore tetrad

(1) Cytokinesis occurs after each karyokinesis of meiosis

(2) Meiosis is not required

(3) Karyokinesis is not required

(4) Cytokinesis occurs after complete meiotic division

74. Each male gametophyte produces two male gametes, those are

(1) Non-motile, amoeboid and unequal in size

(2) Motile, amoeboid and equal in size

(3) Non-motile, amoeboid and equal in size

(4) Motile, amoeboid and unequal in size

75. In which of the following families polysiphonous pollen grains have been reported?

(1) Cucurbitaceae and Malvaceae

(2) Cruciferae and Malvaceae

(3) Leguminosae and Solanaceae

(4) Liliaceae and Asteraceae

76. How many meiosis and mitosis divisions are required respectively to produce 32 male gametes in *Brassica*?

(1) 4, 32 (2) 4, 16

(3) 8, 32 (4) 8, 16

77. Agamospermy is/are related with

(1) Development of seed without meiosis

(2) Development of seed through diplospory

(3) Development of seed without fertilization

(4) All of the above

78. Choose **incorrect** statement w.r.t. synergids in female gametophytes of angiosperms

(1) Its cytoplasm is highly polarised

(2) One of them degenerates before the pollen tube enters the embryo sac

(3) The wall around the synergids is thick and complete

(4) Filiform apparatus is useful for absorption and transportation of nutrients

79. The most vital event of amphimixis is the

(1) Fusion of gametes

(2) Meiosis for the formation of gametes

(3) Development of (+) and (–) strains on gametes

(4) Production of large number of male gametes

80. Read the following statements w.r.t. Double fertilization
(i) It is the characteristic feature of both angiosperms and gymnosperms
(ii) It was confirmed by Guignard in *Lilium* and *Fritillaria*
(iii) Five nuclei and 3 gametes are involved in this process
Select **correct** one
(1) Only (i) is correct
(2) Only (ii) is correct
(3) Both (i) & (ii) are correct
(4) Both (ii) & (iii) are correct

81. Select the **incorrect** statement for pollination
(1) Wind pollinated flowers often have a single ovule in each ovary
(2) Pollination by water is quite rare and is limited to about 30 genera, mostly dicotyledons
(3) Some larger animals like lemurs, arboreal rodents and lizards have also been reported as pollinators in some species
(4) Cheiropterophily generally observed in flowers of tropical regions

[Chapter 15 : Principles of Inheritance and Variation]

1. All 4 types of blood groups are possible in children when
(1) Mother has blood group O and father has blood group AB
(2) Mother has blood group A and father has blood group AB
(3) Mother has blood group AB and father has blood group B
(4) Mother has blood group A and father has blood group B

2. Trisomy of 21st human chromosome is present in a human female. If the female is married with a normal male then what proportion of progeny is likely to be affected by this abnormality
(1) 50% (2) 25%
(3) 75% (4) 100%

3. Select **incorrect** statement
(1) A pureline is the progeny of a single plant obtained due to continuous self-fertilization
(2) Inbred lines are obtained in cross-fertilizing individuals due to fertilization among closely related lines
(3) A genotype cannot exhibit different phenotypes under different environmental conditions
(4) Hereditary characters have been found in chloroplast and mitochondria too

4. The number of phenotypes and types of gametes in a trihybrid cross AaBbCc × AaBbCc will be
(1) 8 and 64 (2) 8 and 8
(3) 8 and 27 (4) 27 and 27

5. In tetrahybrid (TtRrGgAa) selfing, the possibility of plant with genotype TTRrggAa in next generation would be
(1) $\frac{1}{256}$ (2) $\frac{9}{256}$
(3) $\frac{4}{256}$ (4) $\frac{2}{64}$

6. Crossing over is absent in
(1) Male *Drosophila* and *Bombax mori*
(2) Female *Drosophila* and *Bombax mori*
(3) Male *Drosophila* and female *Bombax mori*
(4) Female *Drosophila* and male *Bombax mori*

7. Blockage of phenylalanine hydroxylase leads to the appearance of disease phenylketonuria as well as
(1) Albinism
(2) Sickle cell anaemia
(3) Lesch nyhan's syndrome
(4) Tay-sach's disease

8. Choose **correct** match
(1) Patau's syndrome - Non-disjunctions
(2) Hypoploidy - Klinefelter's syndrome
(3) Auto-allopolyploidy - *Raphanobrassica*
(4) Familial's Down's syndrome - Trisomy of 21st chromosome

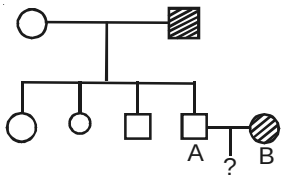
9. How many types of zygotic combinations are possible between a cross Aa BB Cc Dd × AA bb Cc DD?
(1) 32 (2) 128
(3) 64 (4) 16

10. What would be the phenotypic ratio in F_2 generation in a dihybrid cross if both the genes show lethality in homozygous dominant state?
(1) 2 : 2 : 2 : 2 (2) 4 : 2 : 2 : 1
(3) 6 : 3 : 2 : 1 (4) 9 : 3 : 3 : 1

11. The recombination frequency between the gene L and M is 7%, M and N is 12% and N and P is 15%. The distance between the gene M and P is
(1) 15 cM (2) 12 cM
(3) 19 cM (4) 3 cM

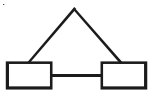
12. In the pedigree given below, a genetic disease caused by an autosomal gene (recessive) has been shown.

You would counsel the couple marked A and B that the probability that each of their children will have the disease is



(1) 0% (2) 25%

(3) 75% (4) 50%

13. In pedigree analysis the symbol  represents

(1) Consanguineous marriage

(2) Sex unspecified

(3) Monozygotic twin

(4) Dizygotic twin

14. Chromosome theory of linkage was given by

(1) Boveri and Sutton

(2) Bateson and Punnett

(3) Morgan and Castle

(4) Wilson and Stevens

15. If interference is complete the frequency of observed double crossover will be

(1) Equal to expected frequency

(2) Greater than expected frequency

(3) Lesser than expected frequency

(4) Zero

16. Which of the following chromosomal mutation can be beneficial and provide the basis for adaptive evolution?

(1) Duplication (2) Inversion

(3) Deletion/Deficiency (4) Translocation

17. F_2 phenotypic ratio by crossing AaBb would be _____ when first trait is completely dominant and second trait is incompletely dominant.

(1) 3 : 6 : 3 : 1 : 2 : 1 (2) 9 : 3 : 3 : 1

(3) $(1 : 2 : 1)^2$ (4) 9 : 3 : 1 : 2 : 1

18. How many types of gametes will be produced by a trihybrid individual, where last two genes are completely linked?

(1) Eight (2) Four

(3) Six (4) Two

19. *Drosophila* was utilized as experimental material by Morgan for his investigation, as

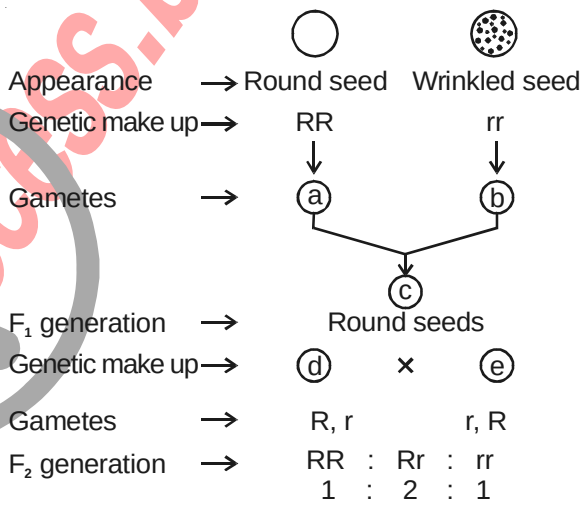
(1) It has very large size so that all the characters as easily observable without microscope

(2) Single mating produces a large number of offsprings

(3) Female flies can be easily distinguishable from male flies due to their small size

(4) New generation can be raised within two months

20. Given below is the diagram of a monohybrid cross between round and wrinkled seeded pea plants where the round allele (R) is dominant over wrinkled allele (r). From the given diagram label a, b, c, d and e.



(1) a = R, b = r, c = RR, d = rr, e = RR

(2) a = R, b = r, c = Rr, d = rr, e = RR

(3) a = r, b = R, c = rr, d = Rr, e = RR

(4) a = R, b = r, c = Rr, d = Rr, e = Rr

21. The crossover frequency between the genes X and Z is 4%, Z and Y is 10%, X and Y is 6%. Find the sequence of genes on chromosome.

(1) Z – X – Y (2) Y – Z – X

(3) X – Y – Z (4) Z – Y – X

22. A carrier female having gene for colourblindness and haemophilia on same X chromosome marries a colourblind man. What percentage of children will suffer from both traits?

(1) 100% (2) 50%

(3) 75% (4) 25%

23. Aneuploids develop due to

(1) Illegitimate crossing over

(2) Multiplication of same set of chromosome

(3) Exchange of chromosome segments between sister chromatids

(4) Non-disjunction of chromosomes

24. Which of the following represents the effect of UV rays?

(1) C → U (2) T → 5BrU

(3) T = T (dimer) (4) A → G

25. What is the probability of finding progenies having genotype AAbb in a cross involving AaBb × Aabb?

(1) $\frac{1}{2}$ (2) $\frac{3}{4}$

(3) $\frac{1}{4}$ (4) $\frac{1}{8}$

26. If a heterozygous AaBb for red flower and tallness is selfed, then calculate the number of red flowered plants among 1000 plants produced

(1) 750 (2) 500

(3) 900 (4) 250

27. In what proportion the genotype AABB, AABb, AaBB and AaBb are produced in a typical dihybrid F_2 generation?

(1) 1 : 1 : 1 : 1 (2) 1 : 2 : 3 : 4

(3) 1 : 2 : 2 : 4 (4) 9 : 3 : 3 : 1

28. How many types of gamete will be produced by genotype AaBbCcDDEE where all the genes are situated on different chromosomes?

(1) 8 (2) 16

(3) 4 (4) 32

29. The expressed phenotype in F_1 is combination of two phenotypes and their alleles in

(1) Incomplete dominance

(2) Codominance

(3) Double recessive epistasis

(4) Polygenic inheritance

30. Female heterozygous for phenylketonuria and for TSD marries a man which is also heterozygous for both traits. Find the probability of progeny to be suffering from both disorders

(1) 50% (2) 12.5%

(3) 6.25% (4) 0%

31. Person exhibiting sickle cell trait shows which of the following conditions?

(1) Hb^AHb^A

(2) Hb^SHb^S

(3) Hb^AHb^S

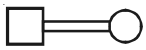
(4) More than one is correct

32. Choose the **incorrect** option

(1)  – Death

(2)  – Still birth

(3)  – Proposita

(4)  – Consanguineous marriage

33. How many total genotypes and phenotypes will be produced in a dihybrid test cross in case of independent assortment?

(1) 2 (2) 13

(3) 27 (4) 8

34. If in a dihybrid cross, 2000 individuals are produced in F_2 generation, approximately how many will be phenotypically different from parents (P-generation)?

(1) 1250 (2) 1000

(3) 1500 (4) 750

35. What respective ratio of purple flowered and white flowered individuals is expected when plants with the given genotypes are crossed in *Lathyrus odoratus*? [CcPp × ccPp]

(1) 5 : 3 (2) 2 : 6

(3) 6 : 2 (4) 3 : 5

36. Mendel's work was not taken seriously by contemporary scientists. Among the various reasons cited below, which one is **incorrect**?

(1) Non-duplication of results on Hawkweed

(2) Occupation of biological world with Darwin's theory of natural selection

(3) Non discovery of chromosome, mitosis and meiosis at that time

(4) His selection of garden pea which possessed limited number of varieties and produced limited number of seeds

37. Out of the following parental combinations, which one will produce 16 types of gametes, 16 phenotypes and 16 genotypes?

(1) TtRrWWAa × TtRrwwaa

(2) TtRrWWAA × TTRRwwaa

(3) TtRrWwAa × ttrrwwaa

(4) TtRrWwAa × TtRrWwAa

38. When a heterozygous *Cucurbita pepo* (Summer Squash) plant with disc-shaped fruit is crossed with homozygous plant with long-shaped fruit, three types of plants with disc-shaped, spherical and long fruits are produced in the ratio of _____ respectively.

(1) 9 : 6 : 1 (2) 1 : 2 : 1

(3) 2 : 1 : 1 (4) 1 : 1 : 2

39. Nitrous acid changes cytosine into _____ and adenine into _____.

(1) Xanthine, Uracil

(2) Hypoxanthine, Xanthine

(3) Guanine, Thymine

(4) Uracil, Hypoxanthine

40. What would be the blood groups of children if both parents have AB blood group?

(1) B or AB (2) O

(3) A, AB or B (4) A or AB

41. Normal parents have three normal daughters and one colour blind son. The possible reason is/are

(1) It is sex-linked inheritance

(2) Daughter is heterozygous for colour blindness

(3) Mother is carrier

(4) More than one option is correct

42. Which one of the following characters of garden pea studied by Mendel was a dominant feature?

(1) Yellow pod colour

(2) Terminal flower position

(3) Green seed colour

(4) Green pod colour

43. A pure sinistral female snail is crossed with a pure dextral male. The phenotypic ratio in F_2 is

(1) 1 Dextral : 3 Sinistral

(2) 1 Dextral : 2 Sinistral

(3) All dextral

(4) All sinistral

44. Nutritionally mutant strain of pink bread mould is called

(1) Prototroph (2) Auxotroph

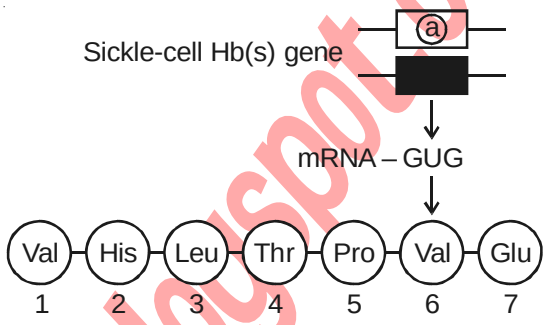
(3) Osmotroph (4) Phagotroph

45. During cross between Agouti (AABB) and Albino (aabb) mouse, the ratio of F_2 progenies with genotypes, *i.e.*, aabb, AaBB and AaBb will be

(1) 1 : 2 : 2 (2) 1 : 2 : 4

(3) 1 : 1 : 2 (4) 1 : 4 : 2

46. Following is the micrograph of red blood cells and amino acid composition of the relevant portion of β-peptide of haemoglobin from an individual with sickle-cell anaemia



The triplet nucleotides, *i.e.*, (a) of template is

(1) GTG (2) GUG

(3) GAG (4) CAC

47. Which of the following type of gamete will not be produced normally by genotype AaBbCc?

(1) AbC (2) ABc

(3) aBC (4) aBb

48. What would be the genotypic basis of ascospores arrangement in the ascus of *Neurospora crassa* if crossing over occurs at 2-stranded stage?

(1) 4Ab : 4aB

(2) 4AB : 4aB

(3) 2AB : 2Ab : 2aB : 2ab

(4) 2AB : 4Ab : 2ab

49. In a forest, if the maximum height of teak tree is 60 feet and minimum height is 32 feet. The average height of teak with aaBB genotype will be

(1) 55 feet (2) 52 feet

(3) 46 feet (4) 36 feet

50. A cross is made between AABbcc and aaBbCC typed individuals. What proportion of the offsprings will be of genotype, *i.e.*, aaBBCc?

(1) 25% (2) 12.5%

(3) 6.25% (4) Zero

51. For which of the following chromosome constitution, the sterile male is produced in *Drosophila*?

(1) AA + XY (2) AAA + XXX

(3) AA + XX (4) AA + XO

52. If a trait is controlled by 2 polygenes, then phenotypic classes will show the ratio of _____

(1) 1 : 4 : 6 : 4 : 1 (2) 9 : 3 : 3 : 1

(3) 4 : 4 (4) 6 : 3 : 2 : 1

53. If the genotype is AaBbCc. What will be percentage of gamete having two recessive alleles?

(1) 37.5% (2) 12.5%

(3) 6.25% (4) 27.5%

54. Number of grains in ear of wheat is due to

(1) Somatogenic variation

(2) Discontinuous variation

(3) Continuous variation

(4) Phenotypic plasticity

55. In a dominant epistatic gene interaction in *Cucurbita pepo*, calculate the number of phenotype and genotype in a cross AaBb × aabb

(1) 4 genotypes, 3 phenotypes

(2) 3 genotypes, 2 phenotypes

(3) 4 phenotypes, 4 genotypes

(4) 2 phenotypes, 2 genotypes

56. Read the following statements carefully and choose the **correct** option

(a) Phenotype is the external manifestation of gene product

(b) Individuals with similar phenotypes may not belong to same genotype

(c) Individuals with different phenotypes usually have similar genotypes

(d) Phenotype is not influenced by environment

(e) Phenotype remains same throughout the life of an individual

(1) b, c, & d are correct

(2) a, b & e are correct

(3) c & d are correct

(4) a & b are correct

57. Probability of heterozygous individual for all the traits produced by a cross between AaBbCC × AaBbcc is

(1) $\frac{1}{4}$ (2) $\frac{1}{8}$

(3) $\frac{1}{2}$ (4) $\frac{1}{16}$

58. Choose the **odd** one out w.r.t. the number of type of gametes formed in the given below genotypes

(1) AaBbCc (2) TtRrUuVv

(3) YyWwXxZZ (4) LlIiZZRRFf

59. Mice having yellow body colour is crossed with brown colour one. What percentage of progeny show lethality?

(1) 25% (2) 75%

(3) 0% (4) 100%

60. A heterozygous plant with red flower and tall height was crossed with recessive plant having white flower and dwarf height. What will be the percentage of plants having dwarf height?

(1) 25% (2) 75%

(3) 50% (4) 12.5%

61. What will be the number of individuals homozygous for first character and heterozygous for second character in a dihybrid cross?

(1) $\frac{4}{16}$ (2) $\frac{6}{16}$

(3) $\frac{3}{16}$ (4) $\frac{4}{64}$

62. A diploid organism is heterozygous for 5 loci. The types of gametes produced will be

(1) 16 (2) 8

(3) 32 (4) 5

63. Mendel selected _____ true breeding pea plant varieties which were similar except for _____ character(s) with contrasting traits.

(1) 7, one (2) 14, two

(3) 7, two (4) 14, one

64. Why was Mendel successful in his experiments performed on pea plant?

(1) He selected only pure breeding varieties of *Pisum sativum*

(2) He took only those traits for his studies which showed linkage

(3) Characters chosen by him were not distinctive contrasting traits

(4) He studied the inheritance of a character for only one generation

65. If mulatto man marries an albino woman (aabbcc), how many different type of phenotypes are obtained?

(1) 4 (2) 3

(3) 2 (4) 5

66. Which one of the following is not the characteristic feature of multiple allele?

(1) Individual will always have more than 2 alleles of the group

(2) A chromosome contains only one allele of the group

(3) Gametes carry single allele

(4) All multiple alleles occur on same gene locus of homologous chromosomes

67. A heterozygous purple coloured *Lathyrus odoratus* flower (CcPp) is crossed with double recessive homozygous white colour flower. What is the phenotypic ratio of purple and white flowers obtained in progeny?

(1) 9 : 7

(2) 9 : 3 : 3 : 1

(3) 1 : 3

(4) 9 : 3 : 4

68. In a Mendelian dihybrid cross, if one trait shows incomplete dominance and other trait shows homozygous dominant lethality then what will be the phenotypic ratio of progenies obtained in F_2 generation?

(1) 9 : 3 : 3 : 1

(2) 2 : 4 : 2 : 1 : 2 : 1

(3) 3 : 1

(4) 1 : 2 : 1 : 2 : 4 : 2 : 1 : 2 : 1

69. Trihybrid genotypic test cross ratio will be

(1) 1 : 1 : 1 : 1 : 1 : 1 : 1 : 1

(2) 1 : 1 : 1 : 1

(3) 1 : 1

(4) 1 : 2 : 1

70. How many type of gametes can be formed from AaBbCcDdEEZz genotype?

(1) 2^2 (2) 2^5

(3) 2^4 (4) 3^2

71. When a pea plant with intermediate sized starch grain in seed is crossed with other plant having small sized starch grain in seed, the total number of seeds obtained in progeny is 630. What is **correct** for this progeny?

(1) 330 (large size), 330 (small size)

(2) 330 (small size), 330 (medium size)

(3) 315 (intermediate size), 315 (small size)

(4) 158 (large size), 158 (small size), 314 (intermediate size)

72. Symbol utilized in pedigree analysis for unspecified sex is

(1)  (2) 

(3)  (4) 

73. The gene interaction where both dominant and recessive alleles express together and equally is

(1) Dominance

(2) Pseudodominance

(3) Incomplete dominance

(4) Co-dominance

74. Proportion of plants with purple coloured petals in sweet pea produced from Ccpp × ccPp would be

(1) $\frac{1}{4}$ (2) $\frac{3}{4}$

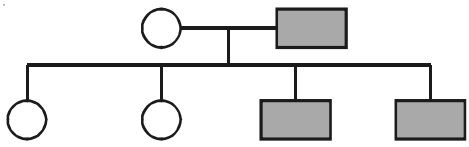
(3) $\frac{2}{4}$ (4) $\frac{3}{8}$

75. Find out the sequence of genes on chromosome if recombination frequency between genes A and B, C and D, B and C, A and C are 12%, 5%, 3% and 15% respectively

(1) ACBD (2) CBAD

(3) ABCD (4) DCAB

76. Find a correct statement w.r.t. given pedigree



(1) This can explain inheritance of hypertrichosis

(2) It may represent inheritance of an trait autosomal recessive

(3) Autosomal dominant trait shows such an inheritance

(4) All of these can be explained

77. Percentage of garden pea seeds with round shape having intermediate starch grain size will be _____, if the cross is made between BB and Bb parents.

(1) 100% (2) 50%

(3) 25% (4) 0%

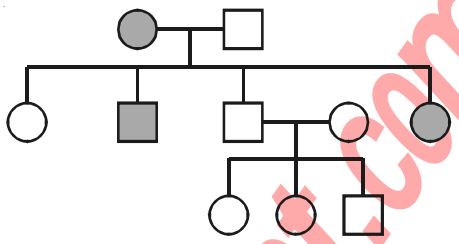
78. Which is not an effect of chemical mutagen HNO_2?
(1) Causes deamination of bases like A, G and C
(2) Causes methylation and ethylation of bases
(3) C is converted to U which pairs with A
(4) A is deaminated to hypoxanthine and pairs with C

79. Match the following **correctly**

	Column I		**Column II**
a.	Father of polygenic inheritance	(i)	Nilsson-Ehle
b.	Kernel colour in wheat	(ii)	Kolreuter
c.	Human skin colour	(iii)	Galton
d.	Human height	(iv)	Davenport

(1) a(ii), b(i), c(iv), d(iii) (2) a(i), b(ii), c(iv), d(iii)
(3) a(ii), b(i), c(iii), d(iv) (4) a(i), b(ii), c(iii), d(iv)

80. In the given pedigree, the shaded symbols indicate autosomal _____ trait.



(1) Recessive
(2) Dominant
(3) Incompletely dominant
(4) More than one option is correct

ZOOLOGY

[Chapter 11 : Reproduction in Organisms, Human Reproduction]

1. The type of parthenogenesis wherein the parthenogenetic egg may develop into individual of any sex is known as
(1) Arrhenotoky (2) Thelytoky
(3) Amphimixis (4) Amphitoky

2. Which of the following structure in the human male reproductive system can be considered equivalent to the mesorchium?
(1) Dartos muscles (2) Cremaster muscles
(3) Gubernaculum (4) Detrusor muscles

3. Testis in the male reproductive system is surrounded by 3 covers. Which of the following cover is the outermost?
(1) Mesorchium (2) Tunica vaginalis
(3) Tunica vasculosa (4) Tunica albuginea

4. Which of the following can't be taken as the character/function of the sertoli cell?
(1) Release of ABP
(2) Contribute to major part of semen
(3) Release of AMF
(4) Formation of blood testes barrier

5. Which of the following act as a direct link between the ovary and the wall of the uterus?
(1) Broad ligament (2) Mesovarium
(3) Ovarian ligament (4) Mesosalpnix

6. 'Inhibin' hormone which regulates the release of 'FSH' by acting on adenohypophysis and hyothalamus, is released by
(1) Endocrine cells or Interstitial cells of testes
(2) Sertoli cells of testes
(3) Granulosa cells of ovary
(4) Both (2) & (3)

7. Which of the following structrue in the Graafian follicle acts as a link between the developing oocyte and wall of the follicle?
(1) Tunica vaginalis (2) Jelly envelope
(3) Cumulus ovaricus (4) Corona radiata

8. If a female is having a menstrual cycle of 32 days, what will be the day of ovulation in this case?
(1) 14^{th} day (2) 10^{th} day
(3) 18^{th} day (4) 16^{th} day

9. If one of the ovary of a female fails to develop, how many ova will be released by her in one year provided no fertilisation occurs?
(1) Only 6
(2) No ova will be released
(3) Less than 6
(4) Approximately 12

10. Which of the following structure is referred to as white scar or white body of the ovary?
(1) Corpus albicans
(2) Stroma part of ovary
(3) Tunica albuginea of ovary
(4) Follicles of the ovary

11. At the time of ovulation, how many polar bodies will be present in the human ovum?

(1) Three (2) Two

(3) One (4) None of these

12. In human, the ovum is first released from the ovary into

(1) Body cavity (2) Isthmus part

(3) Fimbriae of oviduct (4) Ampulla part

13. Which of the following acrosomal enzyme of the sperm is involved in dissolution of proteoglycan filaments of granulosa layer surrounding the ovum?

(1) Hyaluronidase (2) Acrosin

(3) Zona lysin (4) Both (1) & (2)

14. Which part of the blastocyst contributes to the formation of foetal part of placenta?

(1) Epiblast layer (2) Trophoblast layer

(3) Hypoblast layer (4) Inner cell mass

15. Which of the following will be included under slow block to prevent polyspermy?

(1) Depolarisation of egg membrane

(2) Cortical reaction

(3) Zona reaction

(4) Both (2) & (3)

16. The type of placenta in early human embryo on the basis of distribution of chorionic villi is

(1) Discoidal (2) Diffuse

(3) Metadiscoidal (4) Zonary

17. The cells of the trophoblast which are in contact with the inner cell mass are called

(1) Extra embryonic cells

(2) Cells of Rauber

(3) Germinal cells

(4) Renshaw cells

18. In which of the following type of placenta, no maternal barrier is left *i.e.* only fetal layers are involved?

(a) Endotheliochorial

(b) Hemochorial

(c) Hemoendothelial

(1) Only (b) (2) Only (c)

(3) Both (a) & (c) (4) Both (b) & (c)

19. Which of the following is correct w.r.t. extra embryonic layers involved in formation of Allantois?

(1) Somatopleuric extra embryonic mesoderm + Trophoblast

(2) Splanchnopleuric extra embryonic mesoderm + Endoderm

(3) Somatopleuric extra embryonic mesoderm + Endoderm

(4) Splanchnopleuric extra embryonic mesoderm + ectoderm

20. Which of the following character can't be linked to the colostrum in human?

(1) Poor in Iron content

(2) Vitamin C is present in small quantity

(3) Contain IgM antibodies to provide immunity

(4) Casein and lactose are present

21. Which of the following structures in the testes acts as link between tubuli recti and vasa efferentia?

(1) Seminiferous tubule (2) Rete testis

(3) Vasa deferentia (4) Epididymis

22. Which of the following can't be taken as character of the Sertoli cells?

(1) Present in between germinal epithelial cells

(2) Elongated structure

(3) Secrete androgen and inhibin to regulate FSH

(4) Release Anti Mullerian factor

23. The type of blastula which develops from centrolecithal egg in which the yolk is present in centre of the egg

(1) Periblastula (2) Discoblastula

(3) Stereoblastula (4) Coeloblastula

24. Extra embryonic coelom *i.e.* chorionic cavity is lined by

(1) Ectoderm of chorion and endoderm of amnion

(2) Ectoderm of amnion and mesoderm of chorion

(3) Mesoderm of chorion and mesoderm of amnion

(4) Endoderm of allantois and ectoderm of amnion

25. If the foetal testis (within 8 months) is not able to produce sufficient amount of testosterone then

(1) Cremaster muscles are not allowed to form spermatic cord

(2) Testes fails to descend in scrotum

(3) Inguinal hernia is commonly reported

(4) No effect on sperm formation and maturation

26. Which of the following acts as ''precursor of the embryo'' in human embryonic development?

(1) Trophoectoderm (2) Primitive streak

(3) Cells of Rauber (4) Embryonic knob

27. The state of suspension of estrons cycle, during non-breeding season is called _____

(1) Polyestrous (2) Anestrum

(3) Monoestrous (4) Reflex ovulation

28. When every part of fertilized egg has a definite fate, so that fate of every blastomere is determined from beginning is called _____

(1) Indeterminate

(2) Regulative cleavage

(3) Determinate cleavage

(4) Both (1) & (2)

29. During embryonic development in human, Zona pellucida disappears _____

(1) After one month of pregnancy

(2) Just after fertilization

(3) Just before implantation

(4) Any time in 2nd trimester

30. Migration or spreading of the micromeres all over the megameres in the development of frog is known as

(1) Invagination (2) Involution

(3) Epiboly (4) Emboly

31. The egg membrane which is secreted by the follicular cells around the ovum is

(1) Primary egg membrane

(2) Secondary egg membrane

(3) Tertiary egg membrane

(4) Chalazae

32. Which of the following hormone induces cervical glands to secrete viscous mucus to form a protective plug?

(1) Estrogen (2) hCG

(3) Progesterone (4) GnRH

33. If a mother does not feed her baby, there is inhibition of milk production . The autocrine action thus meets the need of supply with demand, it is due to the presence of

(1) VIP (2) Inhibin

(3) Inhibitory peptide (4) CRH

34. During parturition which of the following stage involves the rupturing of the amniotic sac?

(1) Expulsion phase (2) Ectopic phase

(3) Stage of dilation (4) Placental phase

35. The type of reproduction in which only females are produced as a result of parthenogenesis is called as

(1) Thelytoky

(2) Arrhenotoky

(3) Natural parthenogenesis

(4) Amphitoky

36. After ovulation the path of secondary oocyte in fallopian tube is

(1) Fimbriae → Infundibulum → Ampulla → Isthmus

(2) Fimbriae → Isthmus → Infundibulum → Ampulla

(3) Fimbriae → Coelomic cavity → Infundibulum → Ampulla → Isthmus

(4) Isthmus → Fimbriae → Infundibulum → Ampulla

37. Spermiation is

(1) The process of release of sperms from seminiferous tubules

(2) The process of conversion of spermatids from spermatogonia

(3) The process of conversion of spermatids into sperms

(4) The low count of sperms in semen

38. Incomplete parthenogenesis is found in

(1) *Lacerta sexicola armaniaca*

(2) *Typhlina brahmina*

(3) *Ambystoma*

(4) Honey bees

39. The first movement of the foetus and appearance of hair on the head are usually observed during

(1) Fifth week (2) Fifth month

(3) Seventh month (4) Third month

40. Leydig cells stimulates synthesis and secretion of androgens under the influence of

(1) FSH (2) ICSH

(3) Estrogen (4) All of these

41. Primary oocytes undergo meiosis-I and get temporarily arrested at the stage called

(1) Metaphase-I

(2) Anaphase-I

(3) Diakinesis of prophase-I

(4) Diakinesis of prophase-II

42. Zona pellucida is formed in

(1) Primary oocyte (2) Primary follicle

(3) Secondary oocyte (4) Secondary follicle

43. Which of the following hormones achieves two peaks during the menstrual cycle?

(1) FSH (2) LH

(3) Estrogen (4) Progesteron

44. Capacitation of sperm includes all except

(1) Removal of membrane cholesterol present over acrosome

(2) Dilution of decapacitation factors

(3) Entry of Ca^{2+} into sperms causing rapid whiplash motion of the tail part

(4) It takes place in epididymis

45. Entry of sperm causes

(1) Breakdown of metaphase promoting factor and anaphase promoting factor

(2) Turning on metaphase promoting factor only

(3) Break down of anaphase promoting factor only

(4) Breakdown of metaphase promoting factor and turning on anaphase promoting complex

46. Which of the following is not a function of placenta?

(1) Nutrition (2) Endocrine

(3) Excretion (4) Haemopoiesis

47. Foetus is less susceptible to tetratogens

(1) During formation of extra embryonic embrane

(2) After first trimester

(3) After formation of placenta

(4) After formation of neural tube

48. Sertoli cells also termed as nurse cells secrete androgen binding proteins which helps in

(1) Inhibiting LH/ICSH released by anterior pituitary

(2) Concentrating testosterone in the seminiferous tubules

(3) Providing nutrition to developing spermatozoa

(4) Inhibiting development of mullerian duct in male

49. Which of the following is incorrect statement w.r.t. spermatogenesis and release of sperms

(1) FSH acts at the leydig cells and stimulates synthesis and secretion of androgens

(2) LH acts on the sertoli cells and stimulates secretion of some factors to assist spermiogenesis

(3) Secretion of epididymis, vas-deferens, seminal vesicle and prostate are essential for maturation and motility of sperms

(4) Both (1) & (2)

50. Which of the following is incorrectly matched?

(1) Hyaluronidase - Dissolves hyaluronic acid responsible for cementing granulosa cells

(2) Corona penetrating enzyme - Dissolved corona radiata

(3) Zona lysin - Digests the zona pellucida

(4) Cortical reaction - Fast block to check polyspermy

51. Implantation is the attachment of the blastocyst to the uterine wall. It occurs after

(1) 9 days of fertilization

(2) 5 days of fertilization

(3) 7 days of fertilization

(4) 120 hours of fertilization

52. Which of the following provides nutrition to the embryo?

(1) Zona pellucida (2) Corona radiata

(3) Trophoectoderm (4) Hypoblast layer

53. Embryoproper develops from

(1) Trophablast (2) Cells of Rauber

(3) Inner cell mass (4) Abembryonal end

54. The trophoblastic cells secrete

(1) hCG (2) hPL

(3) LH (4) Progesterone

55. A human male ejaculates about 200 - 300 millions sperms of which at least _____ sperms must have normal shape and size and at least _____ of them must show vigorous motility for normal fertility

(1) 60%, 40% (2) 10%, 20%

(3) 40%, 60% (4) 40%, 30%

56. Spermatic cord is inguinal cord containing following structure except

A. Artery and vein B. Nerve, lymph vessel

C. Cremaster muscle D. Dartos muscle

(1) A, B, C & D (2) B & D

(3) A, B & D (4) Only D

57. Glands of Tyson are modified _____ glands, located in the prepuce and glans penis.

(1) Sweat (2) Sebaceous

(3) Meibomian (4) Sudoriferic

58. Removal of womb is called

(1) Castration (2) Hysterectomy

(3) Cryptorchidism (4) Prostatectomy

59. Cremaster muscles are found in

(1) Scrotal sac (2) Testes

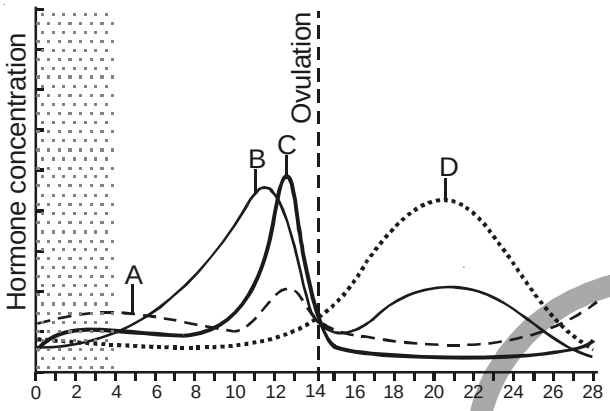
(3) Seminal vesicles (4) Spermatic cord

60. In girls, first event of puberty is called

(1) Thelarche (2) Pubarche

(3) Menarche (4) Menopause

61. Diagram is showing hormonal regulation of menstrual cycle. Which labelling is showing progesterone hormone



(1) A (2) B

(3) C (4) D

62. Vas deferens emerges from

(1) Caput epididymis (2) Corpus epididymis

(3) Cauda epididymis (4) Ejaculatory duct

63. A T.S. from glans penis will show

(1) Corpus spongiosum (2) Corpora cavernosa

(3) Penile urethra (4) Both (1) & (3)

64. Menstruation occurs in

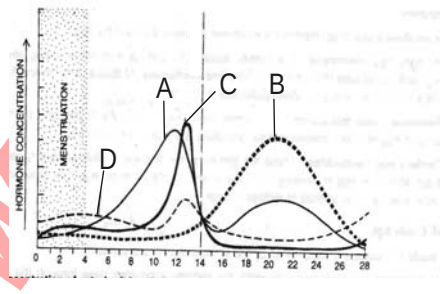
(1) Humans only

(2) All mammals

(3) Humans, apes and old world monkeys

(4) Humans, apes only

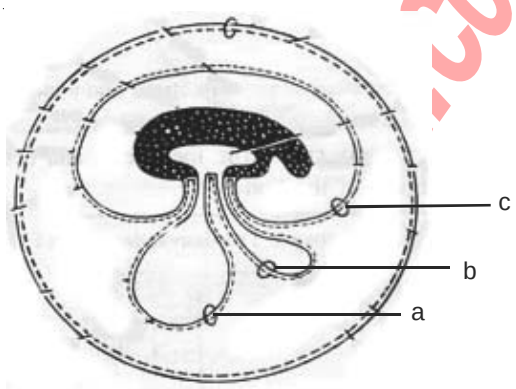
65. In the given graph the concentration of hormone in the blood in different stages of menstrual cycle has been shown. Identify the hormones which show the highest peak just prior to the ovulation.



(1) A = FSH (2) B = Oestrogen

(3) C = LH (4) Both A & B

66. The figure shows extraembryonic membranes. Identify the membranes marked as a, b and c.



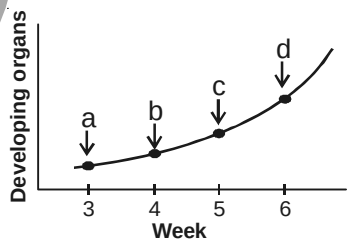
(1) a – Yolk sac ; b – Amnion ; c – Allantois

(2) a – Amnion ; b – Yolk sac ; c – Allantois

(3) a – Allantois ; b – Yolk sac ; c – Amnion

(4) a – Yolk sac ; b – Allantois ; c – Amnion

67. Developmental changes in human embryo during 3rd to 6th week have been depicted as a, b, c and d in the following graph. Identify them.



(1) a - Umbilical cord, b - Neural tube
c - Heart, d - Brain

(2) a - Neural tube, b - Heart, c - Limb bud, d - eye

(3) a - Umbilical cord, b - heart, c - Neural tube,
d - brain

(4) a - Neural tube, b - Umbilical cord, c - Heart,
d - Brain

68. Phocomelia is

(1) Absence of brain

(2) Reduplication of bones

(3) Absence of long bones

(4) None of these

1. Which of the following contraceptive device suppresses sperm motility and the fertilising capacity of the sperms?
   (1) Nonoxynol-9 (2) Sterilisation
   (3) Copper releasing IUD (4) Saheli
2. Choose the incorrect statement
   (1) Complete lactation could be a natural method of contraception
   (2) Creating awareness about sex related aspects is an effective method to improve reproductive health
   (3) Infertility is always due to defects in the female partner
   (4) Abortions can occur spontaneously too
3. The semen collected from healthy donor is artificially introduced into the uterus is called
   (1) Intra-uterine transfer (IUT)
   (2) Intra-uterine insemination (IUI)
   (3) Intra-uterine device (IUD)
   (4) Intra cytoplasmic sperm injection (ICSI)
4. Periodic abstinence is one of the natural contraceptive method in which the couples avoid or abstain from coitus from
   (1) Day 5 to 10 of the menstrual cycle
   (2) Day of ovulation till next menstruation
   (3) Day 10 to 17 of the menstrual cycle
   (4) Day 1 to 5 of menstrual cycle
5. Which of the following is incorrect w.r.t. minipill 'Saheli'?
   (1) Non steroidal
   (2) Causes asynchrony in the menstrual cycle
   (3) Prevents ovulation
   (4) Causes lining of the uterus to build more slowly
6. Consider following statements
   (i) Contraceptive pills alter the quality of cervical mucous to retard entry of sperms
   (ii) Saheli is an oral contraceptive contains steroid preparation
   (iii) Saheli is the "once a week" pill with very few side effects and high contraceptive value
   (iv) Cervical caps, vaults and diaphragms are reusable

   Which of the above statements are true?
   (1) (i), (ii) & (iii) (2) (ii), (iii) & (iv)
   (3) (i), (iii) & (iv) (4) (i), (ii), (iii) & (iv)
7. Which of the following criteria can be considered as the difference between oral contraceptive pills and injections or implants?
   (1) Mode of action
   (2) Mode of administration
   (3) Duration of effective periods
   (4) Both (2) & (3)
8. Administration of which contraceptive device within 72 hours of coitus have been found to be very effective as emergency contraceptives as they could be used to avoid possible pregnancy due to casual unprotected intercourse?
   (1) Progestogen estrogen combinations
   (2) IUDs
   (3) Barriers
   (4) Both (1) & (2)
9. MTP is legalised in India. It becomes essential in certain cases where
   (1) Continuation of the pregnancy could be harmful or even fatal either to the mother or to the foetus or both
   (2) To get rid of unwanted pregnancies either due to casual unprotected intercourse or due to rapes
   (3) Female child is not required
   (4) Both (1) & (2)
10. Choose **incorrect** statement among following
   (1) Some STDs like hepatitis-B and HIV can be transmitted by transfusion of blood or from an infected mother to the foetus
   (2) Except hepatitis-B and genital herpes, all other STDs are completely curable if detected early and treated properly
   (3) In STDs, infected females may often be asymptomatic and may remain undetected for long
   (4) Social stigma attached to STDs deters the infected persons from going for timely detection and proper treatment
11. Prevention or early detection and cure of STDs are given prime consideration under the reproductive health care programmes. Why?
   (1) Because incidences of STD infections are very high among persons in the age group of 15-24 years
   (2) STDs could leads to complications like abortions, stillbirths, ectopic pregnancies and PID
   (3) Because all the STDs are incurable
   (4) Because STDs remain always asymptomatic

12. Fertilisation outside the body in almost similar conditions as that in the body is called
(1) *In vivo* fertilization
(2) ZIFT
(3) GIFT
(4) *In vitro* fertilization (IVF)

13. Mark the correct statement
(1) Embryos formed by *in vivo* fertilization also could be used for ZIFT or IUT to assist those females who can not conceive
(2) Embryos with more than 8 blastomeres are transferred into the fallopian tube
(3) Transfer of ovum collected from a donor into uterus of another female is called GIFT
(4) Performing MTP in the 2nd trimester is safe and not riskier

14. Which of the following is hormone releasing IUD?
(1) Multiload 375 (2) LNG-20
(3) Lippes loop (4) CuT

15. Match the following

Column-I	**Column-II**
a. Syphilis	(i) HSV-2
b. Genital herpes	(ii) *Treponema pallidum*
c. Genital warts	(iii) Virus with ds DNA
d. Hepatitis-B	(iv) HSV-1
	(v) HPV

(1) a(iii), b(iv), c(ii), d(v) (2) a(ii), b(i), c(v), d(iii)
(3) a(ii), b(iv), c(v), d(iii) (4) a(ii), b(v), c(iv), d(i)

16. An STD caused by a spirochete and characterized by cerebellar damage which is manifested by uncoordinated movements is
(1) Gonorrhoea (2) Chlamydia
(3) French pox (4) Chancroid

17. Pap smear test is performed to detect the
(1) Time of ovulation
(2) Implantation
(3) Genetic defect of foetus
(4) Cervix cancer

18. Find out the **incorrect** statement
(1) French drug RU-486 can induce abortion
(2) RU-486 (Mifepristone) is an antiprogestin
(3) Ru-486 prepares the uterine endometrium for implantation
(4) The effectiveness of Norplant is about 99.7 percent

19. Find out the incorrect statement w.r.t. Norplant
(1) Contain progestin, the active ingredient in birth control pills
(2) Hormone containing six plastic cylinders are inserted directly under the skin of the upper arm
(3) It is effective for 5 months
(4) Effectiveness is about 99.7%

20. Which of the following is **incorrect** pair w.r.t. the disease and its causative agent?
(1) Syphilis : *Treponema pallidum*
(2) AIDS : HIV
(3) Chancroid : Human papilloma virus
(4) Gonorrhoea : *Neisseria gonorrhoeae*

21. Which of the following sexually transmitted diseases is/are not completely curable?
(1) Hepatitis B (2) Genital herpes
(3) HIV infection (4) All of these

22. Mark the detection technique for syphilis
(1) PCR
(2) VDRL
(3) Ames test
(4) ELISA

23. Which of the following contraceptive implant is inserted directly under the skin of the upper arm in a relatively simple surgical procedure?
(1) Depo-provera (2) Norplant
(3) CuT (4) LNG-20

24. Family planning programmes creating awareness among people about various reproduction related area are in operation under the name
(1) Mother and child health care(MCHC)
(2) Reproductive and child health care (RCH)
(3) Child health care (CHC)
(4) Reproductive and mother health care (RMC)

25. In females hundred percent effective method of birth control is provided by
(1) Vasectomy (2) Tubal ligation
(3) Depo provera (4) IUDs

26. Lactational amenorrhea method is based on:
(1) No ovulation therefore the cycle do not occur during the period of intense lactation following parturition
(2) Ovulation occur but cycle do not occur during the period of intense lactation following parturition
(3) This is reported to be effective only upto a maximum period of three months
(4) Chances of failure of this method is very low

27. Which of the following is odd one out?
(1) LNG-20 (2) Cu T
(3) Cu7 (4) Multiload 375

28. Match the following

	Column I		Column II
a.	Chancroid	(i)	VDRL
b.	Carcinogenicity	(ii)	Ames
c.	Syphilis	(iii)	ELISA
d.	Hepatitis	(iv)	Gram staining

(1) a(i), b(ii), c(iii), d(iv) (2) a(iv), b(ii), c(iii), d(i)
(3) a(iv), b(ii), c(i), d(iii) (4) a(iii), b(ii), c(i), d(iv)

29. Following are considered as method of ART except
(1) IUI (2) GIFT
(3) ZIFT (4) IUDs

30. Technique where another women carries embryo or a donor embryo to full term in her uterus is called
(1) Gestational carrier (2) Surrogacy
(3) ICSI (4) Both (1) & (2)

31. Medical termination of pregnancy is legalised upto
(1) 12 week (2) 20 week
(3) 4 week (4) 24 week

32. Birth pills are effective method of contraception. Which is not correct w.r.t. oral contraceptives?
(1) Pills contain estrogen and progesterone
(2) Ovarian follicles do not ripen in their presence
(3) Ovulation does not take place
(4) Failure rate is almost zero

33. It is non-steroidal, once a week contraceptive pill with very few side effects
(1) Mala-D (2) Norplant
(3) Saheli (4) RU 486

34. Which of the following statement is true w.r.t. use of diaphragm?
(1) Used together with a spermicide
(2) Toxic shock syndrome and recurrent urinary tract infections are associated with it
(3) Protect against STDs
(4) Only (1) & (2)

35. Which of the following is incorrectly matched?
(1) Hormone releasing IUD - Progestasert
(2) Induced abortion - Vacuum aspiration
(3) Condom - Protect against STD also
(4) Lippes loop - Cu releasing IUD

36. What is correct with the action of copper releasing IUDs?
(1) Are functional for specified limit of time
(2) Suppress sperm motility
(3) Reduces fertilising capacity of sperms
(4) All of these

37. Some studies have revealed that the following contraceptive may cause cancer. It is
(1) Norplant (2) RU-486
(3) Saheli (4) Depo provera

38. Infection of female genitals including pelvic cavity causing peritonitis commonly called as clap is caused by
(1) *Neisseria gonorrhoea*
(2) *Treponema pallidum*
(3) *Haemophilus ducryei*
(4) Human papilloma virus

39. One of the following is not advisable for a patient who requires emergency contraception
(1) Use of combined pills in overdose
(2) Use of mifepristone
(3) Insertion of IUD with 5 days of sexual activity
(4) Insertion of diaphragm

40. Yellow vaginal discharge with a particular offensive odour and severe vaginal itch are the symptoms related to infection of
(1) HPV
(2) *Trichomonas vaginalis*
(3) *Treponema pallidum*
(4) HSV-1

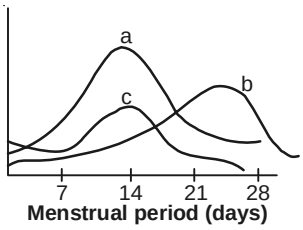
41. Which of the following immunological test is for sexually transmitted disease syphilis?
(1) Wassermann's test (2) Tourniquet
(3) Schick's test (4) Mantoux

42. *Haemophilus ducrei* is a causative agent of
(1) Genital warts (2) Chancroid
(3) Genital herpes (4) Chlamydia

43. Mark the non-invasive technique being used by physicians now a days to determine the foetal health condition
(1) Amniocentesis
(2) Chorionic villus sampling
(3) Ultrasonic imaging
(4) Tubectomy

44. Which of the following contraceptive is given as intramuscular injection once every 3 months, contains progestin that prevents maturation of ovum?
(1) Norplant (2) Saheli
(3) Mala-D (4) Depo provera

45. During menstrual period levels of different hormones (a,b,c) have been shown in the following graph. Find out the contraceptives which prevent their formation or action.



(1) a – Mifepristone ; b – Centchroman ; c – LNG-20

(2) a – LNG-20 ; b – Mifepristone ; c – Centchroman

(3) a – CuT ; b – Progestasert ; c – PoP

(4) a – PoP ; b – Mifepristone ; c – LNG-20

46. Mifepristone is

(1) Antiprogesterone (2) Antigonadotropin

(3) Antiestrogen (4) Antiandrogen

47. World population day is on

(1) 1st December (2) 11th July

(3) 26th June (4) 4th December

48. In the intrauterine transfer, which of the stage of early embryo is transferred into uterus?

(1) Zygote

(2) Upto 8 blastomere

(3) More than 8 blastomeres

(4) After first trimester

49. Formula for calculation of average annual growth rate is

(1) $\left[\frac{P_2-P_1}{P_1-N}\right]\times 100$ (2) $\left[\frac{P_2-P_1}{P_1\times N}\right]\times 100$

(3) $\left[\frac{P_1+P_2}{P_1\times N}\right]\times 100$ (4) $\left[\frac{P_1+P_2}{P_2+N}\right]\times 100$

50. Match the following

	Column-I		Column-II
a.	Saheli	(i)	Nonoxynol-9
b.	Gossypol	(ii)	Hormone releasing IUD
c.	Sponge	(iii)	Centchroman
d.	LNG-20	(iv)	Male contraceptive

(1) a(i), b(ii), c(iii), d(iv) (2) a(iii), b(iv), c(i), d(ii)

(3) a(iii), b(ii), c(i), d(iv) (4) a(ii), b(i), c(iv), d(iii)

51. Legalisation of MTP was done by Govt. of India in

(1) 1951 (2) 1971

(3) 1997 (4) 2001

52. Benign Prostatic hypertrophy can be checked by

(1) Removing source of testosterone

(2) Providing enough of testosterone

(3) Stimulating Sertoli cells to produce AMFs

(4) Stopping the release of FSH from pituitary

53. Which of the following is not a STD ?

(1) AIDS (2) Genital herpes

(3) Genital warts (4) Haemophilia

54. Which of the following oral contraceptive pills is correctly matched with its action?

A) Centchroman – Blocks implantation

B) Combined pill – Disintegration of sperm

C) Morning after pill – Inhibit ovulation

D) Progestin pill – Blocks fertilization

(1) Only A (2) A & B

(3) A, B & C (4) A, B, C & D

55. Mark the **incorrect** match w.r.t causative agent

(1) Chlamydia – *Haemophilus ducrei*

(2) Syphilis – *Treponema pallidum*

(3) Trichomoniasis – *Trichomonas vaginalis*

(4) Genital wart – *Human papilloma* virus

56. Replacement level is the number of children a couple must produce to replace themselves, so as to maintain the population at zero growth level. Replacement level in developed countries is

(1) 2.1 (2) 2.7

(3) 2.0 (4) Less than 2

57. In which of the stage of demographic transition there is declining birth rate and death rate being already low?

(1) Stage I (2) Stage II

(3) Stage III (4) Stage IV

❑ ❑ ❑

ANSWERS

[PHYSICS]

Chapter 14 : Electric Charges and Field

1.	(3)	2.	(1)	3.	(4)	4.	(3)	5.	(2)	6.	(4)	7.	(4)
8.	(4)	9.	(4)	10.	(1)	11.	(3)	12.	(1)	13.	(3)	14.	(3)
15.	(2)	16.	(1)	17.	(3)	18.	(4)	19.	(3)	20.	(2)	21.	(4)
22.	(4)	23.	(4)	24.	(1)	25.	(3)	26.	(2)	27.	(4)	28.	(1)
29.	(4)	30.	(1)	31.	(2)	32.	(3)	33.	(1)				

Chapter 15 : Electrostatics Potential and Capacitance

1.	(3)	2.	(4)	3.	(1)	4.	(4)	5.	(1)	6.	(3)	7.	(2)
8.	(3)	9.	(2)	10.	(1)	11.	(3)	12.	(1)	13.	(2)	14.	(2)
15.	(3)	16.	(1)	17.	(2)	18.	(2)	19.	(3)	20.	(4)	21.	(1)
22.	(1)	23.	(1)	24.	(2)	25.	(4)	26.	(3)	27.	(3)	28.	(2)
29.	(2)	30.	(3)	31.	(4)	32.	(3)	33.	(4)	34.	(1)	35.	(4)
36.	(4)	37.	(2)	38.	(3)	39.	(2)	40.	(4)	41.	(3)	42.	(2)
43.	(2)	44.	(2)	45.	(3)	46.	(1)	47.	(1)	48.	(1)	49.	(2)
50.	(2)	51.	(3)	52.	(3)	53.	(1)	54.	(2)	55.	(2)	56.	(4)
57.	(3)	58.	(1)	59.	(1)								

Chapter 16 : Current Electricity

1.	(2)	2.	(1)	3.	(2)	4.	(2)	5.	(2)	6.	(2)	7.	(2)
8.	(4)	9.	(1)	10.	(4)	11.	(2)	12.	(1)	13.	(1)	14.	(2)
15.	(1)	16.	(1)	17.	(2)	18.	(2)	19.	(2)	20.	(3)	21.	(4)
22.	(1)	23.	(1)	24.	(3)	25.	(1)	26.	(1)	27.	(1)	28.	(3)
29.	(2)	30.	(1)	31.	(1)	32.	(4)	33.	(2)	34.	(1)		

[CHEMISTRY]

Chapter 14 : Solid State

1.	(2)	2.	(4)	3.	(1)	4.	(4)	5.	(4)	6.	(2)	7.	(2)
8.	(1)	9.	(4)	10.	(3)	11.	(4)	12.	(4)	13.	(2)	14.	(1)
15.	(4)	16.	(2)	17.	(2)	18.	(3)	19.	(1)	20.	(1)	21.	(2)
22.	(4)	23.	(3)	24.	(4)	25.	(2)	26.	(3)				

Chapter 15 : Solution

1.	(1)	2.	(1)	3.	(1)	4.	(4)	5.	(1)	6.	(1)	7.	(3)
8.	(1)	9.	(4)	10.	(1)	11.	(3)	12.	(1)	13.	(2)	14.	(1)
15.	(1)	16.	(1)	17.	(2)	18.	(3)	19.	(1)	20.	(1)	21.	(3)
22.	(4)	23.	(1)	24.	(3)	25.	(3)	26.	(1)	27.	(1)	28.	(4)
29.	(4)	30.	(2)										

Chapter 16 : Electrochemistry

1. (3)	2. (3)	3. (4)	4. (4)	5. (1)	6. (1)	7. (3)
8. (3)	9. (3)	10. (3)	11. (3)	12. (4)	13. (2)	14. (1)
15. (3)	16. (3)	17. (3)	18. (4)	19. (2)	20. (4)	21. (2)
22. (3)	23. (4)	24. (3)	25. (4)	26. (1)	27. (1)	28. (2)
29. (2)	30. (1)	31. (3)	32. (3)	33. (3)	34. (4)	35. (4)
36. (3)	37. (2)	38. (4)	39. (2)	40. (1)	41. (1)	42. (2)
43. (4)	44. (2)	45. (2)	46. (1)	47. (2)		

Chapter 17 : Chemical Kinetics

1. (4)	2. (3)	3. (1)	4. (2)	5. (1)	6. (4)	7. (2)
8. (2)	9. (4)	10. (1)	11. (1)	12. (4)	13. (2)	14. (3)
15. (4)	16. (1)	17. (1)	18. (2)	19. (3)	20. (1)	21. (2)
22. (3)	23. (2)	24. (1)	25. (1)	26. (3)	27. (1)	28. (3)
29. (1)						

Chapter 18 : Surface Chemistry

1. (3)	2. (2)	3. (1)	4. (2)	5. (1)	6. (3)	7. (3)
8. (1)	9. (4)	10. (4)	11. (2)	12. (4)	13. (4)	14. (3)
15. (1)	16. (3)	17. (4)	18. (2)	19. (1)	20. (1)	

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Chapter 13 : Reproduction in Organisms

1. (2)	2. (3)	3. (2)	4. (1)	5. (3)	6. (1)	7. (3)
8. (2)	9. (1)	10. (1)	11. (1)	12. (1)	13. (4)	14. (3)
15. (4)	16. (3)	17. (3)	18. (4)	19. (2)		

Chapter 14 : Sexual Reproduction in Flowering Plants

1. (1)	2. (4)	3. (2)	4. (1)	5. (3)	6. (2)	7. (3)
8. (2)	9. (3)	10. (2)	11. (3)	12. (1)	13. (1)	14. (2)
15. (1)	16. (2)	17. (2)	18. (1)	19. (4)	20. (2)	21. (4)
22. (2)	23. (1)	24. (2)	25. (3)	26. (3)	27. (4)	28. (3)
29. (2)	30. (1)	31. (3)	32. (2)	33. (2)	34. (4)	35. (1)
36. (2)	37. (1)	38. (3)	39. (3)	40. (3)	41. (3)	42. (2)
43. (1)	44. (1)	45. (4)	46. (2)	47. (3)	48. (3)	49. (3)
50. (4)	51. (3)	52. (3)	53. (4)	54. (2)	55. (3)	56. (4)
57. (1)	58. (3)	59. (3)	60. (2)	61. (1)	62. (3)	63. (2)
64. (4)	65. (4)	66. (4)	67. (3)	68. (3)	69. (2)	70. (1)
71. (4)	72. (4)	73. (1)	74. (1)	75. (1)	76. (1)	77. (4)
78. (3)	79. (1)	80. (4)	81 (2)			

Chapter 15 : Principies of Inheritance and Variation

1.	(4)	2.	(1)	3.	(3)	4.	(2)	5.	(3)	6.	(3)	7.	(1)
8.	(1)	9.	(4)	10.	(2)	11.	(4)	12.	(4)	13.	(3)	14.	(3)
15.	(4)	16.	(1)	17.	(1)	18.	(2)	19.	(2)	20.	(4)	21.	(1)
22.	(4)	23.	(4)	24.	(3)	25.	(4)	26.	(1)	27.	(3)	28.	(1)
29.	(2)	30.	(3)	31.	(3)	32.	(3)	33.	(2)	34.	(4)	35.	(4)
36.	(4)	37.	(3)	38.	(2)	39.	(4)	40.	(3)	41.	(4)	42.	(4)
43.	(3)	44.	(2)	45.	(2)	46.	(4)	47.	(4)	48.	(1)	49.	(3)
50.	(4)	51.	(4)	52.	(1)	53.	(1)	54.	(3)	55.	(1)	56.	(4)
57.	(1)	58.	(2)	59.	(3)	60.	(3)	61.	(1)	62.	(3)	63.	(4)
64.	(1)	65.	(1)	66.	(1)	67.	(3)	68.	(2)	69.	(1)	70.	(2)
71.	(3)	72.	(2)	73.	(4)	74.	(1)	75.	(3)	76.	(1)	77.	(2)
78.	(2)	79.	(1)	80.	(4)								

[ZOOLOGY]

Chapter 11 : Reproduction in Organisms, Human Reproduction

1.	(4)	2.	(3)	3.	(2)	4.	(2)	5.	(3)	6.	(4)	7.	(3)
8.	(3)	9.	(4)	10.	(1)	11.	(3)	12.	(1)	13.	(1)	14.	(2)
15.	(4)	16.	(2)	17.	(2)	18.	(4)	19.	(2)	20.	(3)	21.	(2)
22.	(3)	23.	(1)	24.	(3)	25.	(2)	26.	(4)	27.	(2)	28.	(3)
29.	(3)	30.	(3)	31.	(2)	32.	(3)	33.	(3)	34.	(3)	35.	(1)
36.	(1)	37.	(1)	38.	(4)	39.	(2)	40.	(2)	41.	(3)	42.	(3)
43.	(3)	44.	(4)	45.	(4)	46.	(4)	47.	(2)	48.	(2)	49.	(4)
50.	(4)	51.	(3)	52.	(3)	53.	(3)	54.	(1)	55.	(1)	56	(4)
57.	(2)	58.	(2)	59.	(4)	60.	(1)	61.	(4)	62.	(3)	63.	(4)
64.	(3)	65.	(3)	66.	(4)	67.	(2)	68.	(3)				

Chapter 12 : Reproductive Health

1.	(3)	2.	(3)	3.	(2)	4.	(3)	5.	(3)	6.	(3)	7.	(4)
8.	(4)	9.	(4)	10.	(2)	11.	(2)	12.	(4)	13.	(1)	14.	(2)
15.	(2)	16.	(3)	17.	(4)	18.	(3)	19.	(3)	20.	(3)	21.	(4)
22.	(2)	23.	(2)	24.	(2)	25.	(2)	26.	(1)	27.	(1)	28.	(3)
29.	(4)	30.	(4)	31.	(2)	32.	(4)	33.	(3)	34.	(4)	35.	(4)
36.	(4)	37.	(4)	38.	(1)	39.	(4)	40.	(2)	41.	(1)	42.	(2)
43.	(3)	44.	(4)	45.	(2)	46.	(1)	47.	(2)	48.	(3)	49.	(2)
50.	(2)	51.	(2)	52.	(1)	53.	(4)	54.	(1)	55.	(1)	56	(1)
57.	(3)												

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