Code - B

Aakash
Medical │ IIT-JEE │ Foundations
(Divisions of Aakash Educational Services Limited)

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MM : 720

Test Series for NEET - 2019
Test – 3

Time : 3 Hrs.

Topics Covered :

Physics : System of Particles and Rotational Motion, Gravitation

Chemistry : Thermodynamics, Equilibrium

Botany : Cell: The Unit of Life, Cell Cycle and Cell Division, Transport in Plants.

**Zoology** : Digestion and Absorption, Breathing and Exchange of Gases (Respiration)

Instructions :

(i) Use Blue/Black ballpoint pen only to darken the appropriate circle.

(ii) Mark should be dark and should completely fill the circle.

(iii) Dark only one circle for each entry.

(iv) Dark the circle in the space provided only.

(v) Rough work must not be done on the Answer sheet and do not use **white-fluid** or any other **rubbing material** on Answer sheet.

(vi) Each question carries 4 marks. For every wrong response 1 mark shall be deducted from total score.

PHYSICS

Choose the correct answer :

1. A square frame is made by combining four rods each of mass M and length L. Moment of inertia of the square frame about an axis through one side of the frame is (see figure)
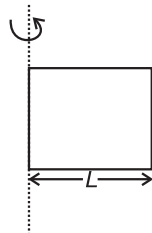

(1) $\dfrac{ML^2}{3}$

(2) ML^2

(3) $\dfrac{4ML^2}{3}$

(4) $\dfrac{5ML^2}{3}$

2. If the moment of inertia of a solid sphere of mass M and radius R about an axis passing through its centre of mass is $\dfrac{2}{5}MR^2$, then its radius of gyration about an axis which is parallel to given axis and at a distance $2R$ from the center will be

(1) $R\sqrt{\dfrac{22}{5}}$

(2) $R\sqrt{\dfrac{26}{3}}$

(3) $R\sqrt{\dfrac{26}{5}}$

(4) $R\sqrt{\dfrac{11}{5}}$

3. A uniform thin rod of length ℓ and mass m is hinged at one end O and released from horizontal position as shown in figure. The angular acceleration of the rod about the hinge point, when rod becomes vertical is
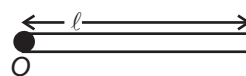

(1) $\dfrac{g}{2\ell}$

(2) $\dfrac{g}{3\ell}$

(3) Zero

(4) $\dfrac{3g}{2\ell}$

4. Two blocks of masses $2m$ and $3m$ are connected through a string which passes over a pulley (disc) of mass m and radius R as shown in figure. If system is released from rest and string does not slip on the pulley, then angular acceleration of the pulley is
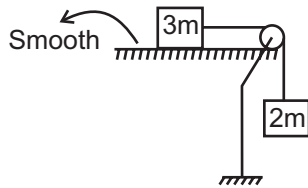
(1) $\dfrac{2g}{7R}$

(2) $\dfrac{4g}{11R}$

(3) $\dfrac{g}{3R}$

(4) $\dfrac{g}{2R}$

5. A disc of radius R is rolling without slipping on a floor as shown in the figure. If velocity of its centre of mass is v_0, then velocity of point P at the instant shown is ($OP = \dfrac{R}{2}$)
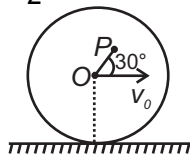
(1) v_0

(2) $\dfrac{v_0\sqrt{7}}{2}$

(3) $\sqrt{2}\,v_0$

(4) $\sqrt{3}\,v_0$

6. A solid sphere of mass M and radius R is in pure rolling with angular velocity ω over a horizontal plane as shown in figure. The magnitude of angular momentum of the sphere about the point of contact of the sphere is
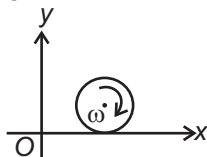

(1) $\dfrac{7MR^2\omega}{5}$

(2) $2\,MR^2\omega$

(3) $\dfrac{3}{2}MR^2\omega$

(4) $\dfrac{3MR^2\omega}{5}$

7. Percentage decrease in the value of acceleration due to gravity, on moving 32 km above the earth surface w.r.t. earth's surface is (Take radius of earth 6400 km)

(1) 0.5%

(2) 1%

(3) 1.5%

(4) 2%

8. The mass per unit length of a non-uniform rod of length L is given by $\mu = kx$, where k is a constant and x is distance from one end of the rod. The distance of the centre of mass of rod from this end is

(1) $\dfrac{L}{2}$

(2) $\dfrac{L}{4}$

(3) $\dfrac{2L}{3}$

(4) $\dfrac{L}{3}$

9. A hollow sphere of mass M and radius R is released from height h on a inclined plane. If hollow sphere is rolling without slipping on the inclined then velocity of centre of sphere when it reaches the bottom of inclined plane is
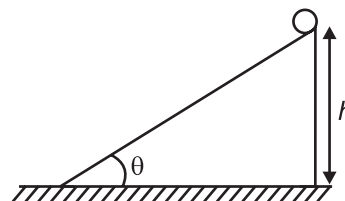
(1) $\sqrt{2gh}$

(2) $\sqrt{\dfrac{6gh}{5}}$

(3) $\sqrt{\dfrac{3gh}{5}}$

(4) $\sqrt{\dfrac{2gh}{5}}$

10. An uniform rod of mass 15 kg and length 5 m is held stationary with the help of a light string as shown in figure. The tension in the string is (g = 10 m/s²)
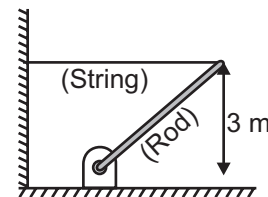

(1) 150 N

(2) 225 N

(3) 100 N

(4) 250 N

11. A force $\vec{F} = (a\hat{i} + 3\hat{j} + 6\hat{k})$ N is acting at a point having position vector $\vec{r} = (2\hat{i} - 6\hat{j} - 12\hat{k})$ m. The value of a, for which angular momentum about origin is conserved is

(1) 0

(2) 1

(3) -1

(4) 2

12. From a uniform disc of radius R and mass M, a square plate is removed as shown in figure. The moment of inertia of remaining body about an axis passing through the centre (O) of the original disc and perpendicular to its plane is
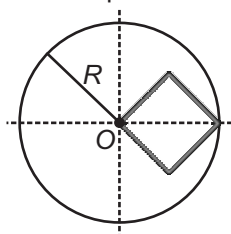
(1) $\dfrac{MR^2}{2}\left(1+\dfrac{1}{3\pi}\right)$ 　(2) $\dfrac{MR^2}{2}\left(1-\dfrac{1}{3\pi}\right)$

(3) $MR^2(1+3\pi)$ 　(4) $MR^2(2\pi-1)$

13. Gravitational potential in a region is given by $V = (3x + 4y + 12z)$. The magnitude of gravitational field at ($x = 1$ m, $y = 0$ m, $z = 3$ m) is (where V is in J/kg and x, y and z are in m)

(1) 20 N/kg 　(2) 13 N/kg

(3) 12 N/kg 　(4) 5 N/kg

14. A ring of radius R is first rotated with an angular velocity ω_0 and then carefully placed on a rough horizontal surface. The coefficient of friction between the surface and ring is μ. The time after which its angular speed is reduced to half is

(1) $\dfrac{\mu\omega_0 R}{2g}$ 　(2) $\dfrac{\omega_0 g}{2\mu R}$

(3) $\dfrac{2\omega_0 R}{\mu g}$ 　(4) $\dfrac{\omega_0 R}{2\mu g}$

15. A satellite is revolving round the Earth in an orbit of radius r with time period T. If the satellite is revolving round the earth in an orbit of radius $r + \Delta r$ ($\Delta r \ll r$) with time period $T + \Delta T$($\Delta T \ll T$) then $\dfrac{\Delta T}{T}$ is

(1) $\dfrac{3}{2}\dfrac{\Delta r}{r}$ 　(2) $\dfrac{2}{3}\dfrac{\Delta r}{r}$

(3) $\dfrac{\Delta r}{r}$ 　(4) $\dfrac{2\Delta r}{r}$

16. A projectile is thrown vertically upwards from the surface of earth with a velocity kv_e, where v_e is the escape velocity from earth's surface and $k < 1$. If R is the radius of earth then the maximum height to which it will rise measured from centre of Earth is

(1) $\dfrac{1-k^2}{R}$ 　(2) $\dfrac{R}{1-k^2}$

(3) $R(1 - k)^2$ 　(4) $\dfrac{R}{1+k^2}$

17. Dimensional formula of radius of gyration is same as that of

(1) Moment of inertia 　(2) Angular momentum

(3) Radius 　(4) Torque

18. If v_e is the escape velocity for the Earth when a projectile is fired from the surface of Earth, then the escape velocity if the same projectile is fired from the Earth's centre is

(1) $\sqrt{\dfrac{3}{2}}v_e$ 　(2) $\dfrac{3}{2}v_e$

(3) $\dfrac{2}{3}v_e$ 　(4) $\sqrt{\dfrac{2}{3}}v_e$

19. The gravitational field in a region is given by $\vec{E} = \left(4\hat{i} + \hat{j}\right)$ N/kg. Work done by the field is zero, if particle is move along the line

(1) $y + 4x = 2$ 　(2) $4y + x = 6$

(3) $x + y = 5$ 　(4) $x + 2y = 4$

20. A bomb is projected at an angle 60° with the horizontal with a speed of 20 m/s. At the highest point of its trajectory it explodes into three parts of equal masses. If just after explosion one part comes to rest, and 2nd part retraces its path, then the distance of third part from the point of projection when it strikes the ground is (consider ground to ground projection)

(1) $20\sqrt{3}$ m 　(2) $30\sqrt{3}$ m

(3) $40\sqrt{3}$ m 　(4) $50\sqrt{3}$ m

21. A particle of mass M is moving with constant velocity v along a line $y = a$ as shown in figure. Select the correct statement about the particle
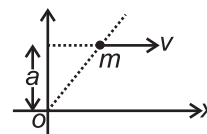
(1) Angular momentum about origin is constant.

(2) Angular velocity about origin is decreasing with time.

(3) Angular velocity about the origin is constant.

(4) Both (1) and (2)

22. Infinite masses each of mass 2 kg are placed along x-axis at 1 m, 2 m, 4 m, 8 m ....∞ from origin. The gravitational potential at origin due to these masses is (All quantities are in SI unit)

(1) $- G$ 　(2) $- 2G$

(3) $- 4G$ 　(4) $-\dfrac{G}{3}$

23. Moment of inertia of an annular disc of mass M having inner and outer radius r and R respectively about an axis passing through centre of mass and perpendicular to the plane of the disc is

    (1) $\dfrac{1}{2}M\left(R^2 + r^2\right)$ (2) $\dfrac{1}{2}M\left(R^2 - r^2\right)$

    (3) $M(R^2 + r^2)$ (4) $M(R^2 - r^2)$

24. A body is dropped from a height $h = R$ over the Earth surface. The velocity with which it will strike the earth surface is (R = Radius of earth $= 6.4 \times 10^6$ m and acceleration due to gravity on earth's surface $g = 10$ m/s^2)

    (1) 8 km/s   (2) 4 km/s

    (3) 10 km/s   (4) 5 km/s

25. Mass of a man on the Earth surface is 60 kg. Mass of the same man on moon surface will be $\left(g_m = \dfrac{g_e}{6}\right)$

    (1) 10 kg   (2) 60 kg

    (3) 15 kg   (4) Zero

26. Escape velocity from the surface of a planet whose density is same as that of earth but radius is double that of earth. [Take escape velocity from earth's surface $v_e = 11.2$ km/s]

    (1) 11.2 km/s   (2) 16.8 km/s

    (3) 22.4 km/s   (4) 8.0 km/s

27. If a spherical solid ball rolls on a table without slipping, then the fraction of its total kinetic energy associated with rotation is

    (1) $\dfrac{3}{5}$ (2) $\dfrac{2}{7}$

    (3) $\dfrac{2}{5}$ (4) $\dfrac{3}{7}$

28. A disc of radius R and mass M have only translational motion. Initial velocity of its centre of mass is v_0 and then is gently placed on a rough horizontal surface. The coefficient of friction between surface and disc is μ. Angular velocity of disc when it start pure rolling is

    (1) $\dfrac{2v_0}{R}$ (2) $\dfrac{2v_0}{3R}$

    (3) $\dfrac{3v_0}{2R}$ (4) $\dfrac{v_0}{R}$

29. A uniform disc of radius R lies in x-y plane, with its centre at origin. Its moment of inertia about z-axis is equal to its moment of inertia about line $y = x + c$. The value of c is

    (1) $-\dfrac{R}{2}$ (2) $\pm\dfrac{R}{\sqrt{2}}$

   (3) $+\dfrac{R}{4}$ (4) $-R$

30. The minimum energy required to launch a satellite of mass m from the surface of Earth of mass M and radius R in a circular orbit at an altitude $2R$ from Earth's surface is

    (1) $\dfrac{5GMm}{6R}$ (2) $\dfrac{2GMm}{3R}$

    (3) $\dfrac{GMm}{2R}$ (4) $\dfrac{GMm}{3R}$

31. The distance of two planets from the Sun are 10^{13} and 10^{12} m. The ratio of time periods of these two planets around the Sun is

    (1) 10   (2) 100

    (3) $10\sqrt{10}$ (4) $\sqrt{10}$

32. Torque (τ) acting on a body in the time interval 0 to T is shown in figure. Angular impluse on the body in this interval is
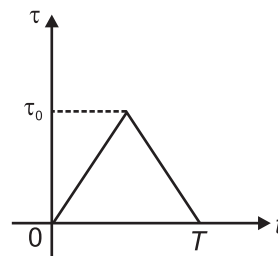
    (1) $\tau_0 T$ (2) $2\tau_0 T$

    (3) $\dfrac{\tau_0 T}{2}$ (4) $\dfrac{\tau_0 T}{4}$

33. There are two identical spherical bodies fixed in two positions as shown in figure. While moving from A to B gravitational potential
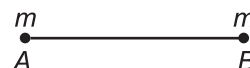
    (1) First decreases then increases

    (2) First increases then decreases

    (3) Minimum at the mid-point of AB

    (4) Zero at the mid-point of AB

34. Two uniform rods of mass m and $2m$ each of length L are placed along X and Y axis as shown in figure. Coordinates of the centre of mass of the combination is
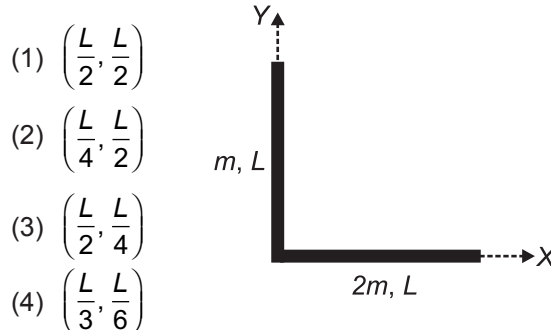
    (1) $\left(\dfrac{L}{2}, \dfrac{L}{2}\right)$

    (2) $\left(\dfrac{L}{4}, \dfrac{L}{2}\right)$

    (3) $\left(\dfrac{L}{2}, \dfrac{L}{4}\right)$

    (4) $\left(\dfrac{L}{3}, \dfrac{L}{6}\right)$

35. The correct variation of gravitational potential V with radius r measured from the centre of earth of radius R is best described by

(1)

(2)

(3)

(4)
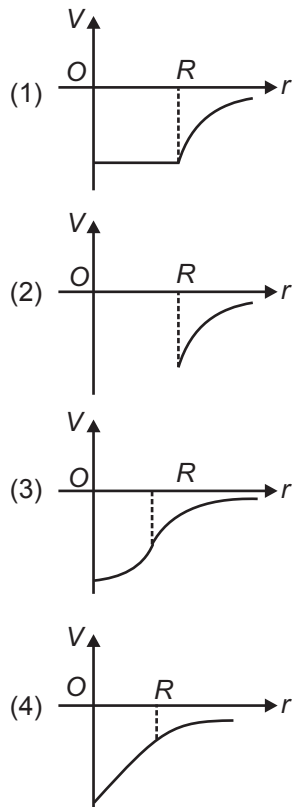
36. Three particles each having a mass of 100 g are placed on the vertices of an equilateral triangle of side 20 cm. The external work done in increasing the side of this triangle to 40 cm is (approximately)

(1) 5×10^{-12} J

(2) 2.25×10^{-10} J

(3) 4×10^{-11} J

(4) 6×10^{-15} J

37. The distance between centres of the Moon and the Earth is D. The mass of Earth is 81 times the mass of the Moon. At what distance from the centre of Earth, the gravitational field is zero?

(1) $\dfrac{D}{2}$

(2) $\dfrac{2D}{3}$

(3) $\dfrac{4D}{3}$

(4) $\dfrac{9D}{10}$

38. A satellite is revolving around earth with orbital speed v_0. If it stops suddenly, then the speed with which it will strike the surface of earth is (v_e is escape velocity from earth's surface)

(1) $\dfrac{v_e^2}{v_0}$

(2) v_0

(3) $\sqrt{v_e^2 - v_0^2}$

(4) $\sqrt{v_e^2 - 2v_0^2}$

39. Kinetic energy of a satellite in its orbit is E. Potential energy of the satellite in its orbit is

(1) $-\dfrac{E}{2}$

(2) $-E$

(3) $-2E$

(4) $-\dfrac{3E}{2}$

40. Intensity of gravitational field due to a uniform rod of mass M and length L at a point P as shown in figure is

(1) $\dfrac{GM}{2L^2}$

(2) $\dfrac{4GM}{9L^2}$

(3) $\dfrac{GM}{L^2}$

(4) $\dfrac{2GM}{L^2}$

41. A spherical cavity is made in a solid sphere of radius R as shown in figure. Gravitational field inside the cavity is
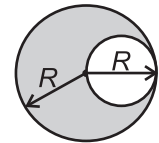
(1) Zero

(2) Non-uniform

(3) Uniform

(4) Constant in magnitude only

42. A ladder of length ℓ = 5 m and mass m = 10 kg is placed against a smooth vertical wall, but ground is rough with coefficient of friction μ = 0.5. The angle θ with the horizontal at which ladder can be in equilibrium is
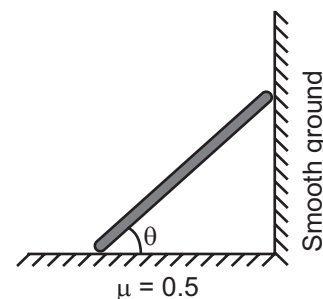
(1) 30°

(2) 50°

(3) 60°

(4) Both (2) and (3)

43. A man is standing at the centre of a freely rotating platform with his hands parallel to the surface of platform. The kinetic energy of the system is k. Man now orients his hands parallel to his body so that moment of inertia of the system is halved. The kinetic energy of the system is now

(1) $2k$

(2) $\dfrac{k}{2}$

(3) $\dfrac{k}{4}$

(4) $4k$

44. Gravitational potential energy of the mass at the centre of a square as shown in figure is {Potential energy at infinite is taken to be zero}

(1) $-\dfrac{4\,Gm^2}{\ell\sqrt{3}}$

(2) $-\dfrac{2\sqrt{2}\,Gm^2}{\ell}$

(3) $-\dfrac{4\,Gm^2}{\ell}$

(4) $-\dfrac{4\sqrt{2}\,Gm^2}{\ell}$

45. A narrow tunnel is dug along a diameter of earth of mass M and radius r. If a body is left free at one end of the tunnel, then speed of body when it will cross the centre of the earth is

(1) $\sqrt{\dfrac{3GM}{R}}$

(2) $\sqrt{\dfrac{GM}{R}}$

(3) $\sqrt{\dfrac{GM}{2R}}$

(4) $\sqrt{\dfrac{2GM}{R}}$

CHEMISTRY

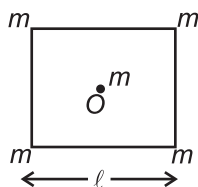46. Which of the following process is always an exothermic process?

(1) Acid-base neutralisation

(2) Combustion

(3) Formation of a compound

(4) Atomisation

47. C_p and C_v for a gas respectively are 0.125 cal/g and 0.075 cal/g. Which one of the following gas has these values?

(1) H_2

(2) Ar

(3) O_2

(4) CH_4

48. If K_{sp} of Hg_2I_2 is 3.2×10^{-23} then its solubility will be

(1) 4×10^{-8}

(2) 2×10^{-8}

(3) 3.2×10^{-6}

(4) 5×10^{-7}

49. On dissolution of NH_4Cl in water, pH of water decreases. It is due to hydrolysis of

(1) $[NH_4]^+$ ion

(2) $[Cl^-]$ ion

(3) Both $[NH_4]^+$ and $[Cl^-]$ ion

(4) No hydrolysis takes place

50. pH of 0.02 M CH_3COONH_4 solution is x then pH of 0.01 M solution of CH_3COONH_4 will be

(1) x/2

(2) x

(3) 2x

(4) x^2

51. A_2B dissociates as $A_2B(s) \rightleftharpoons 2A(g) + B(g)$. At equilibrium total pressure is P, then K_p of the reaction is

(1) $\dfrac{2}{9}P^2$

(2) $\dfrac{4}{9}P^3$

(3) $\dfrac{4}{27}P^3$

(4) $4P^3$

52. Amount of heat released when 0.1 mol of HNO_3 neutralised by 0.1 mol of KOH in water is

(1) 57.1 kJ

(2) 13.7 kJ

(3) 5.71 kJ

(4) 1.37 kJ

53. If 2 mole of an ideal gas expanded isothermally at 300 K from 5 litre volume to 50 litre volume then maximum work done in this process will be

(1) $-$ 11.49 kJ

(2) +11.49 kJ

(3) 4.99 kJ

(4) $-$ 4.99 kJ
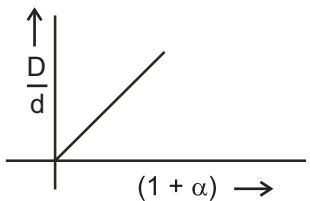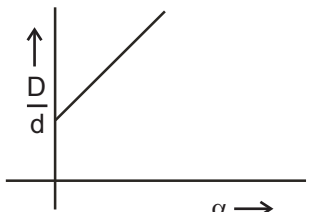
54. A gas at 25°C expanded isothermally from initial pressure of 0.5 MPa to a final pressure of 0.1 MPa. Select correct option in the following

(1) $\Delta H \neq \Delta E > 0$, $\Delta T = 0$, w = $-$q

(2) $\Delta H > 0$, $\Delta E < 0$, $\Delta T = 0$, w = +q

(3) $\Delta H = 0$, $\Delta E = 0$, $\Delta T = 0$, w = $-$q

(4) $\Delta H = 0$, $\Delta E = 0$, $\Delta T = 0$, w = 0

55. In which process entropy will increase?

(1) Denaturation of protein

(2) Polymerization process

(3) Crystallisation process

(4) Condensation

56. Work done in the chemical process

    $CaCO_3(s) \rightarrow CaO(s) + CO_2(g)$, at 27°C is

    (1) –30 R

    (2) –300

    (3) –600

    (4) –300 R

57. 0.1 M HCl (V = 200 ml) and 0.2 M NaOH (V = 100 ml) neutralize together. Temperature of water increase in above process is (Specific heat of H_2O = 4.2 J/g K, density of water = 1g/ml)

    (1) 0.9°C

    (2) 9°C

    (3) 90°C

    (4) 18°C

58. Salt(s) which has acidic hydrogen, is

    (1) NaH_2PO_2

    (2) Na_2HPO_3

    (3) NaH_2PO_4

    (4) All of these

59. pH of 1 litre solution of strong monobasic acid is 2. Amount of water (in litre) added so that its new pH will becomes 4 is

    (1) 10

    (2) 100

    (3) 1000

    (4) 99

60. On the basis of following reactions, find out the order of proton affinities of NH_3, PH_3 and $(CH_3)_3P$

    $PH_3 + NH_4^+ \longrightarrow$ No reaction

    $(CH_3)_3P + NH_4^+ \longrightarrow (CH_3)_3 \overset{+}{P}H + NH_3$

    (1) $NH_3 > PH_3 > (CH_3)_3P$

    (2) $NH_3 > (CH_3)_3P > PH_3$

    (3) $PH_3 < NH_3 < (CH_3)_3P$

    (4) $NH_3 < (CH_3)_3P < PH_3$

61. For the dissociation of PCl_5 into PCl_3 & Cl_2, which is incorrect?

    (1) $d_{20\%} > d_{30\%} > d_{50\%}$ (d → vapour density of Equilibrium mix. at certain % decomposition)

    (2) $\dfrac{D}{d} = 1 + 2\alpha$ $\begin{cases} D : \text{Initial vapour density} \\ d : \text{Vapour density of} \\ \quad \text{Equilibrium mixture} \end{cases}$

    (3)

    (4)

62. pH of an aq. solution of 1 M ammonium formate is (pK_a of formic acid is 3.8 and pK_b of NH_3 is 4.8)

    (1) 7.5

    (2) 6.5

    (3) 2.7

    (4) 7

63. Heat of neutralisation (in kcal/mol) for weak acid HF is

    (1) 13.7

    (2) > 13.7

    (3) < 13.7

    (4) Infinite

64. Weakest base among following is

    (1) CH_3^-

    (2) $C_2H_5O^-$

    (3) Cl^-

    (4) H^-

65. 'a' moles of PCl_5 are heated in a closed container till equilibrium is established

    $PCl_5(g) \rightleftharpoons PCl_3(g) + Cl_2(g)$

    If 'b' mole of PCl_5 dissociates at equilibrium pressure P, then select the correct option

    (1) $\dfrac{a}{b} = \dfrac{K_P}{K_P + P}$

    (2) $\dfrac{a}{b} = \left(\dfrac{K_P + P}{K_P}\right)^{1/2}$

    (3) $\dfrac{a}{b} = \left[\dfrac{K_P}{K_P + P}\right]^{1/2}$

    (4) $\dfrac{a}{b} = \left[\dfrac{K_P}{P}\right]$

66. In the reaction,

    $Y \longrightarrow Z$, $\Delta H = + 100$ kcal/mol

    $Z \longrightarrow X$, $\Delta H = - 80$ kcal/mol

    Select the correct order of stability of X, Y and Z is

    (1) Y > X > Z

    (2) Y > Z > X

    (3) X > Z > Y

    (4) X > Y > Z

67. The compound that is not a Lewis base

    (1) NH_3

    (2) H_2O

    (3) SO_3

    (4) $BeCl_2$

68. Which of the following solution will have highest pH?

    (1) 0.1 M CH_3COONa

    (2) 0.1 M NaCl

    (3) 0.1 M NH_4Cl

    (4) 0.1 M H_2CO_3

69. Which mixture will not act as a buffer?

    (1) 2 mol CH_3COOH + 1 mol NaOH

    (2) CH_3COONH_4 solution

    (3) 1 mol HCl + 2 mol NaCN

    (4) 1 mol HCl + 1 mol NaCl

70. K_{SP} of $M(OH)_2$ at T°C is 8×10^{-12}. Its solubility (in mol L^{-1}) in 0.1 M NaOH solution will be

    (1) 8×10^{-10}

    (2) 2×10^{-10}

    (3) 8×10^{-4}

    (4) 2×10^{-6}

71. For the reaction

$CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2H_2O(l)$

ΔH_f° of $CH_4(g)$, $CO_2(g)$ and $H_2O(l)$ is respectively $-x$, $-y$ and $-z$ kJ mol^{-1}. Enthalpy change ($\Delta_r^\circ H$) for the reaction is

(1) $x + y + 2z$ (2) $x - y - 2z$

(3) $y - x + 2z$ (4) $y + z - x$

72.
$$\begin{array}{ccc} B & \rightarrow & C \\ \uparrow & & \downarrow \\ A & & D \end{array}$$
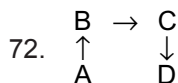
$\Delta S_{A \rightarrow B}$ is +10, $\Delta S_{B \rightarrow C}$ is +20, $\Delta S_{D \rightarrow C}$ is +25 then $\Delta S_{A \rightarrow D}$ is

(1) 5   (2) −5

(3) 45   (4) 15

73. The internal energy change when a system goes from A to B is 60 kJ mol^{-1}. If the system goes from A to B by a reversible path and returns to state A by an irreversible path, what would be the net change in internal energy?

(1) Zero   (2) 60 kJ

(3) > 60 kJ   (4) − 60 kJ

74. For a reaction,
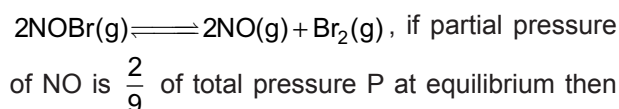
$2NOBr(g) \rightleftharpoons 2NO(g) + Br_2(g)$, if partial pressure of NO is $\dfrac{2}{9}$ of total pressure P at equilibrium then K_P will be

(1) $\dfrac{P}{9}$ (2) $\dfrac{P}{18}$

(3) $\dfrac{P}{81}$ (4) $\dfrac{P}{27}$

75. The plot of ln K_{eq} versus inverse of temperature for a reaction is shown as

$\dfrac{1}{T}$ (K^{-1})
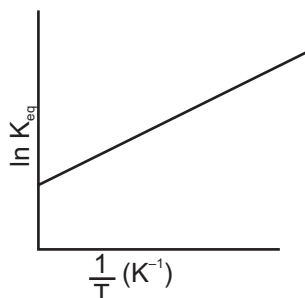
The reaction should be

(1) Endothermic

(2) With no change in enthalpy

(3) Exothermic

(4) Always spontaneous

76. K_{sp} of Na_3AlF_6 will be _____ (in terms of solubility)

(1) $4s^3$

(2) $4s^4$

(3) $16s^4$

(4) $27s^4$

77. The correct relation of pH of salt of weak acid and weak base

(1) $pH = 7 + \dfrac{1}{2}[pK_b + \log C]$

(2) $pH = 7 + \dfrac{1}{2}[pK_a - \log C]$

(3) $pH = -\dfrac{1}{2}[\log K_a + \log K_w - \log K_b]$

(4) $pH = -\dfrac{1}{2}[\log K_w - \log K_b + \log C]$

78. When 5 mL of a 1 M HCl solution is mixed with 5 ml of 0.1 M NaOH solution, temperature of solution increased by 2°C. Which of the following can be predicted accurately from this observation?

(1) If 10 mL of same HCl is mixed with 10 mL of same NaOH, temperature rise will be 4°C

(2) If 10 mL of 0.05 M HCl is mixed with 10 mL of 0.05 M NaCl, temperature rise will be 2°C

(3) If 5 mL of 0.1 M HCl is mixed with 5 mL of 0.1 M NH_3 solution, the temperature rise will be more than 2°C

(4) If 5 mL of 0.1 M CH_3COOH is mixed with 5 mL of 0.1 M NaOH, the temperature rise will be less than 2°C

79. Which of the given mixture will act as buffer?

(1) 100 ml, 1 M HCl + 100 ml, 0.5 M NaCl

(2) 500 ml, 1 M HCl + 200 ml, 0.2 M NH_4OH

(3) 10 ml, 0.1 M H_3PO_4 + 5 ml, 0.1 M KOH

(4) 200 ml, 1 M H_2SO_4 + 200 ml, 1 M NaOH

80. The pH of H_2SO_4 solution with molarity 5×10^{-4} M is (assuming its complete dissociation)

(1) 3   (2) 3.3

(3) 3.8   (4) 4

81. Which of the given salt solution will has minimum pH?

(1) KNO_3

(2) NaCN

(3) $HCOONH_4$

(4) NaOH

82. If β_1, β_2 and β_3 are stepwise formation constants of MCl_1 MCl_2, MCl_3 and K is overall formation constant of MCl_3 then (charges on ions are not included)

    (1) $K = \beta_1 + \beta_2 + \beta_3$

    (2) $\dfrac{1}{K} = \dfrac{1}{\beta_1} + \dfrac{1}{\beta_2} + \dfrac{1}{\beta_3}$

    (3) $\log K = \log \beta_1 + \log \beta_2 + \log \beta_3$

    (4) $pK = \log \beta_1 + \log \beta_2 + \log \beta_3$

83. The enthalpy of vaporisation for 1 g of water from the following data is

    (i) $H_2(g) + \dfrac{1}{2} O_2(g) \rightarrow H_2O(g)$; $\Delta H = -57.8$ kcal mol^{-1}

    (ii) $H_2(g) + \dfrac{1}{2} O_2(g) \rightarrow H_2O(l)$; $\Delta H = -68.3$ kcal mol^{-1}

    (1) 10.5 kcal

    (2) 0.58 kcal

    (3) 4.18 kcal

    (4) 0.18 kcal

84. Equilibrium constant of the reaction

    $A^- + H_3O^+ \rightleftharpoons HA + H_2O$, is (Given K_a for HA is 1×10^{-6})

    (1) 10^6

    (2) 10^{-6}

    (3) 10^{-8}

    (4) 10^{-12}

85. Intensive property is

    (1) Entropy

    (2) Enthalpy

    (3) Density

    (4) Internal energy

86. Which of the following gas doesn't obey third law of thermodynamics?

    (1) N_2

    (2) CO

    (3) H_2

    (4) O_2

87. 1 g of benzene is burnt at 25°C and liberates 2.5 kJ heat. Heat of combustion of benzene at 25°C is

    (1) 25 kJ

    (2) 195 kJ

    (3) 150 kJ

    (4) 75 kJ

88. Given that $\Delta H_{ionisation}$ of CH_3COOH is 0.5 kcal/mol and $\Delta H_{ionisation}$ of NH_4OH is 1.5 kcal/mol.

    The enthalpy of neutralisation of NH_4OH and CH_3COOH is

    (1) −10.5 kcal

    (2) −11.7 kcal

    (3) −7.2 kcal

    (4) −13.7 kcal

89. Which of the following has its standard heat of formation zero at 298 K?

    (1) $Br_2(g)$

    (2) He(l)

    (3) $C_{(diamond)}$

    (4) $I_{2(Solid)}$

90. $\Delta H_{solution}$ of anhydrous $CuSO_4$ is −15.9 kcal/mol and heat of hydrate of $CuSO_4(s)$ into $CuSO_4.5H_2O(s)$ is −18.9 kcal/mol. The heat of solution of $CuSO_4.5H_2O$ is

    (1) −3.0 kcal/mol

    (2) +3.0 kcal/mol

    (3) −34.8 kcal/mol

    (4) +34.8 kcal/mol

BOTANY

91. Mesosomes do **not** help in

    (1) Cell wall formation   (2) DNA replication

    (3) Photosynthesis   (4) Respiration

92. Bacterial flagellum

    (1) Is made up of tubulin protein

    (2) Helps the bacterium to attach to the rocks in streams

    (3) Is the thin filamentous extension from the cell wall of bacterium

    (4) Is different from eukaryotic flagellum as it does not help in motility

93. Select the **odd** one w.r.t. inclusion bodies.

    (1) Sulphur granules

    (2) Cyanophycean granules

    (3) Phosphate granules

    (4) Polyribosomes

94. Lipids of plasma membrane

    a. Are arranged in a bilayer

    b. Have non-polar head and polar tail

    c. Are responsible for quasi-fluid nature

    d. Enables lateral movement of proteins

    (1) Only a and c are true

    (2) Only a and d are true

    (3) Only a, c and d are true

    (4) All a, b, c and d are true

95. The Na^+/K^+ pump in animal cells

    (1) Is energy-dependent

    (2) Is an example of passive transport

    (3) Transports ions along their concentration gradient

    (4) Involves in exocytosis

96. Glycosidation of lipids is a function of

(1) Lysosomes

(2) SER

(3) Golgi complex

(4) Mitochondria

97. Select the **false** statement for lysosomes.

(1) They are polymorphic

(2) They are rich in hydrolytic enzymes

(3) Autophagic vacuoles is a form of lysosome that is involved in metamorphosis.

(4) Digestive vacuoles contain inactive enzymes

98. Which one of the following structures are primarily responsible for cytokinesis in plant cells but not in animal cells?

(1) Kinetochores

(2) Golgi derived vesicles

(3) Actin and myosin

(4) Centriole and centromere

99. The fluid nature of the cell membrane is important from the point of view of functions like

a. Cell division

b. Secretion

c. Cell growth

(1) Only a

(2) Only b

(3) Only b & c

(4) All a, b & c

100. The beginning of diplotene is recognised by

(1) Appearance of chiasmata

(2) Terminalisation of chiasmata

(3) Formation of recombination nodule

(4) Dissolution of the synaptonemal complex

101. The cell envelop found in bacterial cell consists of a tightly bound _____ layered structure.

(1) Two

(2) Three

(3) One

(4) Four

102. Match the following organelles with their function.

Column-I	Column-II
a. Golgi Apparatus	(i) Detoxification of drugs
b. SER	(ii) Excretion
c. Contractile vacuole	(iii) ATP synthesis
d Mitochondria	(iv) Glycosylation

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

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

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

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

103. All of the following are the important events of telophase, **except**

(1) Nucleolus, Golgi complex and ER reform

(2) Nuclear envelope assembles around the chromosome clusters

(3) Chromosomes cluster at the opposite spindle poles

(4) Chromosomes get decondensed and maintain their identity

104. Secondary wall is deposited

(1) Inner to cell membrane

(2) Outer to cell membrane

(3) Outer to primary wall

(4) Just inner to middle lamella

105. Select the **incorrect** match.

(1) Crossing over – Pachytene

(2) Synthesis of histone – G_2 phase

(3) Synapsis – Zygotene

(4) Synthesis of nucleotides – G_1 phase

106. In the below given figure if Ψ_P of all the cells is equal to 2 bar, then which will be the correct direction of the movement of water?
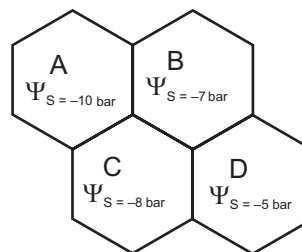
(1) D → B, C → B, B → A

(2) C → A, B → A, D → B

(3) C → A, B → A, D → A

(4) C → A, A → B, A → D

107. According to Dixon and Jolly, the ascent of xylem sap depends mainly on the following properties of water, **except**

(1) Mutual attraction between water molecules

(2) Attraction of water molecule to the polar surface

(3) Surface tension of water

(4) Root pressure

108. Mark the **incorrect** statement for apoplastic movement of water.

(1) It is a system of interconnected protoplasts

(2) The movement occurs exclusively through the intercellular spaces and walls of the cells

(3) It does not involve crossing of cell membrane by water molecules

(4) It does not provide any barrier to the water movement

109. Find out the **correct** statement w.r.t. the structure of stomata.

    (1) Guard cells are always ellipsoidal in dicots

    (2) Cellulose microfibrils are oriented radially in bean shaped guard cells.

    (3) The inner wall of the guard cell is thin

    (4) Dumb-bell shaped stomata have thick end walls.

110. Choose the **incorrect** match.

    (1) Leucoplast   – Lacks granum

    (2) Chromoplast   – Presence of carotenoids

    (3) Chloroplast   – Storage of starch

    (4) Peroxisome   – β oxidation of fats

111. In which phase of interphase, most of the cell organelles duplicate?

    (1) G_1 (2) G_2

    (3) S   (4) G_0

112. A higher plant cell ($2n$ = 20) enters into cell cycle. Which of the given option is **true** for this cell after completion of S-phase?

    (1) Each chromosome contains two sister chromatids

    (2) Amount of DNA remains the same

    (3) The cell will have 40 chromosomes

    (4) Cell cytoplasm has duplicated centrioles

113. Which of the given stages of mitosis is also called spireme stage?

    (1) Prophase

    (2) Metaphase

    (3) Anaphase

    (4) Telophase

114. In an animal cell, mitotic spindle apparatus is constituted by all, **except**

    (1) Aster   (2) Spindle fibre

    (3) Centrosome   (4) Ribosome

115. **A.** A bivalent is a pair of synapsed homologous chromosomes.

    B. At zygotene stage, bivalent become clearly visible as tetrad.

    (1) Only statement A is correct

    (2) Only statement B is correct

    (3) Both A and B are correct

    (4) Both A and B are incorrect

116. Mark the similar feature between meiosis I and meiosis II.

    (1) Both are equational divisions

    (2) Both meiosis I and II are homotypic divisions

    (3) Prophase of both the stages is divided into substages

    (4) Meiosis I and II both occur at the time of gamete formation in higher plants

117. When a chromosome has centromere slightly away from the middle of the chromosome, then it is called

    (1) Acrocentric   (2) Metacentric

    (3) Submetacentric   (4) Telocentric

118. The site of oxidative phosphorylation is

    (1) Chloroplast   (2) Mitochondria

    (3) Ribosomes   (4) Leucoplast

119. Which one of the following is called an organelle within an organelle?

    (1) ER   (2) Ribosome

    (3) Chloroplast   (4) Peroxisome

120. How many of the given features are associated with both mitochondria and plastids?

70S ribosome, ds DNA, RuBisCO, Double membrane bound, Thylakoids, Cristae

    (1) Five   (2) Four

    (3) Three   (4) Two

121. In a cell, if karyokinesis is **not** followed by cytokinesis, it will lead to

    (1) Polyploidy

    (2) Reduction in chromosome number

    (3) Multinucleated condition

    (4) Death of cell

122. In which stage of meiosis, lampbrush chromosome is observed?

    (1) Anaphase-II

    (2) Diplotene

    (3) Diakinesis

    (4) Zygotene

123. In meiosis, the homologous chromosomes start separating during

    (1) Metaphase I

    (2) Anaphase II

    (3) Metaphase II

    (4) Anaphase I

124. Select the **incorrect** statement.

(1) In some social insects, haploid cells divide by mitosis

(2) Mitotic divisions take place only in the apical meristem of plants

(3) Mitosis helps to restore the nucleocytoplasmic ratio

(4) Mitosis helps in cell repair

125. How many of the following statements are **correct**?

(a) Water potential gradient between the absorbent and the liquid imbibed is essential for imbibition.

(b) Volume of imbibant does not change during imbibition.

(c) Phycocolloids imbibe more water than pectins.

(d) Imbibition plays a significant role in the ascent of sap.

(e) Affinity between adsorbent and adsorbate is essential.

(1) Two　　　　　　　(2) Three

(3) Four　　　　　　　(4) Five

126. Transport protein as control points determine the type and quantity of solutes in xylem, is present on/ in

(1) Endodermal cell membrane

(2) Endodermal cell wall

(3) Cortical cell membrane

(4) Cell membrane of stem hairs

127. Three cell A, B and C are placed in a common solution. Cell A shows increase in turgidity, cell B shows no change and cell C undergoes plasmolysis. Mark the **correct** statement, on the basis of the above observation.

(1) The solution is hypertonic to cell A whereas hypotonic to cell C

(2) Solution is isotonic to cell B whereas hypertonic to cell C

(3) Cell A is hypotonic to the solution whereas cell C is hypertonic to the solution

(4) Cell B is hypertonic to the solution whereas cell A and C are isotonic to the solution

128. Select the **wrong** statement w.r.t. phloem transport.

(1) The translocation in phloem is bidirectional

(2) The source-sink relationship is invariable

(3) Sugars are actively transported out of the phloem at the sink

(4) Loading of the phloem sets up a water potential gradient

129. Identify the **incorrectly** matched pair.

(1) Symport　　　　–　　Transport of molecules in same direction

(2) Symplast　　　　–　　Consist of living parts of plant body

(3) Facilitated diffusion　–　Uphill transport

(4) Water channels　–　Made up of eight aquaporins

130. Solute potential of a solution is

(1) Always negative

(2) Greater than its ψ_w at atmospheric pressure

(3) Zero at atmospheric pressure

(4) Always equal to ψ_p

131. Select the **odd** one for root pressure.

(1) It is a positive hydrostatic pressure

(2) It develops due to active transpiration in plants

(3) It is responsible for loss of water in the form of liquid droplets through hydathodes in herbs

(4) It is developed inside xylem channel of roots

132. Which of the given is **not** true for poaceous stomata?

(1) Found mainly in monocots

(2) They have dumb-bell shaped guard cell

(3) Their number is about equal on both the surfaces of isobilateral leaves

(4) Their guard cells have thin walled middle region

133. Which one is **not** a plant factor that affects transpiration?

(1) Root-shoot ratio

(2) Number of stomata

(3) Canopy structure

(4) Soil-water availability

134. Transpiration is useful for plants in all, **except**

(1) Generating root pressure

(2) Cooling of leaf surfaces

(3) Creating transpiration pull

(4) Maintaining shape and structure of plants

135. Girdling experiment proves that

(1) Phloem is responsible for translocation of food in one direction

(2) Xylem is responsible for transport of water

(3) Phloem is responsible for translocation of food from root to leaves

(4) Xylem is responsible for translocation of food

ZOOLOGY

136. Select the **correct** statement w.r.t. submucosal plexus.

    (1) Also termed as myenteric plexus

    (2) Controls secretion of digestive glands

    (3) Present between longitudinal and circular muscle fibres of mucosa

    (4) Controls peristaltic movements in gut

137. Lacteals are located within

    (1) Villi
    (2) Crypts of Lieberkuhn
    (3) Gastric rugae
    (4) Brunner's glands

138. Simultaneous deficiency of protein and energy results in which disorder in an infant?

    (1) Marasmus
    (2) Obesity
    (3) Kwashiorkar
    (4) Jaundice

139. Choose the constituents of bile juice from the list given below and select the **correct** option.

    (a) Bile salts
    (b) Lipases
    (c) Cholesterol
    (d) Phospholipids
    (e) Catabolic products of haemoglobin

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

140. Read the following statements and select the **incorrect** statement.

    (1) Salivary glands situated in buccal cavity secrete amylase rich salivary juice.

    (2) No significant digestive activity occurs in large intestine.

    (3) Hepatic lobules are the structural and functional units of liver.

    (4) Mucus in saliva helps in lubrication and adhering food particles in oral cavity.

141. Under normal physiological conditions, every 1000 ml of deoxygenated blood returns approximately_____of O_2 to the heart.

    (1) 15 ml
    (2) 150 ml
    (3) 40 ml
    (4) 50 ml

142. All the given factors are favourable in formation of oxyhaemoglobin, **except**

    (1) High pO_2
    (2) High temperature
    (3) Low pCO_2
    (4) High pH

143. Choose the **incorrect** match w.r.t. enzyme and its source.

    (1) Chymotrypsinogen – Pancreas
    (2) Trypsinogen – Pancreas
    (3) Sucrase – Small intestine
    (4) Steapsin – Small intestine

144. After normal exhalation, volume of air still retained in the lungs is

    (1) Residual volume

    (2) Expiratory reserve volume

    (3) Expiratory capacity

    (4) Functional residual capacity

145. Which of the following structure is **not** associated with mucosa of alimentary canal?

    (1) Peyer's patches
    (2) Rugae
    (3) Brunner's gland
    (4) Villi

146. Sudden pressure loss on a diver's body while coming up from the base of the sea causes formation of

    (1) Carbonic acid in the blood

    (2) Excess carboxyhaemoglobin in the blood

    (3) Nitrogen bubbles in the blood

    (4) Carbaminohaemoglobin, leading to irregular breathing

147. Consider the given diagram and select the **correct** identification and description of the labelled structure in options below.
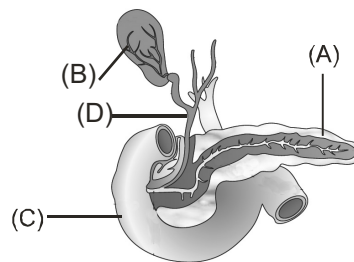
    (1) B – Contracts under the influence of gastrin hormone

    (2) A – Secretes sodium bicarbonate under the influence of secretin

    (3) C – Longest part of small intestine

    (4) D – Ducts from liver, bringing dexoygenated blood to small intestine

148. The deciduous dentition of a seven year old girl child **lacks**

    (1) All molars

    (2) All premolars

    (3) First two molars

    (4) All premolars and molars

149. Select the organs/structures in which cardiac notch is found.

    (1) Left lung   (2) Right lung

    (3) Intestine   (4) Liver

150. Select the **correct** statement.

    (1) CO binds to same site on hemoglobin as O_2 does.

    (2) Reverse chloride shift is also called Hamburger's phenomenon

    (3) Carbonic anhydrase in present exclusively in blood plasma

    (4) Pneumotaxic center in pons region of brain serves as the normal respiratory rhythm center in humans

151. Protein coated fat globules formed in enterocytes are

    (1) Micelles   (2) Chyme

    (3) Chyle   (4) Chylomicrons

152. Select the **correct** statement w.r.t. the partial pressures of inhaled and exhaled air.

    (1) The pO_2 of alveolar air is lower than pO_2 of venous blood

    (2) The pO_2 of alveolar air is lesser than pO_2 of exhaled air

    (3) The pO_2 of arterial blood is greater than pO_2 of alveolar air

    (4) The pCO_2 of tissues is same as pO_2 of arterial blood

153. Select the **correct** match.

    (1) Deglutition   –   Process of swallowing of food from oral cavity

    (2) Rugae   –   The irregular folds in serosa layer of stomach

    (3) Muscularis layer   –   Has inner oblique, middle circular and outer longitudinal muscles in wall of small intestine

    (4) Ileum   –   First part of small intestine

154. Select the **incorrect** statement w.r.t. oxyhaemoglobin dissociation curve.

    (1) Oxyhaemoglobin is formed easily at low temperature

    (2) High blood alkalinity causes a left shift in the oxyhaemoglobin dissociation curve

    (3) P_{50} value of haemoglobin is not affected by presence of 2, 3diphosphoglycerate

    (4) P_{50} value of adult haemoglobin increases with increase in pCO_2 and H^+ level of blood

155. Rib cage comprises ribs attached ventrally to $\underline{X}$ and dorsally to $\underline{Y}$. Choose the option that fill up the blanks **correctly**.

	X	Y
(1)	Vertebrae	Sternum
(2)	Intercostal muscles	Diaphragm
(3)	Sternum	Vertebrae
(4)	Diaphragm	Backbone

156. Salivary secretions aid in lubricating and adhering the masticated food particles into

    (1) Rugae   (2) Chyle

    (3) Chyme   (4) Bolus

157. The chemical process of digestion is initiated in the oral cavity by the hydrolytic action of the

    (1) Carbohydrate splitting enzyme

    (2) Antibacterial agent lysozyme

    (3) Intrinsic factor

    (4) Dipeptidases

158. Choose the **incorrect** match w.r.t. respiratory organs/structures.

    (1) Earthworm   –   Moist cuticle

    (2) Cockroach   –   Tracheal tubes

    (3) Frog   –   Moist skin

    (4) Birds   –   Air sacs in lungs

159. Trachea in man is a straight tube which divides at the level of

    (1) 5th thoracic vertebrae

    (2) 7th thoracic vertebrae

    (3) 12th thoracic vertebrae

    (4) 5th cervical vertebrae

160. Average breathing rate of a healthy human is

    (1) 12-16 times per minute

    (2) 500 ml per minute

    (3) 70-72 times per minute

    (4) 2500-3000 ml per minute

161. Choose the **correct** hydrolytic reaction.

    (1) Starch $\xrightarrow[\text{pH}=7.8]{\text{Amylase}}$ Maltose

    (2) Nucleic acids $\xrightarrow[\text{pH}=7.8]{\text{Nucleases}}$ Nucleotides

    (3) Diglycerides $\xrightarrow[\text{pH}=7.8]{\text{HCl}}$ Monoglycerides

    (4) Proteoses $\xrightarrow[\text{pH6.8}]{\text{Amylase}}$ Dipeptides

162. Enzyme that digests carbohydrate component of milk in small intestine is

    (1) Rennin   (2) Lactase

    (3) Trypsin   (4) Sucrase

163. Approximately half of the total lymphoid tissue is present in the mucosa layers of various organ systems of the body in the form of MALT. The location of MALT in the digestive tract is in

    (1) Muscularis mucosa

    (2) Serosa

    (3) Lamina propria

    (4) Stratified squamous epithelium of the oral cavity

164. The additional amount of air that can be inhaled forcefully after normal inspiration is

    (1) Vital capacity   (2) IRV + ERV

    (3) IRV + TV   (4) IRV

165. Protein intake in diet will cause which of the following effects in the stomach?

    (1) Decreased secretion from neck cells

    (2) Reduced mobility and churning in gastric region

    (3) Enhanced secretion of gastric proenzymes

    (4) Inhibition of proton pumps on the stomach mucosa

166. Which among the given options is the most probable reason for higher diffusion rate of CO_2 than O_2 through diffusion membrane, for per unit difference in partial pressure?

    (1) More affinity of haemoglobin for O_2

    (2) Less difference in pCO_2 in alveolar air and deoxygenated blood

    (3) Less than 1 mm thickness of diffusion membrane

    (4) Among the following higher solubility of CO_2

167. Among the following greater amount of water and electrolytes are absorbed in

    (1) Large intestine   (2) Rectum

    (3) Stomach   (4) Small intestine

168. Select the **correct** sequence for the layers in the wall of ileum from inner to outer side.

    (1) Mucosa – Circular muscles – Oblique muscles Longitudinal muscles – Serosa

    (2) Muscularis interna – Muscularis externa – Submucosa – Visceral peritoneum

    (3) Mucosal epithelium – Oblique muscles – Circular muscles – Longitudinal muscles – Submucosa

    (4) Mucosa – Submucosa – Muscularis externa – Serosa

169. Non-digestive brush bordered enzyme which does **not** act directly on any food source is

    (1) Enterogastrone   (2) Enterocrinin

    (3) Enterokinase   (4) GIP

170. Minute volume in a normal healthy person is approximately

    (1) 500 ml   (2) 1100 ml

    (3) 2500 ml   (4) 7000 ml

171. Portal triads and Glisson's capsule are associated with mammalian

    (1) Liver   (2) Stomach

    (3) Gall bladder   (4) Large intestine

172. Serious lung damage accompanying fibrosis of upper respiratory tract is seen in people suffering from

    (1) Emphysema, due to chronic cigarette smoking

    (2) Asthma, due to continued exposure to allergens

    (3) Pneumoconiosis, due to chronic coal dust exposure

    (4) Hay fever, a serious allergy of lungs

173. Select the **incorrect** match.

    (1) Paneth cells   – Produce anti-bacterial agent

    (2) Argentaffin cells   – Secrete mucus and gastric juice

    (3) Vomiting centre   – Medulla oblongata

    (4) Water   – Absorption based on osmotic gradient

174. Receptors associated with aortic arch and carotid artery can recognise changes in

    (1) pO_2 and pCO_2 levels of CSF

    (2) pCO_2 and pH levels of blood

    (3) pH and pO_2 of CSF

    (4) pO_2 and pCO_2 levels of blood

175. Choose the **incorrect** match.

  (1) Gastro-oesophageal : Controls passage of food sphincter into stomach

  (2) Sphincter of Oddi : Guards the opening of common hepato-pancreatic duct

  (3) Pyloric sphincter : Regulates movement of chyme into duodenum

  (4) Ileo-caecal sphincter : Regulates movement of faeces into ileum.

176. Volume of air that can be estimated by using a spirometer is

  (1) TV			(2) FRC

  (3) RV			(4) TLC

177. 20-25% of CO_2 is transported in the blood in

  (1) Methemoglobin form in plasma

  (2) Carbamino-haemoglobin form in RBCs

  (3) Carboxyhaemoglobin form in RBCs

  (4) Potassium bicarbonate form in plasma

178. Choose the **correct** statement.

  (1) Inner pleural membrane in close contact with thoracic lining

  (2) Inspiration occurs when there is negative pressure in atmosphere w.r.t lungs

  (3) Contraction of diaphragm increases volume of thoracic chamber in antero-posterior axis

  (4) An increase in pulmonary volume increases the intra pulmonary pressure

179. Pancreatic juice in humans contains inactive enzymes

  (1) Chymotrypsinogen, procarboxypeptidases trypsinogen

  (2) Nucleotidases, trypsinogen, enterokinase

  (3) Nucleases, prorennin, carboxypeptidases

  (4) Trypsinogen, pepsinogen,chymotrypsinogen

180. Digestion of nucleic acids start in _____ in humans.

  (1) Stomach			(2) Buccal cavity

  (3) Pancreas			(4) Small intestine

❖◆❖◆❖◆❖

Code - B

Aakash

Medical | IIT-JEE | Foundations

(Divisions of Aakash Educational Services Limited)

Regd. Office : Aakash Tower, 8, Pusa Road, New Delhi-110005; Ph.: 011-47623456

MM : 720

Test Series for NEET - 2019
Test – 3

Time : 3 Hrs

ANSWERS

1. (4)	37. (4)	73. (1)	109. (2)	145. (3)
2. (1)	38. (4)	74. (3)	110. (4)	146. (3)
3. (3)	39. (3)	75. (3)	111. (1)	147. (2)
4. (2)	40. (1)	76. (4)	112. (1)	148. (2)
5. (2)	41. (3)	77. (3)	113. (1)	149. (1)
6. (1)	42. (4)	78. (4)	114. (4)	150. (1)
7. (2)	43. (1)	79. (3)	115. (1)	151. (4)
8. (3)	44. (4)	80. (1)	116. (4)	152. (2)
9. (2)	45. (2)	81. (3)	117. (3)	153. (1)
10. (3)	46. (1)	82. (3)	118. (2)	154. (3)
11. (3)	47. (2)	83. (2)	119. (2)	155. (3)
12. (2)	48. (2)	84. (1)	120. (3)	156. (4)
13. (2)	49. (1)	85. (3)	121. (3)	157. (1)
14. (4)	50. (2)	86. (2)	122. (2)	158. (4)
15. (1)	51. (3)	87. (2)	123. (4)	159. (1)
16. (2)	52. (3)	88. (2)	124. (2)	160. (1)
17. (3)	53. (1)	89. (4)	125. (2)	161. (2)
18. (1)	54. (3)	90. (2)	126. (1)	162. (2)
19. (1)	55. (1)	91. (3)	127. (2)	163. (3)
20. (4)	56. (4)	92. (3)	128. (2)	164. (4)
21. (4)	57. (1)	93. (4)	129. (3)	165. (3)
22. (3)	58. (3)	94. (3)	130. (1)	166. (4)
23. (1)	59. (4)	95. (1)	131. (2)	167. (4)
24. (1)	60. (3)	96. (3)	132. (4)	168. (4)
25. (2)	61. (2)	97. (4)	133. (4)	169. (3)
26. (3)	62. (2)	98. (2)	134. (1)	170. (4)
27. (2)	63. (2)	99. (4)	135. (1)	171. (1)
28. (2)	64. (3)	100. (4)	136. (2)	172. (3)
29. (2)	65. (2)	101. (2)	137. (1)	173. (2)
30. (1)	66. (1)	102. (1)	138. (1)	174. (2)
31. (3)	67. (4)	103. (4)	139. (3)	175. (4)
32. (3)	68. (1)	104. (2)	140. (1)	176. (1)
33. (2)	69. (4)	105. (2)	141. (2)	177. (2)
34. (4)	70. (1)	106. (2)	142. (2)	178. (3)
35. (3)	71. (2)	107. (4)	143. (4)	179. (1)
36. (1)	72. (1)	108. (1)	144. (4)	180. (4)

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MM : 720　　　　　　　**Test Series for NEET - 2019**　　　　　Time : 3 Hrs.

Test – 3

Answers and Hints

PHYSICS

1. Answer (4)

   $I = I_1 + I_2 + I_3 + I_4$

   $I = 0 + \dfrac{ML^2}{3} + \dfrac{ML^2}{3} + ML^2$

   $I = \dfrac{5ML^2}{3}$

2. Answer (1)

   $I = \dfrac{2}{5}MR^2 + M(2R)^2$

   $\Rightarrow Mk^2 = \dfrac{22MR^2}{5} \Rightarrow k = R\sqrt{\dfrac{22}{5}}$

3. Answer (3)

   The net torque about hinge becomes zero.

4. Answer (2)

   $2\,mg - T_1 = 2\,m \times a$　　　... (i)

   $T_2 = 3\,m \times a$　　　　　　... (ii)

   $(T_1 - T_2)R = I \times \alpha$　　　... (iii)

   $2mg = 5ma + \dfrac{1}{2}\dfrac{mR^2 \times \alpha}{R}$

   $2mg = \left(5 \times m \times R + \dfrac{1}{2}mR\right)\alpha$

   $\alpha = \dfrac{4g}{11R}$

5. Answer (2)

   $v_P = v_0^2 + \left(\dfrac{v_0}{2}\right)^2 + 2v_0\dfrac{v_0}{2}\cos 60°$

   $= v_0^2\left(1 + \dfrac{1}{4} + \dfrac{1}{2}\right)$

   $v_P = \dfrac{v_0\sqrt{7}}{2}$

6. Answer (1)

   $L = I_{\text{(Point of contact)}}\,\omega$

   $L = \dfrac{7}{5}MR^2\omega$

7. Answer (2)

   $g' = g = \left[1 - \dfrac{2h}{R}\right]$

   $\therefore \dfrac{\Delta g}{g} = \dfrac{-2h}{R}$
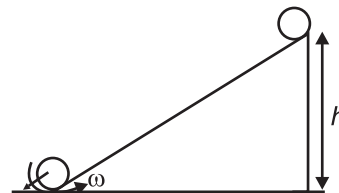
   $\%\dfrac{\Delta g}{g} = \dfrac{2 \times 32 \times 100\%}{6400}$　$\%\dfrac{\Delta g}{g} = 1\%$

8. Answer (3)

   $x_{CM} = \dfrac{\int x\,dm}{\int dm} = \dfrac{\int_0^L (kx)dx\,x}{\int_0^L (kx)dx}$

   $\therefore x_{CM} = \dfrac{2L}{3}$

9. Answer (2)

   $M.E_i = ME_f$

   $mgh = \dfrac{1}{2}I_{COM}\omega^2 + \dfrac{1}{2}mv^2$

$$mgh = \frac{1}{2} \times mR^2 \times \frac{2}{3} \times \frac{v^2}{R^2} + \frac{1}{2}mv^2$$

$$mgh = \frac{5}{6}mv^2 \Rightarrow v = \sqrt{\frac{6gh}{5}}$$

10. Answer (3)
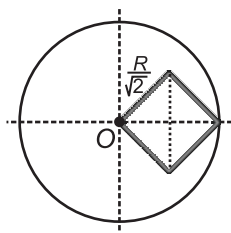
$T \times 3 - 15g \times 2 = 0 \Rightarrow T = 100$ N

11. Answer (3)

$$\vec{\tau} = \vec{0}$$

$$\begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 2 & -6 & 12 \\ a & 3 & 6 \end{vmatrix} = \vec{0}$$

$\Rightarrow$ $a = -1$

12. Answer (2)

$$I_0 = \frac{MR^2}{2} - \frac{M}{2\pi}\left[\frac{R^2}{2 \times 6} + \frac{R^2}{4}\right] = \frac{MR^2}{2}\left[1 - \frac{1}{3\pi}\right]$$

13. Answer (2)

$V = 3x + 4y + 12z$

$$\vec{I} = -\frac{\partial V}{\partial x}\hat{i} - \frac{\partial V}{\partial y}\hat{j} - \frac{\partial V}{\partial z}\hat{k}$$

$$\vec{I} = -3\hat{i} - 4\hat{j} - 12\hat{k}$$

$\therefore$ $I = \sqrt{9 + 16 + 144} = \sqrt{169} = 13$ N/kg

14. Answer (4)

$$\mu MgR = MR^2\alpha \Rightarrow \alpha = \frac{\mu g}{R}$$

$$\omega = \omega_0 - \frac{\mu g}{R}t = \frac{\omega_0}{2}$$

$$\therefore t = \frac{\omega_0 R}{2\mu g}$$

15. Answer (1)

$T^2 = kr^3$

$$2\frac{\Delta T}{T} = 3\frac{\Delta r}{r}$$

$$\frac{\Delta T}{T} = \frac{3}{2}\frac{\Delta r}{r}$$

16. Answer (2)

$$h = \frac{v^2 R}{2gR - v^2} = \frac{v^2 R}{v_e^2 - v^2} = \frac{k^2 R}{1 - k^2}$$

$v = kv_e$

$$d = h + R = \frac{R}{1 - k^2}$$

17. Answer (3)

$$[K] = \frac{[I]}{[M]}$$

18. Answer (1)

$v \propto \sqrt{U}$

U : Potential energy

19. Answer (1)

Slope of $\vec{E}$ vector from origin is

$$\tan\theta = \frac{1}{4}$$

$\therefore$ Slope of line perpendicular to $\vec{E}$ is -4

Slope of $y + 4x = 2$ is -4.

20. Answer (4)

By conservation of linear momentum

$$mu\cos\theta = \frac{m}{3} \times 0 - \frac{m}{3}u\cos\theta + \frac{m}{3}u'$$

$u' = 4u\cos\theta \rightarrow$ Velocity of third part just after explosion

$\Rightarrow$ distance $= 4u\cos\theta \times \frac{u\sin\theta}{g} + u\cos\theta \times \frac{u\sin\theta}{g}$

$$= \frac{5u^2 \sin\theta\cos\theta}{g} = \frac{5 \times 20 \times 20 \times \sqrt{3}}{10 \times 2} \times \frac{1}{2}$$

$$= 50\sqrt{3}\,\text{m}$$

21. Answer (4)

Angular momentum $= mvr_\perp$

$r_\perp = $ constant $= a$

$\Rightarrow$ Angular momentum $=$ constant

22. Answer (3)

$$V = -\frac{GM}{r}$$

$$G = -G \times 2\left[1 + \frac{1}{2} + \frac{1}{4} + ...\infty\right]$$

$$V = -2G\frac{1}{1 - \frac{1}{2}} = -4G$$

23. Answer (1)

$$I = \int_r^R \frac{M}{\pi(R^2 - r^2)}(2\pi x dx)x^2$$

$$= \frac{M}{2(R^2 - r^2)}(R^4 - r^4)$$

$$= \frac{M}{2}(R^2 + r^2)$$

24. Answer (1)

$$V = \sqrt{\frac{2gh}{\left(1 + \dfrac{h}{R}\right)}}$$

$$= \sqrt{gR}$$

$$= \sqrt{gR} = \sqrt{64 \times 10^6} = 8 \text{ km/s}$$
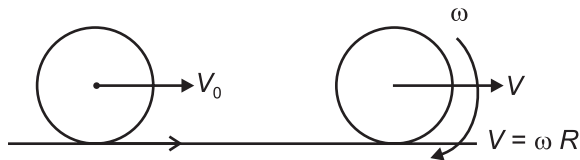
25. Answer (2)

Mass remain same.

26. Answer (3)

$M_P = 8 M_e$

$$v = \sqrt{\frac{2GM}{R}}$$

$$\frac{v_e}{v_p} = \frac{1}{2}$$

$$v_p = 2 \times v_e = 2 \times 11.2 = 22.4 \text{ km/s}$$

27. Answer (2)

$$f_r = \frac{\dfrac{1}{2}I\omega^2}{\dfrac{1}{2}mv^2 + \dfrac{1}{2}I\omega^2}$$

$$\omega = \frac{v}{r} \Rightarrow f_r = \frac{2}{7}$$

28. Answer (2)

By conservation of angular momentum about point of contact.

$$mv_0 R = mvR + \left(\frac{mR^2}{2}\right)\omega$$

$$mv_0 R = m\omega R^2 + \frac{mR^2\omega}{2}$$

$$\frac{2v_0}{3R} = \omega$$

29. Answer (2)
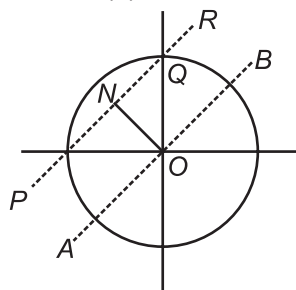
$$I_{PQR} = I_{AB} + M(ON)^2$$

$$= \frac{1}{4}MR^2 + M\left(\frac{c}{\sqrt{2}}\right)^2$$

$$= \frac{1}{4}MR^2 + \frac{Mc^2}{2} = \frac{1}{2}MR^2$$

$$\therefore \frac{Mc^2}{2} = \frac{1}{4}MR^2$$

$$c = \pm\frac{R}{\sqrt{2}}$$

30. Answer (1)

$$-\frac{GMm}{R} + \text{K.E.} = \frac{-GMm}{3R} + \frac{1}{2}m\left(\frac{GM}{3R}\right)$$

$$\text{K.E.} = \frac{GMm}{R} - \frac{GMm}{3R} + \frac{GMm}{6R}$$

$$\therefore \text{K.E.} = \frac{5GMm}{6R}$$

31. Answer (3)

$$T_1^2 \propto (10^{13})^3$$

$$(T_2)^2 \propto (10^{12})^3$$

$$\frac{T_1^2}{T_2^2} = \left(\frac{10^{13}}{10^{12}}\right)^3 = 10^3$$

$$\frac{T_1}{T_2} = 10\sqrt{10}$$

32. Answer (3)

$$J = \int_0^T \tau dt$$

= Area under the graph

33. Answer (2)

$$m \leftarrow x \longrightarrow \leftarrow d-x \longrightarrow m$$
$$A \qquad\qquad\qquad\qquad B$$

$$V = -\left[\frac{Gm}{x} + \frac{Gm}{d-x}\right] = \frac{-Gmd}{x(d-x)}$$

At $x = 0$ and $x = d$　$V \to -\infty$

(3)

34. Answer (4)

$X = \dfrac{m_1 x_1 + m_2 x_2}{m_1 + m_2} = \dfrac{L}{3}$

$Y = \dfrac{m_1 y_1 + m_2 y_2}{m_1 + m_2} = \dfrac{L}{6}$

35. Answer (3)

$V = -\dfrac{GM}{2R^3}(3R^2 - r^2)$

36. Answer (1)

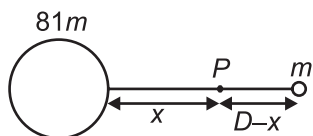$U_i = -\dfrac{3 \times 6.67 \times 10^{-11} \times (0.1)^2}{0.2}$

$U_f = -\dfrac{3 \times 6.67 \times 10^{-11} \times (0.1)^2}{0.4}$

∴ $W = (\text{P.E.})_f - (\text{P.E.})_i$

   $= 3 \times 6.67 \times 10^{-13} \times 2.5$ J

$W = 5.002 \times 10^{-12}$J

37. Answer (4)

$\dfrac{81GM}{x^2} = \dfrac{GM}{(D-x)^2}$

$\Rightarrow \dfrac{9}{x} = \dfrac{1}{(D-x)}$

∴ $x = \dfrac{9D}{10}$

38. Answer (4)

$-\dfrac{GMm}{R} + \dfrac{1}{2}Mv^2 = -\dfrac{GMm}{r} + 0$

$\dfrac{1}{2}v^2 = \dfrac{GM}{R} - \dfrac{GM}{r}$
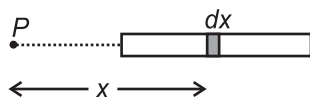
$v^2 = \dfrac{2GM}{R} - \dfrac{2GM}{r}$

∴ $v = \sqrt{v_e^2 - 2v_0^2}$

39. Answer (3)

TE = – KE

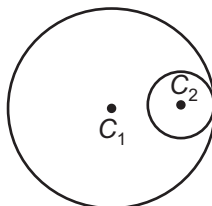PE = – 2KE

40. Answer (1)

$dI = \dfrac{Gdm}{x^2}$

$\int dI = G\int \dfrac{M}{L}\dfrac{dx}{x^2}$

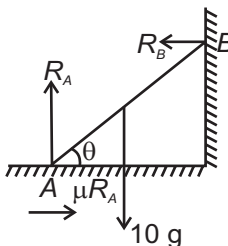$\Rightarrow I = \dfrac{GM}{L}\int_{L}^{2L} x^{-2}dx = \dfrac{GM}{L} \times \dfrac{1}{2L} = \dfrac{GM}{2L^2}$

41. Answer (3)

$\vec{E}_{(\text{in cavity})} = \dfrac{4\pi G\rho}{3}\overline{C_2 C_1}$

⇒   Uniform vector

   (ρ → Volumetric mass density)

42. Answer (4)

$R_A = 10\,g = 100$ N

$\mu R_A = R_B$

Taking moment of all the forces about A

$mg\dfrac{\ell}{2}\cos\theta = R_B \times \ell\sin\theta$

$\dfrac{mg\cos\theta}{2} = \mu \times 100\sin\theta$

$\tan\theta = \dfrac{1}{2 \times 0.5} = 1$

θ = 45°

43. Answer (1)

By the conservation of angular momentum

$L_i = L_f$

$k = \dfrac{L^2}{2I}$

$k' = \dfrac{L^2}{2 \times \dfrac{I}{2}} = 2k$

44. Answer (4)

$U = -\Delta V \times m$

$= (V_0 - V_\infty)m$

$= -\dfrac{Gm \times 4 \times m}{\dfrac{\ell}{\sqrt{2}}} = -\dfrac{4\sqrt{2}\,Gmm}{\ell} = -\dfrac{4\sqrt{2}\,Gm^2}{\ell}$

45. Answer (2)

$\dfrac{-GMm}{R} = -\dfrac{3}{2}\dfrac{GMm}{R} + \dfrac{1}{2}mv^2$
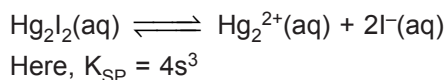
$\therefore\; v = \sqrt{\dfrac{GM}{R}}$

CHEMISTRY

46. Answer (1)

Acid-base neutralisation is always exothermic.

47. Answer (2)

$(C_p - C_v)M = R$

$(0.125 - 0.075)M = 2$

$\therefore\;\; M = 40$ i.e. Ar

48. Answer (2)

$Hg_2I_2(aq) \rightleftharpoons Hg_2^{2+}(aq) + 2I^-(aq)$

Here, $K_{SP} = 4s^3$

49. Answer (1)

NH_4^+ ion hydrolysis, no hydrolysis of Cl^- ion.

50. Answer (2)

51. Answer (3)

$A_2B(s) \rightleftharpoons 2A(g) + B(g)$

$\qquad\qquad 2\;\; : \;\; 1$

$\qquad\qquad \dfrac{2}{3}P \qquad \dfrac{P}{3}$
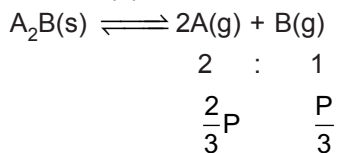
$\therefore\;\; K_P = \left(\dfrac{2}{3}P\right)^2\left(\dfrac{P}{3}\right) = \dfrac{4}{27}P^3$

52. Answer (3)

Heat of neutralisation = –51.7 kJ mol^{-1},

so, for 0.1 mol heat of neutralisation = 0.1 × 51.7

$\qquad\qquad\qquad\qquad\qquad\qquad = -5.17$ kJ

53. Answer (1)

During expansion, max. work done will be in reversible process.

Hence, $w = -2.303\, nRT \log\left(\dfrac{V_2}{V_1}\right)$

$= -2.303 \times 2 \times 8.314 \times 300 \log\left(\dfrac{50}{5}\right)$

$= -11.49$ kJ

54. Answer (3)

Expansion is occurring under isothermal condition

So, $\Delta H = \Delta E = 0$, $\Delta T = 0$ and $w = -q$

55. Answer (1)

56. Answer (4)

$w = -\Delta n_g RT$

$= -1 \times RT$

$= -R \times 300 = -300\,R$

57. Answer (1)

Neutralization enthalpy of (S.A + S.B.) = –57.1kJ/mol

Heat release in above process

$\qquad = (-57.1) \times 0.02 = -1142$ J

$Q = ms\Delta T$

$1142 = (300) \times 4.2 \times \Delta T$

$\Delta T = 0.9°C$

58. Answer (3)

59. Answer (4)

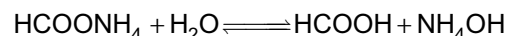$V_1 = 1$ L, $M_1 = 10^{-2}$

$M_2 = 10^{-4}$, $V_2 = ?$

$V_2 = \dfrac{10^{-2} \times 1}{10^{-4}} = 100$ lit

$\therefore\;\; V_{H_2O}$ added $= 100 - 1 = 99$ lit

60. Answer (3)

61. Answer (2)

62. Answer (2)

$HCOONH_4 + H_2O \rightleftharpoons HCOOH + NH_4OH$

$pH = \dfrac{1}{2}\left[pK_a + pK_w - pK_b\right]$

$= \dfrac{1}{2}[3.8 + 14 - 4.8] = 6.5$

63. Answer (2)

Due to excessive hydration of F^- ion.

64. Answer (3)

65. Answer (2)

$\qquad\qquad\qquad\qquad\quad PCl_5 \rightleftharpoons PCl_3 + Cl_2$

Initial moles $\qquad\qquad\quad a$

At equilibrium $\qquad\quad a - b \qquad\quad b \qquad b$

Total number of moles at equilibrium

$\qquad = a - b + b + b = a + b$

Partial pressure of $PCl_5 = \left(\dfrac{a-b}{a+b}\right)P$

Partial pressure of $PCl_3 = \left(\dfrac{b}{a+b}\right)P$

Partial pressure of $Cl_2 = \left(\dfrac{b}{a+b}\right)P$

$K_P = \dfrac{P_{PCl_3} \times P_{Cl_2}}{P_{PCl_5}}$

$K_P = \dfrac{\left(\dfrac{b}{a+b}\right)P \times \left(\dfrac{b}{a+b}\right)P}{\left(\dfrac{a-b}{a+b}\right)P}$

$K_P = \dfrac{b^2 P}{a^2 - b^2}$

$\dfrac{a^2 - b^2}{b^2} = \dfrac{P}{K_P}$

$\dfrac{a^2}{b^2} - 1 = \dfrac{P}{K_P}$

$\dfrac{a^2}{b^2} = \dfrac{P}{K_P} + 1$

$\left(\dfrac{a}{b}\right)^2 = \dfrac{P + K_P}{K_P}$

$\dfrac{a}{b} = \left(\dfrac{P + K_P}{K_P}\right)^{1/2}$

66. Answer (1)

67. Answer (4)

$BeCl_2$ is a Lewis acid.
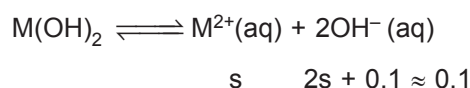
68. Answer (1)

CH_3COONa(aq.) solution has pH > 7.

69. Answer (4)

(HCl + NaCl) does not contain a weak acid and its salt.

70. Answer (1)

$M(OH)_2 \rightleftharpoons M^{2+}(aq) + 2OH^-(aq)$

$\qquad\qquad s \qquad 2s + 0.1 \approx 0.1$

$K_{SP} = s(0.1)^2 = 8 \times 10^{-12}$

$\therefore \quad s = 8 \times 10^{-10}$ mol L^{-1}

71. Answer (2)

$\Delta H_r^\circ = \Sigma \Delta H_f^\circ$ of products $- \Sigma \Delta H_f^\circ$ of reactants.

72. Answer (1)

$\Delta S_{A \to D} = \Delta S_{A \to B} + \Delta S_{B \to C} + \Delta S_{C \to D}$

73. Answer (1)

Internal energy is a state function.

74. Answer (3)

75. Answer (3)

76. Answer (4)

$Na_3AlF_6 \rightleftharpoons 3Na^+ + [AlF_6]^{3-}$
$\qquad\qquad\qquad 3s \qquad s$
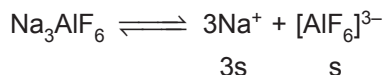
77. Answer (3)

78. Answer (4)

79. Answer (3)

$\qquad\qquad H_3PO_4 + 3\ KOH \longrightarrow K_3PO_4 + 3H_2O$

Millimoles $\quad 10 \times 0.1 \quad 5 \times 0.1 \qquad 0 \qquad\quad 0$

After reaction $\ 2.5/3 \qquad 0 \qquad\quad 0.5/3 \quad\ 0.5/3$

After reaction mixture contains equal moles of weak acid and its salt, so it acts as a buffer solution.

80. Answer (1)

$\underset{(H_2SO_4)}{M} = 5 \times 10^{-4}$

$[H^+] = 2 \times 5 \times 10^{-4} = 10^{-3}$ M

pH = 3

81. Answer (3)

NaCN is a salt of weak acid and strong base. NaOH is a strong base.

82. Answer (3)

83. Answer (2)

84. Answer (1)

For reverse reaction, $K = \dfrac{1}{10^{-6}} = 10^6$

85. Answer (3)

Density is an intensive property.

86. Answer (2)

In case of CO, at 0 K its entropy is 5 JK^{-1} mol^{-1} heat.

87. Answer (2)

ΔH_{comb} = Heat liberated due to combustion of 1 mol benzene i.e. 78 g benzene.

88. Answer (2)

$\Delta H_{neutralisation} = -13.7 + \Delta H_{ionisation}$

$= -13.7 + 1.5 + 0.5$

$= -13.7 + 2 = -11.7$ kcal

89. Answer (4)

At 298 K, naturally occuring, thermodynamically most stable form of a substance, assumed to have its $\Delta H_f = 0$.

90. Answer (2)

BOTANY

91. Answer (3)

Chromatophores are involved in photosynthesis in prokaryotes.

92. Answer (3)

Eukaryotic flagella are made up of tubulin proteins. Fimbriae help in attaching the bacteria to the rocks in streams.

93. Answer (4)

Polyribosomes is formed by the association of many ribosomes on single m-RNA.

94. Answer (3)

Phospholipids have polar head and non-polar tail.

95. Answer (1)

Na^+/K^+ pump is an example of active transport.

96. Answer (3)

97. Answer (4)

Digestive vacuoles are secondary lysosomes that contain active enzymes.

98. Answer (2)

The Golgi derived vesicles take part in formation of cell plate.

99. Answer (4)

100. Answer (4)

(a) Chiasmata appears by the end of diplotene.

(b) Terminalisation of chiasmata occurs in diakinesis.

(c) Recombination nodules are formed at pachytene stage.

101. Answer (2)

Glycocalyx, cell wall and cell membrane.

102. Answer (1)

103. Answer (4)

In telophase, chromosomes get decondensed and lose their identity.

104. Answer (2)

105. Answer (2)

Synthesis of histone proteins – S phase

106. Answer (2)

Water moves from high water potential to low water potential.

Water cannot move from D to A as the two cells are not interconnected.

107. Answer (4)

108. Answer (1)

Symplastic pathway is a system of interconnected protoplasts.

109. Answer (2)

110. Answer (4)

Mitochondria is involved in β-oxidation of fats.

111. Answer (1)

112. Answer (1)

- After S-phase, the amount of DNA doubles, but the number chromosomes remain the same.

- Higher plants lack centrioles.

113. Answer (1)

Prophase is called spireme stage.

114. Answer (4)

Ribosomes are not the component of miotic spindle apparatus.

115. Answer (1)

Bivalent become clearly visible as tetrad in pachytene stage.

116. Answer (4)

Meiosis II is homotypic, equational division. Only prophase I is divided into five substages.

117. Answer (3)

118. Answer (2)

Oxidative phosphorylation occurs in mitochondria.

119. Answer (2)

Ribosomes are organelles within an organelle.

120. Answer (3)

RuBisCO, thylakoid – Chloroplast

Cristae – Mitochondria

Rest are associated with both.

121. Answer (3)

122. Answer (2)

123. Answer (4)

124. Answer (2)

Mitosis can occur in all somatic cells.

125. Answer (2)

(b) Volume of imbibant increases.

(d) Imbibition plays no role in the ascent of sap.

126. Answer (1)

127. Answer (2)

Cell A is hypertonic to the solution, therefore endosmosis occurs.

Cell B is isotonic, so no change take place.

Cell C is hypotonic to the solution, therefore exosmosis occurs.

128. Answer (2)

The source-sink relationship is variable in phloem transport process.

129. Answer (3)

Facilitated diffusion is a downhill transport.

130. Answer (1)

For a solution at atmospheriic pressure, $\psi_w = \psi_s$.

131. Answer (2)

Transpiration creates transpiration pull.

132. Answer (4)

Dumb-bell shaped guard cells have thick walled middle region.

133. Answer (4)

Soil water availability is an abiotic factor that affects transpiration.

134. Answer (1)

135. Answer (1)

ZOOLOGY

136. Answer (2)

Sub mucosal plexus or Meissner's plexus is present in sub mucosa layer. Myenteric plexus regulates movements in gut i.e. peristalsis.

137. Answer (1)

Lacteals are lymph vessels in villi of small intestine.

138. Answer (1)

Kwashiorkar results from deficiency of proteins in a child.

139. Answer (3)

Bile juice comprises bile salts, cholesterol, phospholipids, biliverdin and bilirubin (catabolic products of hemoglobin) but lack enzymes.

140. Answer (1)

Salivary glands are situated outside buccal cavity but secrete enzymes into buccal cavity.

141. Answer (2)

100 ml of oxygenated blood transports 20 ml of O_2 to tissues of which 5 ml is given to tissues. 15 ml of O_2, is returned to venous blood.

1000 ml of deoxygenated blood delivers 15 ml of O_2

142. Answer (2)

High temperature favours dissociation of oxyhaemogolbin.

143. Answer (4)

Steapsin is lipid digesting enzyme and is secreted by pancreas.

144. Answer (4)

Functional residual capacity = ERV + RV.

145. Answer (3)

Brunner's glands are present in submucosal layer.

146. Answer (3)

Dysbarrism causes blockage of narrow blood capillaries due to formation of N_2 bubbles in the blood upon rapid ascent in deep sea diver's.

147. Answer (2)

Pancreas secretes bicarbonate ions in response to acidic food in small intestine.

148. Answer (2)

All premolars and last molars are absent in deciduous dentition.

149. Answer (1)

Cardiac notch is present in left lung.

150. Answer (1)

Carbonic anhydrase is present in high concentration in RBCs and in minute quantities in plasma.

151. Answer (4)

Micelles are formed in lumen of small intestine.

152. Answer (2)

pO_2 of alveolar air = 104 mm Hg

pO_2 of exhaled air = 116 mm Hg

153. Answer (1)

Deglutition is the synonym of swallowing.

154. Answer (3)

Presence of 2, 3DPG increases the P_{50} value of adult Hb.

155. Answer (3)

Rib cage is ventrally formed by sternum, dorsally by vertebral column and laterally by ribs.

156. Answer (4)

Chyme is the partially digested food reaching duodenum. Rugae are irregular folds in stomach.

157. Answer (1)

Salivary amylases or carbohydrate splitting enzyme produced from salivary glands into buccal cavity hydrolyses starch into disaccharides (maltose) at pH 6.8.

158. Answer (4)

Birds respire through lungs.

159. Answer (1)

Trachea divides into primary bronchi at level of 5th thoracic vertebra.

160. Answer (1)

Breathing rate is 12-16 times per minute therefore respiratory minute volume can be 6000 – 8000 ml per minute.

161. Answer (2)

Starch is converted to maltose at pH 6.8.

Diglycerides are converted by lipase into diglycerides

162. Answer (2)

Rennin acts on milk proteins in calf. Lactose is milk sugar.

163. Answer (3)

MALT is situated in lamina propria.

164. Answer (4)

IRV+TV = Inspiratory capacity

165. Answer (3)

Protein intake results in enhanced HCl production, requiring increased proton pump activity.

166. Answer (4)

Less thickness of diffusion membrane is a supporting factor for both O_2 and CO_2, not individually CO_2.

167. Answer (4)

Jejunum part of small intestine absorbs major component of water in alimentary canal in man.

168. Answer (4)

Stomach has an additional layer of oblique muscles, but inner to circular muscles and muscularis interna is the part of mucosa.

169. Answer (3)

Enterokinase activates trypsinogen.

170. Answer (4)

Haldane effect is observed at lung level that act opposite to Bohr's effect.

Hamburger's phenomenon is also called chloride shift.

171. Answer (1)

Glisson's capsule covers hepatic lobules in liver

172. Answer (3)

Hay fever is an allergy of upper respiratory passage, not lungs and emphysema affects alveoli.

173. Answer (2)

Argentaffin cells produce hormones not mucus.

174. Answer (2)

Central chemoreceptors recognises changes in $[H]^+$ and pCO_2 in CSF.

175. Answer (4)

Ileo-caecal sphincter regulates the movements of faeces from ileum to caecum.

176. Answer (1)

With exception of RV, TLC and FRC, all other respiratory volumes and capacities can be measured by spirometer.

177. Answer (2)

Nearly 70% of CO_2 is transported in bicarbonate form in plasma.

178. Answer (3)

Outer pleural membrane is in close contact with thoracic lining. Inspiration occurs when there is negative pressure in lungs with respect to atmosphere. An increase in pulmonary volume decreases intrapulmonary pressure.

179. Answer (1)

Enterokinase is an intestinal enzyme. Prorennin and pepsinogen are gastric enzymes.

180. Answer (4)

Nucleases from pancreatic juice starts digesting nucleic acids in small intestine.

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