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 – 5

Time : 3 Hrs.

Topics Covered :

Physics : Oscillations and Waves

Chemistry : Organic Chemistry-(Some Basic Principles and Techniques), Hydrocarbons, Environmental Chemistry

Botany : Respiration in Plants, Plant Growth and Development

Zoology : Neural Control and Coordination, Chemical Coordination and Integration (Regulation)

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. Consider the apparent change in frequency and wavelength of sound wave due to relative motion of source of sound and observer.

    (a) The apparent frequency changes due to the motion of observer

    (b) The apparent frequency is independent of velocity of medium when source and observer are at rest

    (c) The apparent wavelength changes due to the motion of the source

    (1) (a), (b) and (c) are correct

    (2) Only (a) and (c) are correct

    (3) Only (a) and (b) are correct

    (4) Only (b) and (c) are correct

2. If, f_1 and f_2 be the fundamental frequencies of vibration of two parts of a stretched string separately after cutting under equal tension T. The fundamental frequency f of string before cutting under same tension T will be

    (1) $f_1 + f_2$

    (2) $\dfrac{(f_1 + f_2)^2}{f_1 f_2}$

    (3) $\dfrac{f_1 f_2}{f_1 + f_2}$

    (4) $\dfrac{f_1 f_2}{f_1 - f_2}$

3. A tuning fork produces a wave of wavelength 100 cm in air at 27°C. The wavelength of the wave produced by the fork in air at 127°C will be nearly

    (1) 80 cm

    (2) 85 cm

    (3) 125 cm

    (4) 115 cm

4. The graph plotted between restoring force and displacement from mean position of particle executing S.H.M is

(1)
(2)
(3)
(4)
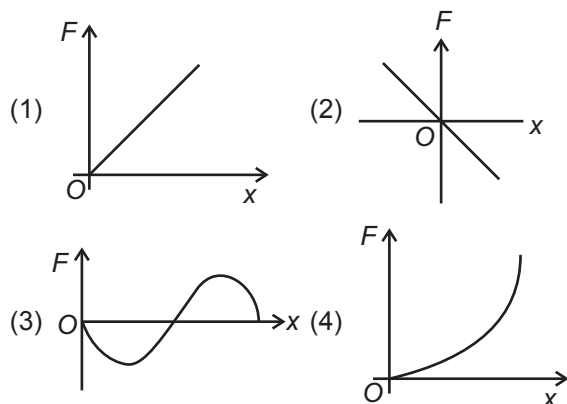
5. The spherical bob of a simple pendulum is half filled with water. Its time period is T_0. If water leaks continuously through an orifice at the bottom of hollow sphere then

   (1) Time period increases continuously

   (2) Time period decreases continuously

   (3) The period remains same

   (4) Time period first increases then suddenly decreases to a certain value

6. A simple harmonic oscillator has time period of 4 s. The change in phase of the oscillator, 1 s after leaving the positive extreme position is (in radian)

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

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

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

   (4) $\dfrac{\pi}{6}$

7. A mass 'm' is suspended from a spring of negligible mass. The spring is pulled a little and then released so that the mass executes SHM of time period T_0. If the mass is increased by M then time period becomes $\dfrac{4T_0}{3}$ then the ratio of M : m is

   (1) 9 : 16

   (2) 7 : 9

   (3) 5 : 9

   (4) 5 : 16

8. For a particle executing SHM with a frequency 80 Hz, the frequency of oscillation of its kinetic energy is

   (1) 20 Hz

   (2) 120 Hz

   (3) 40 Hz

   (4) 160 Hz

9. For an SHM, graph between velocity (v) and displacement (x), in general is

   (1) Parabolic

   (2) Hyperbolic

   (3) Elliptical

   (4) Straight line

10. Which of the following graphs represents variation of velocity of on acoustic wave in given gas as a function of absolute temperature of gas?

(1)
(2)
(3)
(4)
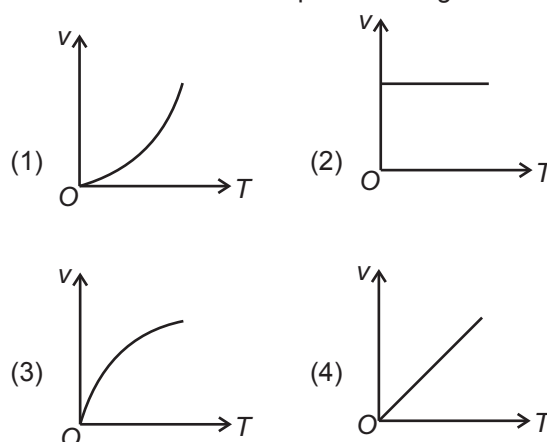
11. One solid sphere, having mass 1 kg and diameter 0.3 m is suspended from a wire. If the twisting couple per unit twist for the wire is 6×10^{-3} Nm/rad, then time period of torsional pendulum will be

   (1) 0.7 s

   (2) 7.7 s

   (3) 77 s

   (4) 0.07 s

12. A whistle of frequency 500 Hz tied to the end of spring and oscillating with angular frequency 20 rad/s and amplitude 2 m. A listener standing at a certain distance away from the whistle along the direction of oscillation, hears frequencies in the range of (velocity of sound = 340 m/s)

   (1) 447 Hz to 567 Hz

   (2) 180 Hz to 380 Hz

   (3) 568 Hz to 880 Hz

   (4) 220 Hz to 384 Hz

13. Two sound sources emitting sound each of wavelength λ are fixed at a given distance apart. A listener moves with a velocity v_0 from one source towards another along the line joining the two sources. The number of beats heard by him per second is

   (1) $\dfrac{v_0}{2\lambda}$

   (2) $\dfrac{2v_0}{\lambda}$

   (3) $\dfrac{v_0}{\lambda}$

   (4) $\dfrac{v_0}{3\lambda}$

14. A simple pendulum has time period T_1. The point of suspension is now moved upward according to equation $y = At$, where $A = 2$ m/s. If new time period is T_2 then the ratio of T_1^2 and T_2^2 is

   (1) 2 : 3

   (2) 5 : 6

   (3) 1 : 1

   (4) 3 : 2

15. Two sound waves having ratio of respective intensities 400 : 1, undergo interference. The ratio of intensity at the maxima to minima is

    (1) $\left(\dfrac{21}{19}\right)^2$

    (2) $\dfrac{21}{19}$

    (3) $\dfrac{401}{399}$

    (4) $\sqrt{\dfrac{401}{399}}$

16. For a particular tube, three harmonic are 300 Hz, 600 Hz, and 750 Hz. The other possible frequencies of oscillations in the tube are

    (1) 100, 200 Hz
    (2) 150, 400 Hz
    (3) 150, 450 Hz
    (4) 450, 800 Hz

17. Two tuning forks have frequencies 450 Hz and 454 Hz respectively. On sounding these forks together, the time interval between successive maximum intensities will be

    (1) $\dfrac{1}{2}$ s
    (2) $\dfrac{1}{4}$ s
    (3) 1 s
    (4) 2 s

18. An SHM is represented by an equation
    $y = A\sin\omega t + A\sin(\omega t + 120°) + A\sin(\omega t - 60°)$.
    Maximum displacement from mean position will be

    (1) A
    (2) $2A$
    (3) $3A$
    (4) $\sqrt{3}A$

19. A transverse wave represented by $y = 0.02 \sin(x + 30t)$, (where x and t are in metres and seconds) is travelling along a wire of cross-sectional area 1 mm^2 and density 8000 kg/m^3. Tension in string is

    (1) 20 N
    (2) 7.2 N
    (3) 30 N
    (4) 14.4 N

20. A transverse harmonic wave on a string is described by $y(x,t) = 5\sin\left(20t + 0.01\pi x + \dfrac{\pi}{3}\right)$ (where x and y are in cm and t is in s). The least distance between successive crest and trough will be

    (1) 100 cm
    (2) 150 cm
   (3) 75 cm
    (4) 50 cm

21. A string of mass 3 kg is under a uniform tension of 500 N. The length of the stretched string is 15 m. If the transverse jerk is struck at one end of the string, then the disturbance will reach the other end in time

    (1) 0.3 s
    (2) 0.5 s
    (3) 0.2 s
    (4) 0.4 s

22. A body is executing S.H.M with amplitude A and angular frequency ω. The root mean square speed of the body for one complete oscillation will be (position of the particle at $t = 0$ is mean position)

    (1) $\dfrac{A\omega}{2}$
    (2) $\sqrt{\dfrac{A\omega}{2}}$
    (3) $\dfrac{A\omega}{\sqrt{2}}$
    (4) $\dfrac{\sqrt{A\omega}}{2}$

23. When a mass m is connected individually to two springs S_1 and S_2 separately the oscillation frequencies are f_1 and f_2 respectively. If the same mass is connected with spring combination as shown in figure, then the oscillation frequency will be
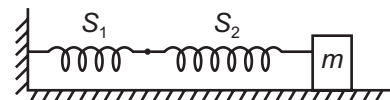
    (1) $\dfrac{f_1^2 f_2^2}{f_1^2 + f_2^2}$
    (2) $\dfrac{f_1 f_2}{f_1 + f_2}$
    (3) $\dfrac{f_1 f_2}{\sqrt{f_1 + f_2}}$
    (4) $\dfrac{f_1 f_2}{\sqrt{f_1^2 + f_2^2}}$

24. The transverse displacement of a string (clamped at its both ends) is given by $y(x,t) = 0.04 \sin\left(\dfrac{\pi x}{3}\right)\cos(100\pi t)$ (where symbols have their usual meanings).

    All the particles on string between two consecutive nodes vibrate with

    (1) Same phase
    (2) Same amplitude
    (3) Same frequency
    (4) Both (1) and (3)

25. Ten springs of spring constant k, $2k$, $3k$, $4k$, $5k$ ... 10 k are connected in parallel and end of springs connected to a rigid support. The mass 'm' kg is attached to other end of all the springs and system is allowed to vibrate. The time period of oscillation of the system is

    (1) $2\pi\sqrt{\dfrac{m}{25k}}$
    (2) $2\pi\sqrt{\dfrac{m}{50k}}$
    (3) $2\pi\sqrt{\dfrac{m}{55k}}$
    (4) $2\pi\sqrt{\dfrac{m}{45k}}$

26. A mass, when suspended from a vertical spring, elongates the spring by a length 3.6 m in equilibrium. The mass is given a small vertical impulse. The time period of resulting oscillations is ($g = 10$ m/s^2)

   (1) 2π s
    (2) π s
    (3) 1.2π s
    (4) 3.8π s

27. A sonometer wire is vibrating in the second overtone. In the wire there are

    (1) Two nodes and two antinodes

    (2) One node and two antinodes

    (3) Four nodes and three antinodes

    (4) Three nodes and three antinodes

28. In a resonance column tube experiment, diameter of tube is 4 cm. The speed of sound is found to be 336 m/s. If frequency of tuning fork is 512 Hz, then first resonance occurs at length

    (1) 14.0 cm

    (2) 16.0 cm

    (3) 17.2 cm

    (4) 15.2 cm

29. The displacement from mean position of a particle executing SHM is given by $y = 5\sin\left(4t + \dfrac{\pi}{3}\right)$ cm. If T is time period and mass is 2 g, then KE of particle at $t = \dfrac{T}{4}$ is

    (1) 4×10^{-3} J

    (2) 5×10^{-5} J

    (3) 3×10^{-3} J

    (4) 3×10^{-5} J

30. Starting from mean position a body oscillates simple harmonically with a period of 6 s. After what time, the kinetic energy will be one third of potential energy?

    (1) 1 s

    (2) $\dfrac{1}{4}$ s

    (3) $\dfrac{1}{3}$ s

    (4) $\dfrac{1}{12}$ s

31. Differential equation of wave motion is (symbols have their usual meanings)

    (1) $\dfrac{\partial^2 y}{\partial t^2} = v^2 \dfrac{\partial^2 y}{\partial x^2}$

    (2) $\dfrac{\partial^2 y}{\partial x^2} = v^2 \dfrac{\partial^2 y}{\partial t^2}$

    (3) $\dfrac{\partial^2 y}{\partial t^2} = v \dfrac{\partial^2 y}{\partial x^2}$

    (4) $\dfrac{\partial^2 y}{\partial x^2} = v \dfrac{\partial^2 y}{\partial t^2}$

32. Two closed organ pipes have length l and $l + \Delta l$ respectively. If velocity of sound in air is v, then the number of beats heard per second when the two organ pipes are vibrated together in their respective fundamental mode is about (neglect end correction and $\Delta l \ll l$)

    (1) $\dfrac{v}{4l^2}\Delta l$

    (2) $\dfrac{v}{3l}$

    (3) $\dfrac{v}{2l^2}\Delta l$

    (4) $\dfrac{v}{6l}$

33. A uniform rod oscillates in vertical plane about a horizontal axis passing through one of its ends and its time period is equal to that of a seconds pendulum. Its length is (g = 10 m/s^2)

    (1) 1.5 m

    (2) 1 m

    (3) 3 m

    (4) 2 m

34. Velocity of sound in air is v. If density of air is increased to four times, then the new velocity of sound will be (assume constant pressure)

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

    (2) $\dfrac{v}{12}$

    (3) $12v$

    (4) $\dfrac{3}{2}v$

35. A point mass of 0.1 kg is executing SHM with an amplitude 0.1 m. When it passes through its mean position, its kinetic energy is 8×10^{-3} J. If initially particle is at extreme position, then displacement-time equation of the particle is (all units are in SI)

    (1) $x = 0.1\ \sin 4t$

    (2) $x = 0.1\ \sin 4\pi t$

    (3) $x = 0.1\ \cos 4t$

    (4) $x = 0.1\ \cos 4\pi t$

36. A stretched wire of length l, free at one end can sustain stationary waves of wavelength λ then the value of λ which is not possible is (symbols have their usual meaning)

    (1) $\lambda = \dfrac{4l}{3}$

    (2) $\lambda = \dfrac{4l}{7}$

    (3) $\lambda = \dfrac{4l}{6}$

    (4) $\lambda = \dfrac{4l}{9}$

37. The function y = $\sin 2\omega t$ represents a motion which is

    (1) Periodic, but not SHM with a period $\dfrac{2\pi}{\omega}$

    (2) SHM with a period $\dfrac{2\pi}{\omega}$

    (3) SHM with a period $\dfrac{\pi}{\omega}$

    (4) A periodic, but not SHM with a period $\dfrac{\pi}{\omega}$

38. The ratio of intensities of two coherent acoustic wave is 16 : 1. The difference in loudness (in decibels) between maximum and minimum intensities when they interfere in space is

    (1) $20\log\left(\dfrac{8}{9}\right)$

    (2) $10\log\left(\dfrac{25}{9}\right)$

    (3) $10\ \log(8)$

    (4) $20\log\left(\dfrac{2}{9}\right)$

39. The velocities of a body executing S.H.M at displacement x cm and y cm are y cm/s and x cm/s respectively. The amplitude of S.H.M will be

    (1) $(x^2 + y^2)$ cm

    (2) $\sqrt{x^2 + y^2}$ cm

    (3) $(x + y)$ cm

    (4) $\sqrt{x + y}$ cm

40. A spring have spring constant k is connected to two masses m and $2m$ and forces of same magnitude are applied on both masses as shown in figure. The time period of oscillation of the system will be
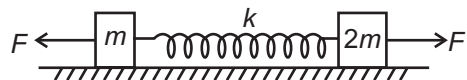

    (1) $2\pi\sqrt{\dfrac{m}{k}}$

    (2) $2\pi\sqrt{\dfrac{2m}{3k}}$

    (3) $2\pi\sqrt{\dfrac{3m}{2k}}$

    (4) $2\pi\sqrt{\dfrac{m}{2k}}$

41. A simple pendulum of length 2 m, swings with an amplitude of 0.1 m. The acceleration of the bob at its extreme position will be (g = 10 m/s^2)

    (1) 1 m/s^2

    (2) 1.5 m/s^2

    (3) 0.5 m/s^2

    (4) 0.1 m/s^2

42. In a simple harmonic mechanical wave, positions of different particles at time $t = 0$ are as shown in figure. The equation of the wave, if it is moving in positive x-direction will be (symbols have their usual meaning)
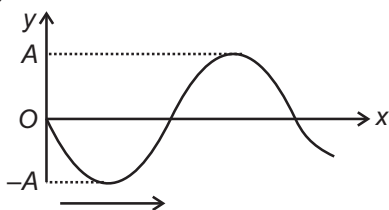
    (1) $y = A \sin (kx - \omega t + \pi)$

    (2) $y = A \sin (kx - \omega t)$

    (3) $y = A \cos (kx - \omega t + \pi)$

    (4) $y = A \cos (kx - \omega t)$

43. The length of a sonometer wire is 90 cm. If it is divided into two segments having fundamental frequencies in the ratio 1 : 2, then length of the respective segments will be

    (1) 60 cm, 30 cm

    (2) 70 cm, 20 cm

    (3) 50 cm, 40 cm

    (4) 45 cm, 45 cm

44. In a closed organ pipe the frequency of fundamental mode is 75 Hz. The node of which of the following frequencies can be produced by it

    (1) 150 Hz

    (2) 225 Hz

    (3) 200 Hz

    (4) 300 Hz

45. The displacement y (in cm) produced by a plane progressive wave is given by
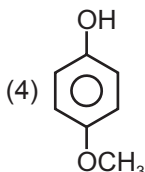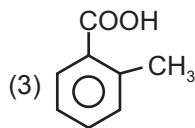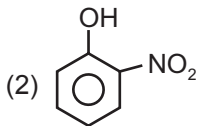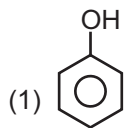
    $$y = \frac{10}{\pi} \sin\left(200\pi t - \frac{\pi x}{17}\right) \ (x \text{ is in cm})$$

    The ratio of maximum particle velocity to the wave velocity will be

    (1) $\dfrac{10}{17}$

    (2) $\dfrac{20}{17}$

    (3) $\dfrac{10}{34}$

    (4) $\dfrac{5}{34}$

CHEMISTRY

46. Which of the following compound is most acidic?

47. Highest boiling point is observed for
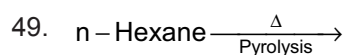
    (1) 2-methyl butane

    (2) Pentane

    (3) Hexane

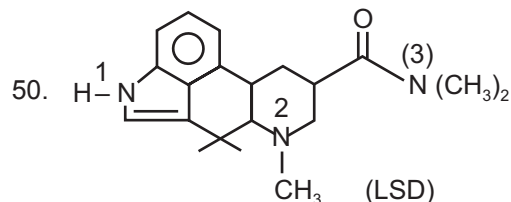   (4) 2, 2 - Dimethyl propane

48. Consider the following three halides.

    (A) $CH_3 - CH_2 - Cl$

    (B) $CH_2 = CH - Cl$

    (C) $HC \equiv C - Cl$

    Arrange these compounds in decreasing order of C–Cl bond length.

    (1) (A) > (B) > (C)

    (2) (C) > (B) > (A)
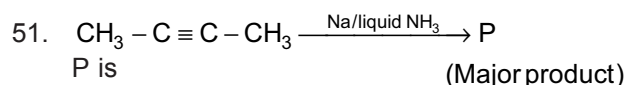
    (3) (B) > (A) > (C)

    (4) (A) > (C) > (B)

49. n – Hexane $\xrightarrow[\text{Pyrolysis}]{\Delta}$

(1) $C_3H_6 + C_2H_4 + CH_4$

(2) $C_3H_8 + C_3H_6$

(3) $C_3H_8 + C_2H_4 + CH_4$

(4) $C_3H_8 + C_2H_4 + C_2H_2$

50.

Which nitrogen in Lysergic acid diethylamide (LSD) is most basic?

(1) 1   (2) 2

(3) 3   (4) All are equally basic

51. $CH_3 - C \equiv C - CH_3 \xrightarrow{\text{Na/liquid NH}_3} P$

P is   (Major product)

(1) But-1-ene

(2) Butane

(3) Cis-but-2-ene

(4) Trans-but-2-ene

52. Excess nitrate in drinking water can cause a disease called

(1) Mottling of teeth   (2) Liver damage

(3) Blue baby syndrome (4) Skin disease

53. In which of the following molecule all the three effects namely inductive, mesomeric and hyperconjugation operate?

(1) $CH_3 - O - CH = CH - CH_3$

(2) $CH_3 - CH = CH_2$

(3) $CH_3 - CH = CH - \overset{+}{N}H_3$

(4) $CH_2 = CH - OH$

54. The IUPAC name of the given compound is

$\underset{CN}{CH_2} - \underset{CN}{CH} - \underset{CN}{CH_2}$
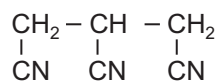
(1) 1, 2, 3-tricyanopropane

(2) 2-cyanopentane initrile

(3) 1, 3-dicarbonitrile propane

(4) Propane-1,2,3-tricarbonitrile

55. Which of the following can act as a nucleophile

(1) $H_3\overset{+}{O}$ (2) $\overset{+}{N}H_4$

(3) $NH_2 - NH_2$ (4) $\overset{+}{Br}$

56. Arrange the given compounds in order of decreasing acidity.

(a) $CH_3 - NO_2$

(b) $NO_2 - CH_2 - NO_2$

(c) $CH_3 - CH_2 - NO_2$

(d) $NO_2 - \underset{NO_2}{CH} - NO_2$

(1) (d) > (b) > (a) > (c)

(2) (d) > (b) > (c) > (a)

(3) (b) > (d) > (a) > (c)

(4) (c) > (a) > (d) > (b)

57. Photochemical smong does not contain

(1) Ozone   (2) Glycerol

(3) Formaldehyde   (4) Nitric oxide
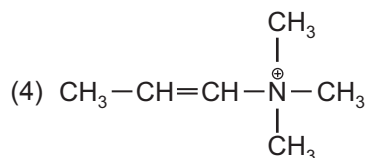
58. Rate of hydrogenation of which alkene will be minimum?

(1) $CH_3 - CH = CH_2$

(2) $CH_2 = CH_2$

(3) $(CH_3)_2C = C(CH_3)_2$

(4) $CH_3 - CH = CH - CH_3$

59. Cyanides and isocyanides are

(1) Metamers

(2) Functional isomers

(3) Position isomers

(4) Chain isomers

60. Which of the following alkenes is most reactive for electrophilic addition reactions?

(1) $CH_3 - CH = CH - CH_3$

(2) $H_3 - CH = CH - NO_2$

(3) $CH_2 = CH - CF_3$

(4) $CH_3 - CH = CH - \overset{\overset{\displaystyle CH_3}{|}}{\underset{\underset{\displaystyle CH_3}{|}}{\overset{\oplus}{N}}} - CH_3$

61. Which of the following is not aromatic in nature?

(1)   (2)

(3)   (4)
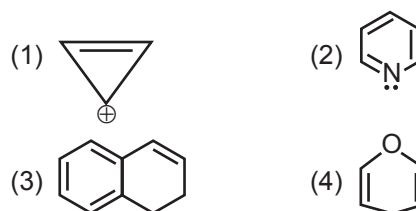
62. Select the correct statement(s).

    I.   Ortho and para-directing groups increase electron density at ortho and para positions.

    II. Meta-directing groups increase electron density at meta position.

    III. Meta-directing groups decrease electron-density at ortho and para positions.

    IV. Ortho and para-directing groups decrease electron density at meta position.

    (1) I & II only   (2) I & III only

    (3) III & IV only   (4) II & IV only

63. In Duma's method, which of the following is estimated?
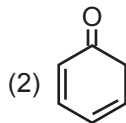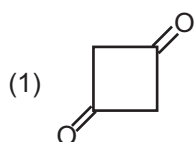
    (1) N   (2) Cl

    (3) P   (4) S

64. Decreasing order of -I effect of given groups is

    i.   CN   ii. NO_2

    iii. NH_2 iv. F

    (1) iii > ii > i > iv   (2) ii > iii > iv > i

    (3) iii > ii > iv > i   (4) ii > i > iv > iii

65. In Kjeldahl's method, nitrogen is liberated as

    (1) $N_2(g)$ (2) $NO(g)$
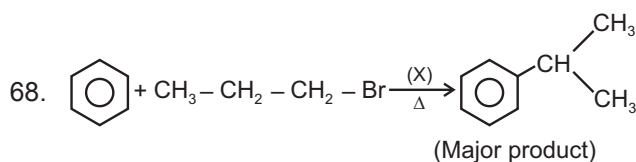
    (3) $N_2O(g)$ (4) $NH_3(g)$

66. In which of the following compounds tautomerism is favourable and enol form is most stable?

    (1)   (2)

    (3) $CH_3 - \overset{O}{\overset{\|}{C}} - CH_3$ (4) $CH_3 - \overset{O}{\overset{\|}{C}} - H$

67. The most serious water pollutant is/are

    (1) $CaSO_4$

    (2) NaCl

    (3) Pathogens

    (4) CFCs

68.

    In order to get good yield of product, (X) will be
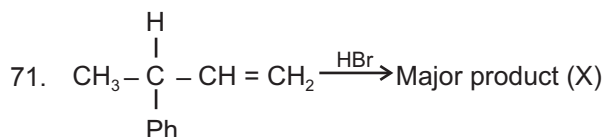
    (1) Anhydrous $AlCl_3$

    (2) NH_4Cl

    (3) Fe

    (4) Zn

69. Chloroform (B.P. 334 K) and aniline (B.P. 457 K) are easily separated by the technique of

    (1) Crystallisation

    (2) Distillation

    (3) Sublimation

    (4) Chromatography

70. Select incorrect statement.

    (1) Fuel obtained from plastic waste has high octane rating.

    (2) Clothes are bleached from H_2O_2.

    (3) With the depletion of ozone layer, more UV radiations reach troposphere.

    (4) In 1980s, ozone hole was reported over the North Pole.

71. $CH_3 - \overset{\overset{H}{|}}{\underset{\underset{Ph}{|}}{C}} - CH = CH_2 \xrightarrow{HBr}$ Major product (X)

    X is

    (1) $CH_3 - \underset{\underset{Ph}{|}}{CH} - \underset{\underset{Br}{|}}{CH} - CH_3$

    (2) $CH_3 - \underset{\underset{Br}{|}}{CH} - \underset{\underset{Ph}{|}}{C} = CH_2$

    (3) $CH_3 - \underset{\underset{Br}{|}}{\overset{\overset{Ph}{|}}{C}} - CH_2 - CH_3$

    (4) $CH_3 - \underset{\underset{Ph}{|}}{CH} - CH_2 - CH_2 - Br$
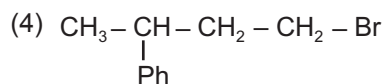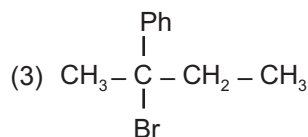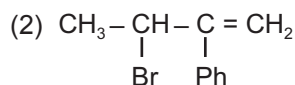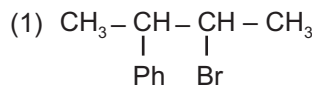
72. In Carius method of estimation of halogen, 0.5 g of an organic compound gave 0.47 g of AgBr. Percentage of bromine in compound is (molar mass of AgBr = 188)

    (1) 20%

    (2) 40%

    (3) 50%

    (4) 80%

73. + ICl $\xrightarrow{AlCl_3}$ Major product P, P is

(1)

(2)

(3)

(4)

74. Which among the following is a blood red species?

(1) PbS

(2) NaCN

(3) $[Fe(SCN)]^{2+}$

(4) NaSCN

75. In qualitative estimation of P, following reaction takes place.

$H_3PO_4 + (NH_4)_2MoO_4 + HNO_3 \longrightarrow$

The products formed are

(1) $(NH_4)_2SO_4$ + other products

(2) NH_4Cl + other products

(3) $(NH_4)_3PO_4$ + other products

(4) $(NH_4)_3PO_4 \cdot 12MoO_3$ + other products

76. Which has maximum heat of hydrogenation?

(consider only heat released)

(1)

(2)

(3)

(4) All have same value

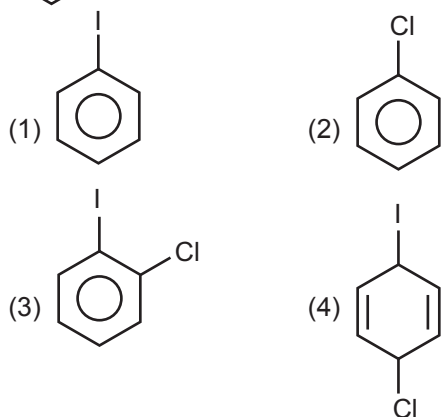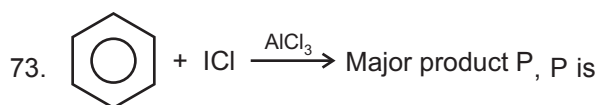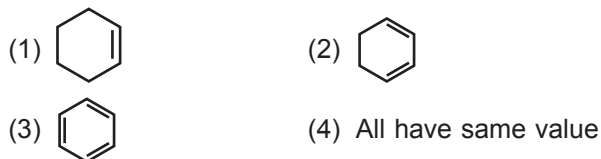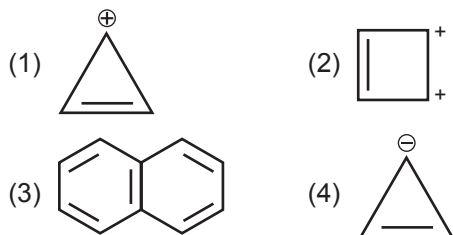77. Which of the following is antiaromatic species?

(1)

(2)

(3)

(4)

78. Which of the following compound does not exhibit geometrical isomerism?

(1) $CH_3CH = CHCH_3$

(2)

(3) $PhCH = CHPh$

(4) $CH_3CH = CH_2$
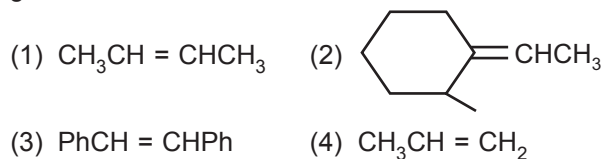
79. Molecule that will have maximum enol content is

(1) $CH_3 - \overset{\overset{O}{\|}}{C} - CH_3$

(2) $CH_3 - \overset{\overset{O}{\|}}{C} - CH_2 - \overset{\overset{O}{\|}}{C} - OC_2H_5$

(3) $CH_3 - \overset{\overset{O}{\|}}{C} - CH_2 - \overset{\overset{O}{\|}}{C} - CH_3$

(4) $CH_3 - \overset{\overset{H}{|}}{C} = O$
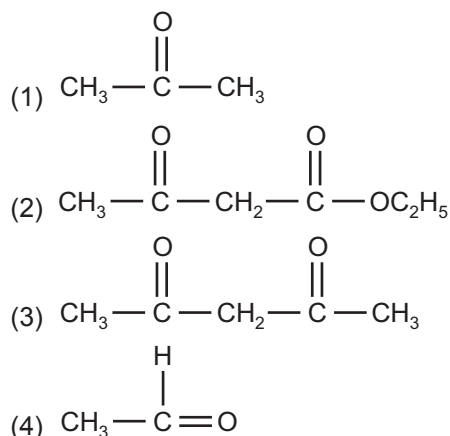
80. The number of structural isomers for the compound with molecular formula C_4H_6 is

(1) 3

(2) 7

(3) 5

(4) 9

81. 0.128 g of an organic compound gave 0.466 g of $BaSO_4$. Percentage of sulphur in the compound is (M.W. of $BaSO_4$ = 233)

(1) 15%

(2) 50%

(3) 25%

(4) 74%

82. The order of stability of the following carbocations is

(I) $CH_2 = CH - \overset{\oplus}{C}H_2$

(II) $CH_3 - CH_2 - \overset{\oplus}{C}H_2$

(III)
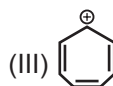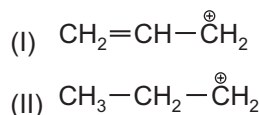
(1) (III) > (II) > (I)

(2) (II) > (III) > (I)

(3) (I) > (II) > (III)

(4) (III) > (I) > (II)

83. $Ph - C \equiv C - H \xrightarrow[\text{dil. } H_2SO_4]{Hg^{2+}} A \text{ (Major)}$, A is

(1) Ph

(2) $PhCH_2CHO$

(3) Ph CH_3

(4) $PhCH_2CH_2OH$
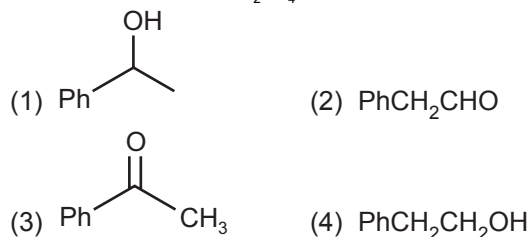
84. $P \xrightarrow[\text{EtOH}/\Delta]{NaOH} Q \xrightarrow{NaNH_2} Acetylene$, P is

(1) Bromobenzene

(2) Bromoethane

(3) 1,2,3-Tribromoethane

(4) 1, 2-Dibromoethane

85. Select correct statements among the following.

    (i) Hyperconjugation involves σ –p conjugation

    (ii) Resonance effect operates through sigma bond

    (ii) Resonance effect is stronger than inductive effect

    (iv) Inductive effect is a temporary effect

    (1) 1, 2, and 3

    (2) 1 and 3 only

    (3) 2 and 3 only

    (4) 1, 2, 3 and 4

86. $CH_3 - CH = CH_2 \xrightarrow{NBS} (A) \xrightarrow[hv]{HBr/ROOR} (B) \xrightarrow{Mg/\Delta} (C)$

    end product (C) of the above reaction sequence is

    (1) Cyclopropane

    (2) Propane

    (3) Hexane

    (4) 2, 2–dimethylbutane

87.

    P is

    (1)

    (2)
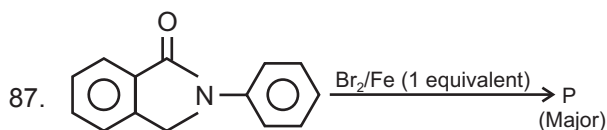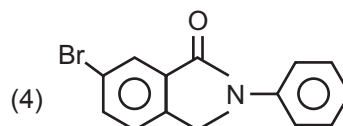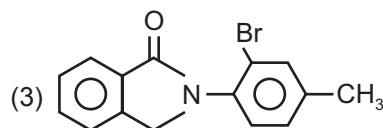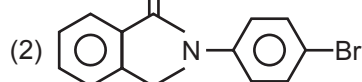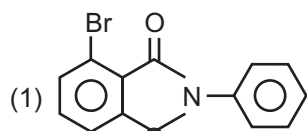
88. Incorrect statement about bromination of propene in CCl_4 is

    (1) $Br^{\delta+}$ is added first

    (2) Br^+ is added to generate a carbocation

    (3) Addition of Br_2 molecule is stereochemically anti

    (4) Colour of bromine disappears

89. $CH_3 - \underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}} - H \xrightarrow[\text{light, 25°C}]{Cl_2} (A)$ (Major product)
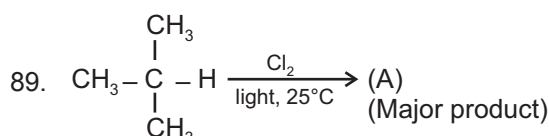
    Correct statement about A is

    (1) It is a primary alkyl halide

    (2) It is a secondary alkyl halide

    (3) It is a tertiary alkyl halide

    (4) It is a chiral molecule.

90. $H - C \equiv C - CH_3 \xrightarrow{HBr (excess)} A \xrightarrow[\Delta]{H_2O} B$

    Compound B is
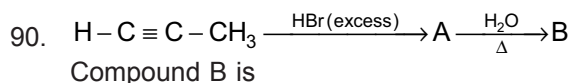
    (1) A diol   (2) An aldehyde

    (3) A ketone   (4) An alkyl halide

BOTANY

91. During pay off phase of glycolysis

    (1) Fructose-6-phosphate is converted into fructose 1, 6-bisphosphate

    (2) Substrate level phosphorylation takes place

    (3) Activation of glucose takes place

    (4) Complete oxidation of glucose takes place

92. Fermentation takes place under anaerobic conditions in

    (1) Many prokaryotes

    (2) Some unicelled eukaryotes

    (3) All eukaryotes

    (4) Both (1) and (2)

93. Lactic acid fermentation results in the formation of

    (1) CO_2 (2) C_2H_5OH

    (3) $C_3H_6O_3$ (4) NADPH

94. Which of the following serves as a common oxidative pathway for carbohydrates, fats and proteins?

    (1) TCA cycle   (2) Glycolysis

    (3) Calvin cycle   (4) Alcoholic fermentation

95. Glycerol-3- phosphate shuttle

    (1) Occurs in all prokaryotes

    (2) Leads to production of net 38 ATP molecules

    (3) Is found in flight muscle cells

    (4) Works during anaerobic respiration

96. Complex IV is related to all, **except**

    (1) Cytochrome c oxidase

    (2) Cytochrome a and a_3

    (3) Two copper centres

    (4) Cytochrome bc_1

97. If $C_{51}H_{98}O_6$ is used as respiratory substrate then the RQ value will be

    (1) 0.7   (2) 1.4

    (3) 1.0   (4) 0.9

98. The total number of ATP produced from ETS only from one molecule of pyruvic acid in aerobic respiration is

    (1) 9   (2) 14

    (3) 11   (4) 17

99. Read the following statements and state **true (T)** or **false (F)**.

    A. In plants, the glucose is derived from sucrose.

    B. Phosphofructokinase is known as the pacemaker enzyme of EMP pathway.

    C. Respiratory substrate is fat in protoplasmic respiration.

    D. Dehydration step in glycolysis is catalysed by aldolase enzyme only.

	A	B	C	D
(1)	T	T	F	T
(2)	T	F	T	F
(3)	T	T	F	F
(4)	F	T	T	F

100. Match the following w.r.t. R.Q.

Column-I (R.Q.)	Column-II (Respiratory substrate)
a. Palmitic acid	(i) 0.9
b. Malic acid	(ii) 1
c. $C_6H_{12}O_6$	(iii) > 1
d. Proteins	(iv) 0.7

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

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

101. The tissues in a woody dicotyledonous plant that are formed through redifferentiation are

    (1) Interfascicular cambium, lenticels

    (2) Secondary cortex, secondary phloem

    (3) Cork cambium, intrafascicular cambium

    (4) Secondary cortex, phellogen

102. Which intermediate compound of Krebs' cycle produces cytochrome and chlorophyll?

    (1) Succinyl CoA

    (2) Acetyl CoA

    (3) Oxaloacetic acid

    (4) α-ketoglutaric acid

103. Find out the **correctly** matched pair.

    (1) Kinetin   – Adenine derivative

    (2) GA_3 – Derivative of tryptophan

    (3) IAA   – Derivative of carotenoids

    (4) ABA   – Derivative of methionine

104. In which of the following reactions, decarboxylation takes place in Krebs' cycle?

    a. PGA $\longrightarrow$ Acetaldehyde

    b. PGA $\longrightarrow$ Acetyl CoA

    c. Citrate $\longrightarrow$ α–Ketoglutaric acid

    d. α-Ketoglutaric acid $\longrightarrow$ Succinyl CoA

    (1) b, c and d only   (2) b and c only

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

105. Site for tricarboxylic acid cycle in eukaryotes is

    (1) Matrix of mitochondria

    (2) Cytoplasm

    (3) Inter membrane space of mitochondria

    (4) Mesosome

106. Which of the following is **not** true for ethylene?

    (1) Promotes root growth and root hair formation

    (2) Promotes flowering in mango

    (3) Common source of ethylene is ethephon

    (4) Prevents abscission of flowers and fruits

107. Stimulus for vernalisation is recieved by all, **except**

    (1) Mature stem apex

    (2) Leaves

    (3) Embryo of seed

    (4) Both (1) and (3)

108. Choose the **wrongly** matched pair.

    (1) Ethylene   – Gaseous plants hormone

    (2) Auxins   – Prevents abscission

    (3) Gibberellins – Responsible for Richmond Lang effect

    (4) Cytokinins   – Purine derivatives

109. Cytokinins and auxins show their synergistic effect on

    (1) Cell division

    (2) Apical dominance

    (3) Internode elongation

    (4) Promotes senescence

110. Which of the following statements is **incorrect**?

    (1) Slow oxidation of NADH occurs in fermentation.

    (2) In aerobic respiration, the end products are CO_2 and H_2O.

    (3) α-ketoglutaric acid is the raw material for amino acid synthesis.

    (4) Respiratory pathway is mainly an anabolic process.

111. In an anaerobic bacterium, the total number of ATP generated from one glucose molecule is

    (1) 2   (2) 4

    (3) 38   (4) 36

112. For chemiosmosis, the proton accumulation in mitochondria takes place in

    (1) Matrix

    (2) Outer membrane

    (3) Inner membrane

    (4) Intermembrane space

113. In link reaction, a 3C molecule (Pyruvic acid) is converted into a

    (1) 5C compound   (2) 2C compound

    (3) 4C compound   (4) 6C compound

114. All of the following are synthetic auxins, **except**

    (1) 2, 4-D   (2) 2,4,5-T

    (3) IAA   (4) NAA

115. Bunch length in grapes can be increased by

    (1) Auxin   (2) Gibberellins

    (3) CK   (4) ABA

116. Which of the following plants do not show any correlation between exposure to light duration and induction of flowering response?

    (1) Wheat   (2) Tobacco

    (3) Pepper   (4) Soyabean

117. Thinning of cotton, cherry and walnut is hastened by the application of

    (1) Kinetin   (2) Zeatin

    (3) Abscisic acid   (4) Ethephon

118. For flowering in henbane

    (1) The photoperiod must be above the critical photoperiod

    (2) They should get dark period above the critical period

    (3) Shoot apex perceives stimulation of photoperiods

    (4) P_r / P_{fr} should be more than one

119. Which of the following is **not** a de-differentiated tissue?

    (1) Interfascicular cambium

    (2) Cork cambium

    (3) Wound cambium

    (4) Intrafascicular cambium

120. A plant hormone which is used to speed up the malting process in brewing industry

    (1) Stimulates synthesis of hydrolytic enzymes for mobilisation of reserve foods

    (2) Decreases the yield of sugarcane

    (3) Delays ripening of fruits

    (4) Both (1) and (3)

121. Select the **mis-matched pair.**

    (1) F_0–F_1 particles   – Inner mitochondrial membrane

    (2) End product of glycolysis – Acetyl CoA

    (3) TCA cycle   – Elucidated by Hans Krebs

    (4) Molecular oxygen   – Electron acceptor in ETS

122. In EMP pathway, the conversion of glyceraldehyde-3- phosphate to 1,3 - bisphosphoglyceric acid is catalysed by which of the following enzyme?

    (1) Phosphohexoisomerase

    (2) Glyceraldehyde-3-phosphate dehydrogenase

    (3) Glyceraldehyde-3-phosphate carboxylase

    (4) Phosphoglycerate kinase

123. How many oxygen molecules are involved in ETS if one molecule of acetyl CoA is completely oxidised?

    (1) Six

    (2) Four

    (3) Five

    (4) Two

124. In arithmetic growth

    a   All progeny cells following mitosis division retain the ability to divide

    b   The growth occurs at a constant rate

    c   It is mathematically represented as $L_t = L_0 + rt$

    Identify the **correct** set of statements

    (1) a only   (2) b and c only

    (3) a and c only   (4) a, b and c

125. Find the **odd** one w.r.t LDP.

    (1) Wheat

    (2) Cucumber

    (3) Radish

    (4) Sugarbeet

126. Select the **incorrect** statement w.r.t. short day plants.

    (1) Most of winter flowering plants belong to this category.

    (2) Do not initiate flowering when photoperiod exceeds the critical photoperiod.

    (3) Are actually long night plants as they need uninterrupted dark period.

    (4) Initiate flowering when dark period is less than the critical photoperiod and light period is more.

127. Select the **odd** one w.r.t. developmental plasticity.

    (1) Coriander

    (2) Cotton

    (3) Larkspur

    (4) Buttercup

128. Which one is **not** the function of gibberellins?

    (1) Internode elongation just prior to flowering in plants with rosette habit

    (2) Improvement in shape of fruits like apple

    (3) Increase in the length of sugarcane stem

    (4) Delay in early growth in juvenile conifers

129. Auxin activity can be tested by

    (1) Triple response test

    (2) Cell division test

    (3) Induction of α-amylase activity

    (4) *Avena* curvature test

130. In tissue culture, when concentration of auxin is equal to cytokinin, it leads to the formation of

    (1) Stem   (2) Root

    (3) Callus   (4) Leaves

131. Ethylene can be used for

    (1) Inducing dormancy in seeds

    (2) Increase in number of fruits in cucumber

    (3) Overcoming senescence

    (4) Preventing the development of adventitious roots.

132. The phytohormone which was first isolated from unripe maize grains was

    (1) IAA   (2) ABA

    (3) GA_3 (4) CK

133. Select the **correct** statement for phytochrome.

    (1) Responsible for transpiration

    (2) Is a photoreceptor

    (3) Has Pr as physiologically active form

    (4) Is a colourless pigment

134. Which of the following is **not** a feature of meristematic cells?

    (1) Have dense cytoplasm

    (2) Increase in size and number of vacuoles

    (3) Contain large nucleus

    (4) Have high respiration rate

135. In TCA cycle, how many total reduced coenzymes are produced from one acetyl CoA?

    (1) Three   (2) Four

    (3) Five   (4) Six

ZOOLOGY

136. Type of neuron characterised by presence of a single dendron and a single axon emerging from its cell body is called

    (1) Multipolar neuron

    (2) Bipolar neuron

    (3) Unipolar neuron

    (4) Pseudounipolar neuron

137. Sodium-potassium pumps require energy input to transport _____ outwards in exchange for _____ into the axon to restore resting conditions.

    Select option which fill the blanks correctly

    (1) 3 Na^+ and 3 K^+ (2) 2 Na^+ and 3 K^+

    (3) 2 Na^+ and 2 K^+ (4) 3 Na^+ and 2 K^+

138. Which parameter of nerve fibre is directly proportional to the transmission of nerve impulses?

    (1) Length

    (2) Diameter

    (3) Subthreshold stimulus

    (4) Frequency of stimulus

139. Afferent fibres from hair cells in human ear conduct impulses to brain via which nerve ?

    (1) Optic   (2) Olfactory

    (3) Vagus   (4) Auditory

140. Select the **odd** one w.r.t brain stem

    (1) Pons   (2) Cerebellum

    (3) Medulla   (4) Mid brain

141. Read the following statements and choose the **correct** option.

    Statement A – The space between the lens and the retina is called vitreous chamber.

    Statement B – Vitreous chamber contains a thin watery fluid which is synthesized regularly

    (1) Both statements are correct

    (2) Both statements are incorrect

    (3) Statement B is incorrect

    (4) Statement A is correct explanation of B

142. Vestibular apparatus of inner ear does not contain

    (1) Semicircular canals (2) Saccule

    (3) Utricle   (4) Eustachian tube

143. The potential difference across the membrane of a nerve fibre showing no physiological activity *i.e.*, its resting potential is

    (1) – 110 mV   (2) – 70 mV

    (3) + 80 mV   (4) +40 mV

144. Excess of GH during adulthood results in

    (1) Acromegaly   (2) Acromicria

    (3) Atelectasis   (4) Ateleosis

145. Node of Ranvier is the area where

    (1) Neurilemma is discontinuous

    (2) Nerve fibre is covered by myelin sheath

    (3) Axolemma is absent

    (4) Myelin sheath is absent

146. Hormone that is predominantly present in lactating women is

    (1) ACTH

    (2) TSH

    (3) PRL

    (4) FSH

147. Component absent in limbic system is

    (1) Amygdala

    (2) Hippocampus

    (3) Hypothalamus

    (4) Cerebellum

148. Hormones derived from amino acid tyrosine are

    (1) Thyrotropic hormone

    (2) Luteotrophic hormones

    (3) Hormones of adrenal cortex

    (4) Hormones of adrenal medulla

149. Read the following statements and choose the option which is a false statement

    (1) Cerebellum is a part of hindbrain that harbours a region named 'tree of life'

    (2) Midbrain is located between thalamus of forebrain and pons of the hindbrain

    (3) The ventral portion of midbrain consists mainly of four round swellings called corpora quadrigemina

    (4) Association area is responsible for complex functions like memory, communication, intersensory association etc.

150. Atrial natriuritic factor is not involved in

    (1) Reduction in blood pressure

    (2) Vasodilation

    (3) Conversion of angiotensinogen to angiotensin I

    (4) Increased excretion of Na^+ in urine

151. Aqueduct of Sylvius is found between

    (1) Paracoel and lateral ventricles

    (2) Third and fourth ventricles

    (3) Lateral ventricles and third ventricles

    (4) Diocoel and lateral ventricles

152. Select the correct statement w.r.t. functions of glucocorticoids.

    (1) Regulate the development, maturation and functions of male accessory sex organs.

    (2) Play a keyrole in the process of spermatogenesis.

    (3) Act on central nervous system and influence the male sexual behaviour (libido).

    (4) These hormones produce catabolic effects on protein and fat metabolism.

153. Mucus secreting Bowman's glands are associated with sensory epithelium involved in

    (1) Olfaction

    (2) Auditory function

    (3) Temperature detection

    (4) Perception of colors

154. Choose the **incorrect** statement for steroid hormones.

    (1) Bind to specific intracellular receptors.

    (2) Lipid soluble in nature.

    (3) Alter the pattern of gene expression initiating the transcription of some genes, while repressing the transcription of others

    (4) Employ cAMP as secondary messenger to bring physiological effects.

155. Which gland degenerates in old individuals resulting in weaker immune responses?

    (1) Parathyroid gland　　(2) Thymus gland

    (3) Thyroid gland　　　　(4) Parotid gland

156. Choose the **incorrect** match

    (1) Erythropoietin　–　Stimulates formation of RBCs

    (2) GIP　–　Inhibits gastric motility

    (3) Gastrin　–　Stimulates the secretion of pepsinogen

    (4) Secretin　–　Inhibits secretion of bicarbonate ions

157. Hormone which does **not** interact with intracellular receptors is

    (1) Insulin

    (2) Iodothyronines

    (3) Cortisol

    (4) Estradiol

158. Hormone that acts mainly at the renal tubules and stimulates the reabsorption of Na^+ and water and excretion of K^+ and phosphate ions, is

    (1) Adrenaline　　　　(2) Norepinephrine

    (3) Aldosterone　　　(4) PTH

159. After ovulation, the ruptured follicle is eventually converted into a yellow coloured structure called

    (1) Corpus albicans　　(2) Corpus stratum

    (3) Corpus luteum　　　(4) Corpus haemorhagium

160. Select a hormone secreted by ovary causing relaxation of cervix during child birth

    (1) Relaxin　　　　　(2) Oxytocin

    (3) Progesterone　　(4) FSH

161. Neurohormone synthesised by hypothalamus and transported to neurohypophysis is

    (1) LH　　　　　　　(2) Oxytocin

    (3) FSH　　　　　　(4) MSH

162. Avascular structure among following is

    (1) Choroid　　　　　(2) Cornea

    (3) Yellow spot　　　(4) Blind spot

163. Gustatory receptors are associated with

    (1) Tongue

    (2) Skin

    (3) Nose

    (4) Eye

164. Select the **incorrect** match

    (1) cGMP　　　　　–　Secondary messenger

    (2) Oxytocin　　　　–　Relaxes smooth muscles of uterus

    (3) Renin　　　　　–　Raises blood pressure

    (4) TCT　　　　　　–　Hypocalcemic harmone

165. Centres regulating body temperature, appetite and thirst are located in

    (1) Cerebrum　　　　(2) Hypothalamus

    (3) Medulla oblongata　(4) Basal ganglia

166. Tryptophan derived hormone responsible for regulating diurnal rhythm in man is

    (1) Thymosin　　　　(2) Testosterone

    (3) Melanin　　　　　(4) Melatonin

167. In mammalian eye, the fovea is the centre of the visual field where

    (1) Only rods are present

    (2) The optic nerve leaves the eye

    (3) Both rods and cones are present

    (4) Only cones are present

168. Select the **incorrect** statement w.r.t. ADH

    (1) Secreted by hypothalamus

    (2) Peptide hormone

    (3) Secreted in response to increase in blood pressure

    (4) Causes constriction of blood vessels

169. A person wears convex lenses for proper vision. Without glasses, the image of the object is formed

    (1) On blind spot

    (2) On yellow spot

    (3) Infront of retina

    (4) Behind retina

170. Temporary increase in circulating estrogen in male will lead to

    (1) Addison's disease

    (2) Gynaecomastia

    (3) Eunuchoidism

    (4) Castration

171. Which of the following layers of the eye ball contains many blood vessel and looks bluish in colour?

    (1) Sclera

    (2) Choroid

    (3) Retina

    (4) Cornea

172. Temporary endocrine gland which appears during adult life is

    (1) Corpus luteum

    (2) Thymus

    (3) Pineal gland

    (4) Corpus albicans

173. Excessive stimulation of vagus nerve may lead to

    (1) Irregular function of kidney

    (2) Movement of tongue

    (3) Peptic ulcers

    (4) Lack of digestion of protein, lipids and carbohydrates

174. Read the following statements and choose the **correct** option.

    Statement A – Hormones are nutrient chemicals.

    Statement B – Hormones act as intracellular messengers.

    (1) Both statements are correct

    (2) Statement A is correct

    (3) Statement B is correct

    (4) Both statements are incorrect

175. Hormone that influences metabolism, pigmentation, the menstrual cycle as well as our defense capability, is

    (1) MSH

    (2) Melanin

    (3) Melatonin

    (4) FSH

176. Select the correct statement

    (1) Aldosterone is the main glucocorticoid in our body.

    (2) The adrenal cortex secretes adrenaline and noradrenaline.

    (3) Catecholamines stimulate the synthesis of lipids and proteins.

    (4) Sex corticoids are secreted from zona reticularis of adrenal cortex.

177. Target organ of mineralocorticoids is

    (1) Gonads

    (2) Liver

    (3) Kidney

    (4) Pancrease

178. Outermost protective coat/meninx around brain is known as

    (1) Sub arachnoid space

    (2) Duramater

    (3) Piamater

    (4) Arachnoid

179. Endolymph filled area of ear is

   (1) Eustachian tube

   (2) Scala vestibuli

   (3) Scala tympani

   (4) Scala media

180. One of the example of the action of sympathetic nervous system is

   (1) Contraction of urinary bladder

   (2) Lowering of blood pressure

   (3) Promotes secretion of intestinal juice

   (4) Reduces bile secretion

❑ ❑ ❑

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 – 5

Time : 3 Hrs

ANSWERS

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

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Test Series for NEET - 2019
Test – 5

Time : 3 Hrs.

Hints and Solutions

PHYSICS

1. Answer (1)

Frequency of the sound wave changes due to motion of source and observer both but wavelength changes due to motion of source only.

2. Answer (3)

$$f_1 = \frac{v}{2l_1} \Rightarrow l_1 = \frac{v}{2f_1}$$

$$f_2 = \frac{v}{2l_1} \Rightarrow l_2 = \frac{v}{2f_2}$$

$$f = \frac{v}{2(l_1 + l_2)}$$

$$f = \frac{v}{2\left(\dfrac{v}{2f_1} + \dfrac{v}{2f_2}\right)}$$

$$\boxed{f = \frac{f_1 f_2}{f_1 + f_2}}$$

3. Answer (4)

$$\frac{v_1}{\lambda_1} = \frac{v_2}{\lambda_2}$$

$$\frac{\sqrt{T_1}}{\lambda_1} = \frac{\sqrt{T_2}}{\lambda_2}$$

$$\lambda_2 = \lambda_1 \sqrt{\frac{T_2}{T_1}}$$

$$\lambda_2 = 100\sqrt{\frac{400}{300}}$$

$$\lambda_2 = \frac{200}{\sqrt{3}} \approx 115 \text{ cm}$$

4. Answer (2)

$a = -\omega^2 x$

$F = -m\omega^2 x$

$F \propto -x$

5. Answer (4)

$$T = 2\pi\sqrt{\frac{l}{g}}$$

On leakage of water center of mass of hollow sphere shift downward. Therefore effective length of simple pendulum increases continuously hence time period increase continuously. When all water leaks out then center of mass reaches centre of sphere.

6. Answer (1)

$\Delta\phi = \omega\Delta t$

$$= \frac{2\pi}{T} \times \frac{T}{4}$$

$$= \frac{\pi}{2}$$

7. Answer (2)

$$T_0 = 2\pi\sqrt{\frac{m}{k}} \qquad \text{...(i)}$$

$$\frac{4T_0}{3} = 2\pi\sqrt{\frac{m+M}{k}} \qquad \text{...(ii)}$$

$\dfrac{3}{4} = \sqrt{\dfrac{m}{m+M}}$

$\dfrac{9}{16} = \dfrac{m}{m+M}$

$\dfrac{M}{m} = \left(\dfrac{7}{9}\right)$

8. Answer (4)

9. Answer (3)

$v^2 = \omega^2(a^2 - x^2)$

$\dfrac{x^2}{a^2} + \dfrac{v^2}{a^2\omega^2} = 1$

10. Answer (3)

11. Answer (2)

$T = 2\pi\sqrt{\dfrac{I}{C}} = 2\pi\sqrt{\dfrac{2MR^2}{5C}}$
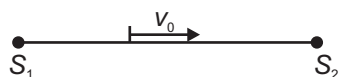
$T = 7.7$ s

12. Answer (1)

$f_{min} = \dfrac{340}{340+40} \times 500 = 447$ Hz

$f_{max} = \dfrac{340}{340-40} \times 500 = 567$ Hz

13. Answer (2)

$n' = \left(\dfrac{v+v_0}{v}\right)\dfrac{1}{\lambda} \;(v_{s_2} = 0)$

$n'' = \left(\dfrac{v-v_0}{v}\right)\dfrac{1}{\lambda} \;(v_{s_1} = 0)$

$n' - n'' = \dfrac{2v_0}{\lambda}$

14. Answer (3)

$y = Kt$

$a = \dfrac{d^2y}{dt^2} = 0$

$T_1 = 2\pi\sqrt{\dfrac{l}{g}} \qquad T_2 = 2\pi\sqrt{\dfrac{l}{g}}$

$\therefore \quad \dfrac{T_1^2}{T_2^2} = \dfrac{1}{1}$

15. Answer (1)

$\dfrac{I_1}{I_2} = \dfrac{a_1^2}{a_2^2}$

$\dfrac{a_1}{a_2} = \dfrac{20}{1}$

$\dfrac{I_{max}}{I_{min}} = \dfrac{(a_1+a_2)^2}{(a_1-a_2)^2} = \left(\dfrac{21}{19}\right)^2$

16. Answer (3)

17. Answer (2)

Time interval between successive maxima

$= \dfrac{1}{\text{Beat frequency}} = \dfrac{1}{4}$ s

18. Answer (1)

19. Answer (2)

$y = 0.02\,(x + 30\,t)$

Velocity = 30 m/s

$v = \sqrt{\dfrac{T}{\mu}} = 30$

$\Rightarrow T = v^2\mu = v^2A\rho = 7.2$ N

20. Answer (1)

$k = \dfrac{2\pi}{\lambda}$

$\dfrac{2\pi}{\lambda} = \dfrac{\pi}{100}$

$\boxed{\lambda = 200\,\text{cm}}$

Distance between consecutive crest and trough will be equal to $= \dfrac{\lambda}{2} = 100$ cm

21. Answer (1)

$v = \sqrt{\dfrac{T}{\mu}}$

$v = \sqrt{\dfrac{500}{\dfrac{3}{15}}}$

$v = 50$ m/s

$t = \dfrac{15}{50} = 0.3$ s

$$\boxed{t = \dfrac{3}{10} \text{ s}}$$

22. **Answer (3)**

$v = A\omega \cos \omega t$

$$V_{rms} = \sqrt{\dfrac{\int v^2 dt}{\int dt}}$$

$$= \sqrt{\dfrac{\int\limits_0^T (A\omega)^2 \cos^2 \omega t\, dt}{\int\limits_0^T dt}}$$

$$= \dfrac{A\omega}{\sqrt{2}}$$

23. **Answer (4)**

$f_1 = \dfrac{1}{2\pi}\sqrt{\dfrac{k_1}{m}}$

$4\pi^2 f_1^2 m = k_1$

$4\pi^2 f_2^2 m = k_2$

$4\pi^2 f^2\, m = k$
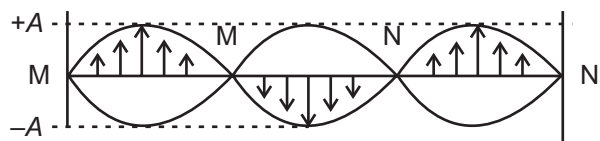
$\dfrac{1}{k} = \dfrac{1}{k_1} + \dfrac{1}{k_2}$

$\dfrac{1}{4\pi^2 f^2 m} = \dfrac{1}{4\pi^2 f_1^2 m} + \dfrac{1}{4\pi^2 f_2^2 m}$

$\dfrac{1}{f^2} = \dfrac{1}{f_1^2} + \dfrac{1}{f_2^2}$

$$\boxed{f = \dfrac{f_1 f_2}{\sqrt{f_1^2 + f_2^2}}}$$

24. **Answer (4)**
This is equation of standing wave.

All particle lying between two consecutive node will vibrate with same frequency, different amplitude and in same phase.

25. **Answer (3)**

$$T = 2\pi\sqrt{\dfrac{m}{K_{eff}}}$$

$K_{eff} = k + 2k + 3k + \ldots 10\,k$

$= k(1 + 2 + 3 + \ldots 10)$

$= k\dfrac{10(10+1)}{2}$

$K_{eff} = 55\,k$

$$\boxed{T = 2\pi\sqrt{\dfrac{m}{55\,k}}}$$

26. **Answer (3)**

27. **Answer (3)**

For 2nd overtone, the string vibrates in three segments. Hence, there are four nodes and three antinodes.

28. **Answer (4)**

$v = n\lambda = n.4(l_1 + e)$

or $\dfrac{v}{4n} = l_1 + e$

or $\dfrac{33600}{4 \times 512} = l_1 + 0.6 \times 2$

or $l_1 = 15.2$ cm

29. **Answer (4)**

$v = 5\cos\left(4t + \dfrac{\pi}{3}\right) \times 4$; $\omega = 4$, $T = \dfrac{\pi}{2}$

at $t = \dfrac{T}{4} = 20\cos\left(T + \dfrac{\pi}{3}\right)$

$v = 20\cos\left(\dfrac{\pi}{2} + \dfrac{\pi}{3}\right) = -10\sqrt{3}$ cm/s

K.E. $= \dfrac{1}{2}mv^2 = \dfrac{1}{2} \times 2 \times 10^{-3} \times (0.1\sqrt{3})^2 = 3 \times 10^{-5}$ J

30. **Answer (1)**

$K = \dfrac{U}{3} \Rightarrow \dfrac{4U}{3} = E$

$\dfrac{4}{3}\left(\dfrac{1}{2}kx^2\right) = \dfrac{1}{2}KA^2$

$\Rightarrow x = \dfrac{\sqrt{3}}{2}A$

31. **Answer (1)**

The differential equation of the wave motion is

$$\dfrac{\partial^2 y}{\partial x^2} = \dfrac{1}{v^2}\dfrac{\partial^2 y}{\partial t^2}$$

32. Answer (1)

33. Answer (1)

$$T = 2\pi\sqrt{\frac{I}{mgd}} = 2 \text{ s}$$

$$I = \frac{m\ell^2}{3}, \ d = \ell/2$$

$$\Rightarrow \ \ell = 1.5 \text{ m}$$

34. Answer (1)

$$v \propto \frac{1}{\sqrt{\rho}}$$

35. Answer (3)

$$KE = \frac{1}{2}mv^2 = 8 \times 10^{-3}$$

$$v = 4 \times 10^{-1} = A\omega; \ \omega = 4$$

$$y = 0.1\sin(\omega t + 90°) = 0.1\cos 4t$$

36. Answer (3)

$$\lambda = \frac{4l}{(2n+1)}$$

37. Answer (3)

$y = \sin(2\omega t)$

Equation of SHM

$$T = \frac{2\pi}{2\omega}$$

$$T = \frac{\pi}{\omega}$$

38. Answer (2)

39. Answer (2)

$$x = \omega\sqrt{A^2 - y^2} \quad \text{...(i)}$$

$$y = \omega\sqrt{A^2 - x^2} \quad \text{...(ii)}$$

$$\frac{x}{y} = \sqrt{\frac{A^2 - y^2}{A^2 - x^2}}$$

$$\frac{x^2}{y^2} = \frac{A^2 - y^2}{A^2 - x^2}$$

$$A = \sqrt{x^2 + y^2}$$

40. Answer (2)

$$\frac{1}{m_{red}} = \frac{1}{m} + \frac{1}{2m}$$

$$\boxed{m_{red} = \frac{2m}{3}}$$

$$T = 2\pi\sqrt{\frac{m_{red}}{k}}$$

$$= 2\pi\sqrt{\frac{2m}{3k}}$$

41. Answer (3)

$$\omega^2 A = \frac{g}{l} \cdot A$$

$$= 0.5 \text{ m/s}^2$$

42. Answer (1)

Equation of the given wave will be

$y = -A \sin(kx - \omega t)$

$y = A \sin(kx - \omega t + \pi)$

43. Answer (1)

$$f \propto \frac{1}{l}$$

$$l_1 : l_2 = \frac{1}{x} : \frac{1}{2x}$$

$$l_1 + l_2 = \frac{3}{2x}$$

$$90 = \frac{3}{2x}$$

$$\frac{1}{x} = 60$$

$$\frac{1}{2x} = 30$$

44. Answer (2)

$$f = \frac{(2n+1)v}{4l}$$

$f = (2n + 1)f_0$

The frequencies produced by it will be odd integral multiple of fundamental frequency.

45. Answer (1)

$$\frac{(v_P)_{max}}{v_{wave}} = \frac{\omega A}{(\omega / K)} = KA$$

$$\frac{\pi}{17} \times \frac{10}{11} = \frac{10}{17}$$

CHEMISTRY

46. Answer (3)

(– COOH) Carboxylic acid group is more acidic than (–OH) alcohol group due to equivalent resonance structures.

47. Answer (3)

B.P. increases with increase in molecular mass. For molecules with same molecular mass, branching matters.
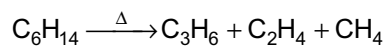
48. Answer (1)

Greater the delocalisation of electrons more will be double bond character hence smaller will be the bond length.

49. Answer (1)

$$\dot{H}_2C = CH \overset{\curvearrowleft}{-} \ddot{C}l: \longleftrightarrow H_2\bar{C} - CH = \overset{+}{Cl}$$

$$HC \equiv CH \overset{\curvearrowleft}{-} \ddot{C}l: \longleftrightarrow H_2\bar{C} = CH = \overset{+}{Cl}$$

Stability $\quad sp.\bar{C} > sp^2.\bar{C}$

Pyrolysis

$$C_6H_{14} \xrightarrow{\Delta} C_3H_6 + C_2H_4 + CH_4$$

Higher alkane   Alkene Lower alkanes

50. Answer (2)

N(2) is most basic as its lone pair is not delocalized.

51. Answer (4)

Hydrogenation of alkynes give selectively trans alkene with Na/liquid NH_3.

52. Answer (3)

In drinking water, NO_3^- is excess beyond 50 ppm concentration.

53. Answer (1)

54. Answer (4)

All three -CN groups are treated equilvalent to each other.

55. Answer (3)

56. Answer (1)

More number of withdrawing groups like NO_2 implies more acidic character.

Stability $\bar{C}H_2 - NO_2 > CH_3 - \bar{C}H - NO_2$ –ve charge due to CH_3
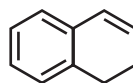
57. Answer (2)

58. Answer (3)

Rate of hydrogenation decreases with increasing substitution in the alkene.
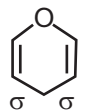
59. Answer (2)

60. Answer (1)

$– NO_2, – CF_3, -\overset{\oplus}{N}R_3$ are electron withdrawing groups. Such groups destabilise C^+ formed by E^+ attack.
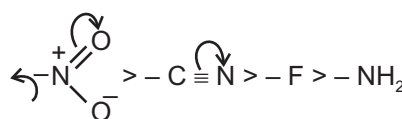
61. Answer (4)

Aromatic because of benzene ring.

  Non-Aromatic

62. Answer (2)

63. Answer (1)

64. Answer (4)

65. Answer (4)

66. Answer (2)

Aromaticity favours enol character in phenol.

67. Answer (3)

Pathogens include microorganisms such as bacteria (E.coli, etc.).

68. Answer (1)

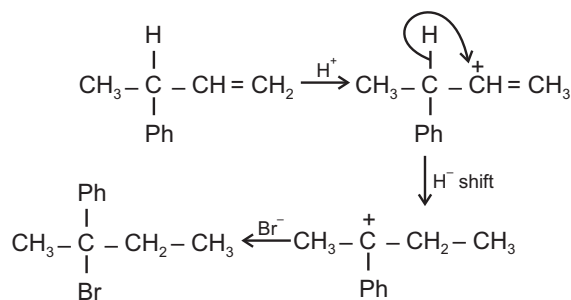$AlCl_3$ facilitates rearrangement of carbocation.

69. Answer (2)

Sufficient difference in B.P. of chloroform and aniline

70. Answer (4)

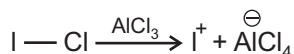Ozone hole was observed, in 1980s, over south pole.

71. Answer (3)

$$CH_3 - \underset{\underset{Ph}{|}}{\overset{\overset{H}{|}}{C}} - CH = CH_2 \xrightarrow{H^+} CH_3 - \underset{\underset{Ph}{|}}{\overset{\overset{H}{|}}{C}} - \overset{+}{CH} = CH_3$$

$$\downarrow H^- \text{ shift}$$

$$CH_3 - \underset{\underset{Br}{|}}{\overset{\overset{Ph}{|}}{C}} - CH_2 - CH_3 \xleftarrow{Br^-} CH_3 - \underset{\underset{Ph}{|}}{\overset{+}{C}} - CH_2 - CH_3$$

72. Answer (2)

Molar mass of AgBr = 188

Mass of Br in $0.47\,g$ AgBr $= \dfrac{80}{188} \times 0.47 = 0.2\,g$

$\therefore$ % of $Br = \dfrac{0.2}{0.5} \times 100 = 40\%$

73. Answer (1)

$$I - Cl \xrightarrow{AlCl_3} I^+ + \overset{\ominus}{AlCl_4}$$

74. Answer (3)

75. Answer (4)

76. Answer (2)

Heat released during hydrogenation and stability follow opposite orders. Aromaticity causes increase in stability and drop in ΔH.

77. Answer (4)
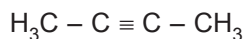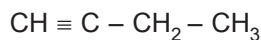
It is $(4n\pi)$ system so antiaromatic
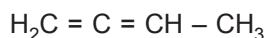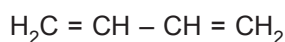
78. Answer (4)

79. Answer (3)

No α–H present.

Hence, resonance stabilised C^- does not form

80. Answer (4)

Degree of unsaturation = 2

C_4H_6 Alkynes

$CH \equiv C - CH_2 - CH_3$

$H_3C - C \equiv C - CH_3$

Alkenes

$H_2C = CH - CH = CH_2$

$H_2C = C = CH - CH_3$

81. Answer (2)

mass of $S = \dfrac{32 \times 0.466}{233}\,g = 0.064\,g$

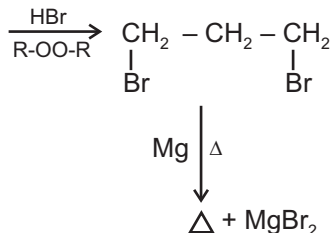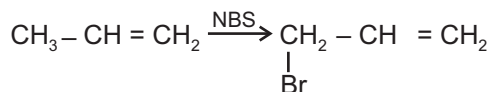$\therefore$ % mass of $S = \dfrac{0.064}{0.128} \times 100 = 50\%$

82. Answer (4)

83. Answer (3)

84. Answer (4)

85. Answer (2)

86. Answer (1)

$$CH_3 - CH = CH_2 \xrightarrow{NBS} \underset{\underset{Br}{|}}{CH_2} - CH = CH_2$$

$$\xrightarrow[R\text{-}OO\text{-}R]{HBr} \underset{\underset{Br}{|}}{CH_2} - CH_2 - \underset{\underset{Br}{|}}{CH_2}$$

$$\downarrow Mg \mid \Delta$$

$$\triangle + MgBr_2$$

87. Answer (2)

$-N\diagup$ is an activating group

Para product is usually major product.

88. Answer (2)

A bridged bromonium intermediate is formed and no carbocation is reported.

89. Answer (1)

$\dfrac{1° \text{ product}}{3° \text{ product}} = \dfrac{9 \times 1}{1 \times 5} = 9 : 5$

90. Answer (3)

$$HC \equiv C - CH_3 \xrightarrow[\text{in excess}]{HBr} CH_3 - \underset{\underset{Br}{|}}{\overset{\overset{Br}{|}}{C}} - CH_3 \xrightarrow[\Delta]{H_2O} CH_3 - \underset{\underset{OH}{|}}{\overset{\overset{OH}{|}}{C}} - CH_3$$

$$\downarrow -H_2O$$

$$\overset{O}{\overset{||}{CH_3 - C - CH_3}}$$
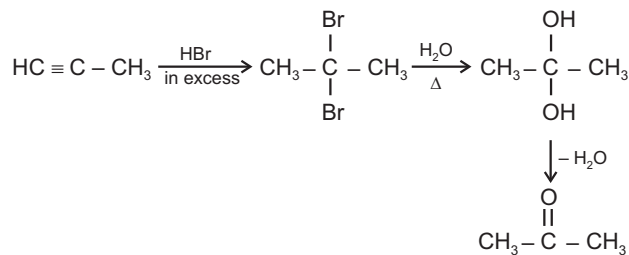
BOTANY

91. Answer (2)

Payoff phase is energy producing phase of glycolysis.

92. Answer (4)

93. Answer (3)

It leads to the production of lactic acid $(C_3H_6O_3)$.

94. Answer (1)

TCA cycle is Krebs cycle.

95. Answer (3)

It leads to production of 36 ATP instead of 38 ATP in respiration.

96. Answer (4)

Cytochrome bc_1 complex is complex III.

97. Answer (1)

$C_{51}H_{98}O_6$ is tripalmitin

98. Answer (2)

From one molecule of pyruvic acid 4 NADH and $1FADH_2$ molecules are produced in aerobic respiration.

4 NADH produce 12 ATP by ETS.

$1FADH_2$ produces 2 ATP by ETS.

Total produced ATP = 14.

99. Answer (3)

- Floating respiration – Fat/carbohydrate
- Protoplasmic respiration – Protein
- 2-phosphoglycerate $\xrightarrow[\substack{H_2O \\ \text{release}}]{\text{Enolase}}$ phosphoenol pyruvate

100. Answer (1)

101. Answer (2)

Secondary cortex and secondary phloem develop from secondary meristem.

102. Answer (1)

103. Answer (1)

104. Answer (3)

c and d are decarboxylation steps of Kreb's cycle.

105. Answer (1)

106. Answer (4)

Ethylene promotes abscission of plant parts.

107. Answer (2)

108. Answer (3)

Cytokinin – Responsible for Richmond Lang effect

109. Answer (1)

Cytokinin and auxin both show cell division.

110. Answer (4)

Respiration is mainly a catabolic process.

111. Answer (2)

In anaerobic bacteria, ATP synthesis occur through glycolysis only.

112. Answer (4)

113. Answer (2)

In link reaction, acetyl CoA(2C) is produced.

114. Answer (3)

IAA is a naturally occuring auxin.

115. Answer (2)

116. Answer (3)

Pepper is a day neutral plant.

117. Answer (4)

118. Answer (1)

Skotoperiod (dark period) must not exceed than critical period for flowering in LDPs.

119. Answer (4)

Intrafascicular cambium is primary meristem.

120. Answer (4)

121. Answer (2)

End product of glycolysis is pyruvic acid.

Oxygen acts as terminal electron acceptor in ETS.

122. Answer (2)

123. Answer (4)

One Acetyl CoA produces $3NADH + H^+$ and $1 FADH_2$

So, total number of oxygen molecules = $4 \times \frac{1}{2}O_2$

124. Answer (2)

125. Answer (2)

Cucumber is DNP.

126. Answer (4)

SDP does not initiate flowering when dark period is less than critical.

127. Answer (4)

In buttercup, environmental plasticity is found.

128. Answer (4)

Gibberellin induces quicker maturity in juvenile conifers.

129. Answer (4)

Bioassay of auxin is *Avena* curvature test.

130. Answer (3)

131. Answer (2)

Ethylene increases number of fruits in plants like cucumber.

132. Answer (4)

Cytokinin was first isolated from unripe maize grains.

133. Answer (2)

Phytochromes receive stimulation for photopheriods.

134. Answer (2)

Increase in size and number in vacuoles is a feature of cells of elongation region.

135. Answer (2)

From each molecule of acetyl CoA, 3NADH and $1FADH_2$ are produced in aerobic respiration *i.e.* total four coenzymes are produced.

ZOOLOGY

136. Answer (2)

Bipolar neurons possess cell bodies with one axon and one dendrite.

137. Answer (4)

$Na^+ – K^+$ pump restores the polarised state in neuron

138. Answer (2)

Diameter of nerve fibre is directly proportional to the transmission of nerve impulse.

139. Answer (4)

Auditory nerves conduct impulses to auditory cortex of the brain.

140. Answer (2)

Brainstem = Midbrain + Hindbrain (Pons + Medulla)

141. Answer (3)

Vitreous chamber is filled with a transparent semi-solid gelatinous material called vitreous humor.

142. Answer (4)

Eustachian tube connects the middle ear cavity with the pharynx.

143. Answer (2)

In neurons, the resting membrane potential ranges from –40 to –90 mV.

144. Answer (1)

Ateliosis is a deficiency disorder of pituitary gland.

145. Answer (4)

The gap between two adjacent myelin sheaths are called node of Ranvier.

146. Answer (3)

Prolactin regulates secretion of milk in lactating mother.

147. Answer (4)

The inner parts of cerebral hemispheres and a group of associated with deep structures like amygdala, hippocampus etc., form a complex structure called the limbic system.

148. Answer (4)

Hormones of adrenal medulla are catecholamines.

149. Answer (3)

Corpora quadrigemina is present on the dorsal side of midbrain.

150. Answer (3)

Renin is responsible for conversion of angiotensinogen to angiotensin I.

151. Answer (2)

Iter is the duct that connects third and fourth ventricles.

Lateral ventricles are called paracoel. Third ventricle is called diocoel.

152. Answer (4)

Androgens produce anabolic effects on protein and carbohydrate metabolism where cortisol has antagonestic effects.

153 Answer (1)

154. Answer (4)

Steroid hormones do not use secondary messengers to carry out their activity.

155. Answer (2)

Thymus gland plays a major role in the development of immune system and it atrophies with age.

156. Answer (4)

Secretin stimulates secretion of bicarbonate ions.

157. Answer (1)

Insulin interacts with extracellular receptors.

158. Answer (3)

Aldosterone is responsible for electrolyte and water balance in blood.

159. **Answer (3)**

If females do not conceive, corpus luteum will be converted into corpus albicans.

160. **Answer (1)**

Relaxin is secreted by placenta.

161. **Answer (2)**

Oxytocin and vasopressin are stored in posterior pituitary.

162. **Answer (2)**

Cornea is avascular structure hence easily transplanted.

163. **Answer (1)**

Pacinian corpuscles are encapsulated pressure receptors for detecting deep pressure.

164. **Answer (2)**

Oxytocin is a neurohormone that causes contraction of smooth muscles of uterus.

165. **Answer (2)**

Hypothalamus has the thirst centre, thermoregulation centre, hunger centre and satiety centres.

166. **Answer (4)**

Estrogen is responsible for secondary sexual characters in females. Hormones of pineal are responsible diurnal rhythm in man.

167. **Answer (4)**

The fovea is a thinned-out portion of the retina where only the cones are densely packed. As a result fovea is the point where the visual acuity (resolution) is the greatest and vision is sharpest.

168. **Answer (3)**

ADH is secreted in response to decrease in blood pressure.

169. **Answer (4)**

Hypermetropia is corrected by convex lens.

170. **Answer (2)**

171. **Answer (2)**

Choroid is a pigmented layer of eye.

172. **Answer (1)**

Corpus luteum and placenta are temporary endocrine glands.

173. **Answer (3)**

Vagus nerve controls the secretion of gastric glands.

174. **Answer (4)**

Hormones are non-nutrient chemicals. Hormones act as intercellular messengers.

175. **Answer (3)**

Melatonin acts like a biological clock. Melanin is a skin pigment.

176. **Answer (4)**

Adrenal medulla secretes adrenaline and noradrenaline. Catecholamines do not stimulate the synthesis of lipid and proteins.

177. **Answer (3)**

Mineralocorticoids regulate the water and electrolyte balance in the body.

178. **Answer (2)**

Piamater is the innermost cranial meninges.

179. **Answer (4)**

Perilymph filled area of ear are scala vestibuli and scala tympani.

180. **Answer (4)**

Sympathetic nervous system decreases secretion of instestinal juice.

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