P ANSWER KEY & SOLUTION KEY FINAL ROUND - 11 (PCB) Dt.20.04.2024

PHYSICS

SECTION - A (35 Questions)

01. **(3)** Due to presence of moisture density of air decreases.

We know that speed of sound in air is given by

$$v = \sqrt{\frac{\gamma p}{\rho}}$$

For air γ and p are constants.

$$v \propto \frac{1}{\sqrt{\rho}}$$, where ρ is density of air.

$$\frac{v_2}{v_1} = \sqrt{\frac{\rho_2}{\rho_1}}$$

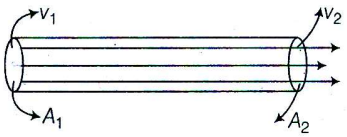
where ρ_1 is density of dry air and ρ_2 is density of moist air.

As $\rho_2 < \rho_1 = \frac{v_2}{v_1} > 1 \Rightarrow v_2 = v_1$.

Hence, speed of sound wave in air increases with increase in humidity.

02. **(2)**

03. **(1)** Consider the diagram where an ideal fluid is flowing through a pipe.



As given

d_1 = diameter of 1st point 2.5

d_2 = diameter of 2nd point 3.75

Applying equation of continuity for cross-sections A_1 and A_2.

$$\Rightarrow A_1 v_1 = A_2 v_2$$

$$\Rightarrow \frac{v_1}{v_2} = \frac{A_2}{A_1} = \frac{\pi(r_2^2)^2}{\pi(r_1^2)^2} = \left(\frac{r_2}{r_1}\right)^2$$

$$= \left(\frac{3.75/2}{2.5/2}\right)^2 = \left(\frac{3.75}{2.5}\right)^2 = \frac{9}{4}\left[\begin{matrix} r_2 = \frac{d_2}{2} \\ r_1 = \frac{d_1}{2} \end{matrix}\right].$$

04. **(4)** The angle between velocity and magnetic field will be zero. Hence electron will not experience any force.

05. **(2)** $\beta_{central} = \frac{2\lambda D}{a} \Rightarrow a = \frac{2\lambda D}{\beta_{central}}$.

06. **(2)** Smaller gulab jamuns are having least surface area hence, they will be heated first. As in case of smaller gulab jamun heat radiates will be less.

Similarly, smaller pizzas are heated before bigger ones because they are of small surface areas.

07. **(3)** As the body is falling freely under gravity, the potential energy decreases and kinetic energy increases but total mechanical energy (PE + KE) of the body and earth system will be constant as external force on the system is zero.

08. **(2)**

09. **(4)** Given, $A = 1.0\text{m} \pm 0.2\text{m}$, $B = 2.0 \pm + 0.2\text{m}$.

Let, $Y = \sqrt{AB} = \sqrt{(1.0)(2.0)} = 1.414\text{m}$

Rounding off to two significant digit $Y = 1.4\text{m}$

$$\frac{\Delta Y}{Y} = \frac{1}{2}\left[\frac{\Delta A}{A} + \frac{\Delta B}{B}\right] = \left[\frac{0.2}{1.0} + \frac{0.2}{2.0}\right] = \frac{0.6}{2\times 2.0}$$

$$\Rightarrow \Delta Y = \frac{0.6}{2\times 2.0} = \frac{0.6\times 1.4}{2\times 20} = 0.212$$

Rounding off to one significant digit $\Delta Y = 0.2\text{m}$

Thus, correct value for

$= \sqrt{AD} = r + \Delta r = 1.4 \pm 0.2\text{m}$.

10. **(1)**

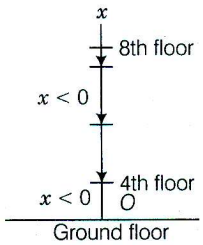
11. **(2)** In the given diagram, when the small piece Q removed and glued to the centre of the plate, the mass comes closer to the z-axis, hence, moment of inertia decreases.

12. **(4)** $\lambda = \frac{h}{p} = \frac{h}{m\sqrt{gH}}$.

13. **(1)** As the lift is coming in downward direction displacement will be negative. We have to see whether the motion is acceleration or retarding.

We know that due to downward motion displacement will be negative. When the lift reaches 4th floor is about to stop hence, motion is retarding in nature

hence, $x < 0$, $a > 0$



As displacement is in negative direction, velocity will also be negative i.e., $v < 0$.

This can be shown on the adjacent graph.

14. **(2)**

15. **(1)** Let equation of an SHM is represented by

$y = a\sin\omega t$

$v = \frac{dy}{dt} = a\omega\cos\omega t$

$\Rightarrow (v)_{max} = a\omega = 30$ .....(i)

Acceleration $(A) = \frac{dx^2}{dt^2} = a\omega^2\sin\omega t$

$A_{max} = a\omega^2 = 60$ .....(ii)

Eqs. (i) and (ii), we get

$\omega(\omega a) = 60 \Rightarrow \omega(30) = 60$

$\Rightarrow \omega = 2$rad/sec

$\Rightarrow \frac{2\pi}{T} = 2\text{rad/sec} \Rightarrow T = \pi\text{sec}.$

16. **(2)**

17. **(2)** Given, mass = $m = 5$ kg

acting force = $\vec{F} = (-3\hat{i} + 4\hat{j})$N.

Initial velocity at $t = 0$, $v = (6\hat{i} - 12\hat{j})$ m/s

Retardation, $\hat{a} = \frac{F}{m} = \left(-\frac{3\hat{i}}{5} + \frac{4\hat{j}}{5}\right)$ m/s^2

As final velocity is along Y-axis only, its x-component must be zero.

Form $v = u + at$, for X-component only,

$0 = 6\hat{i} - \frac{3\hat{i}}{5}t \Rightarrow t = \frac{5\times 6}{3} = 10s.$

18. **(3)**

19. **(1)** All given measurements are correct upto two decimal places. As here 5.00 mm has the smallest unit and the error in 5.00 mm is least (commonly taken as 0.01 mm if not specified), hence,5.00 mm is most precise.

20. **(1)**

21. **(3)** As given motion is two dimensional motion and given that instantaneous speed v_0 is positive constant. Acceleration is rate of change of velocity (instantaneous speed) hence it will also be in the plane of motion.

22. **(2)**

23. **(3)** When the object moves from infinity to 2F, image moves from F to 2F.

When the object moves from 2F to F, image moves from 2F to infinity.

Hence, distanced moved by image varies non-uniformly.

24. **(4)** Given, $h = 1.5$m, $v = 1$ m/s, $m = 10$kg, $g = 10$ m/s^2

From conservation of mechanical energy.

$(PE)i + (KE)i = (PE)f + (KE)f$

$\Rightarrow mgh + \frac{1}{2}mv^2 = 0 + (KE)f$

$\Rightarrow (KE)f = mgh + \frac{1}{2}mv^2$

$\Rightarrow (KE)f = 10\times 10\times 1.5 + \frac{1}{2}\times 10\times (1)^2$

$= 150 + 5 = 155$ J.

25. **(3)**

26. **(3)** Centre of mass of a system lies towards the part of the system, having bigger mass. In the above diagram, lower part is heavier, hence COM of the system lies below the horizontal diameter.

27. **(4)**

28. **(1)** Given, radius $r = 2.5 \times 10^{-5}$ m

surface tension (S) = 7.28×10^{-2} N/m

Angle of contact (θ) = 0°

The maximum height to which sap can rise in trees through capillary action is given by $h = \frac{2S\cos\theta}{r\rho g}$

where S = surface tension, ρ = Density, r = Radius

$= \frac{2\times 7.28\times 10^{-2}\times\cos 0°}{2.5\times 10^{-5}\times 1\times 10^3\times 9.8} = 0.6m.$

This is the maximum height to which the sap can rise due to surface tension. Since, many tress have heights much than this, capillary action alone cannot account for the rise of water in all trees.

29. **(4)** Angle between M and B does not change on rotating the loop by 30°. Hence work done is zero.

30. **(1)** Amount of sweat evaporated / minute

$= \frac{\text{Sweat produced/minute}}{\text{No. of calories required for evaporation/kg}}$

$= \frac{\text{Amount of heat produced per minute in jogging}}{\text{Latent heat (in cal/kg)}}$

$$= \frac{14.5\times10^3}{580\times10^3} = \frac{145}{580} = 0.25kg.$$

31. **(3)**
32. **(3)**
33. **(2)**
34. **(3)**
35. **(2)**

SECTION - B (Attempt Any 10 Questions)

36. **(4)** Gravitational mass of proton is equivalent to its inertial mass and is independent of presence neighbouring heavy objects.
37. **(2)**
38. **(2)** Mass $m = 2.5$ kg, μ = mass per unit length

$$= \frac{m}{l} = \frac{2.5kg}{20} = \frac{125}{10} = 0.125kg/m$$

Speed $v = \sqrt{\frac{T}{\mu}} = \sqrt{\frac{200}{0.125}}$ [speed of transvers waves in any string]

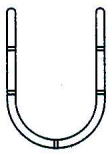
$$l = v\times t \Rightarrow 20 = \sqrt{\frac{200}{0.125}}\times t$$

$$t = 20\times\sqrt{\frac{25\times5}{2\times10^5}}$$

$$= 20\times\sqrt{25\times\frac{1}{0.4\times10^5}} = 20\times5\sqrt{\frac{1}{4\times10^4}}$$

$$= \frac{20\times5}{2\times10^2} = \frac{1}{2} = 0.5.$$

39. **(3)** Consider the diagram in which a liquid column oscillates. In this case, restoring force acts on the liquid due to gravity. Acceleration of the liquid column, can be calculated in terms of restoring force.



Restoring force f = Weight of liquid column f height $2y$

$$\Rightarrow f = -(A\times2y\times\rho)\times g = -2A\rho gy$$

$[\because \eta = \rho v]$

$\Rightarrow f \propto -y \Rightarrow$ Motion is SHM with force constant

$k = 2A\rho g$

$\Rightarrow$ Time period

$$T = 2\pi\sqrt{\frac{m}{k}} = 2\pi\sqrt{\frac{A\times2h\times\rho}{2A\rho g}} = 2\pi\sqrt{\frac{h}{g}}$$

$$T = 2\pi\sqrt{\frac{l}{g}}, \text{ where } l = h$$

Which is independent of the density of the liquid.

40. **(3)**
41. **(4)** We know for an ideal gas, $pV = nRT$
where, n = number of moles, p = Pressure, V = Volume R = Gas constant, T = temperature

$$= \frac{pV}{RT}$$

As number of moles of the gas remains fixed, hence, we can write

$$\frac{p_1V_1}{RT_1} = \frac{p_2V_2}{RT_2} \Rightarrow p_2 = (p_1V_1)\frac{T_2}{V_2T_1}$$

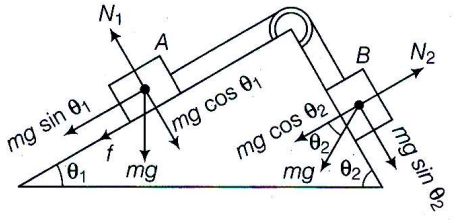
$$= \frac{(p)(V)(1.1T)}{(1.05)V(T)} \quad [p_1 = p,\ V_2 = 1.05\ V \text{ and } T_2 = 1.1T]$$

$$= p\times\frac{1.1}{1.05}$$

$$= p\times(1.0476) = 1.05p.$$

Hence, final pressure p_2 lies between p and $1.1\,p$.

42. **(1)**
43. **(3)** Let A moves up the plane frictional force on A will be downward as shown.



When A just starts moving up

$$mg\sin\theta_1 + f = mg\sin\theta_2$$

$$\Rightarrow mg\sin\theta_1 + \mu mg\cos\theta_1 = mg\sin\theta_2$$

$$\Rightarrow \mu = \frac{\sin\theta_2 - \sin\theta_1}{\cos\theta_1}$$

When A moves upwards

$$f = mg\sin\theta_2 - mg\sin\theta_1 > 0$$

$$\Rightarrow \sin\theta_2 > \sin\theta_1 \Rightarrow \theta_2 > \theta_1.$$

44. **(3)**
45. **(4)** Given, fundamental quantities are momentum (p), area (A) and time (T).
We can write energy E as

$$E \propto p^a A^b T^c$$

$$E = kp^a A^b T^c$$

where k is dimensionless constant of proportionally.

Dimensions of

$E = [E] = [ML^2T^{-2}]$ *and* $[p] = [MLT^{-1}]$

$[A] = [L^2]$

$[T] = [T]$

$[E] = [k][p]^a[A]^b[T]^c$

$= M^a L^{2b+a} T^{-a+c}$

By principle of homogeneity of dimensions,

$a = 1$, $2b + a = 2$

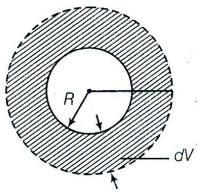
$\Rightarrow 2b + 1 = 2$

$\Rightarrow b = 1/2 - a + c = -2$

$c = -2 + a = -2 + 1 = -1$

Hence, $E = pA^{1/2}T^{-1}$.

46. **(4)** Let the radius of the sphere is R. As the temperature increases radius of the sphere increases as shown.



Original volume $V_0 = \frac{4}{3}\pi R^3$

Coefficient of linear expansion = α

$\therefore$ Coefficient of volume expansion = 3α

$\therefore \frac{1dV}{VdT} = 3\alpha \Rightarrow dV = 3V\alpha dt \Rightarrow 4\pi R^3 \alpha \Delta T$

= increase in the volume.

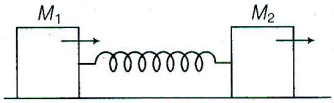
47. **(3)** Consider the adjacent diagram when M_1 comes in contact with the spring, M_1 is retarded by the spring force and M_2 is accelerated by the spring force.

(1) The spring will continue to compress until the two blocks acquire common velocity.

(2) As surface are frictionless momentum of the system will be conserved

(3) If spring is massless whole energy of M_1 will be imparted to M_2 and M_1 will be at rest, then

(4) Collision is inelastic, even if friction is not involved.



48. **(1)** Given, mass = m = 5 kg , Radius = 1m = R

Revolution per minute ω = 300 rev/min

$= (300 \times 2\pi)$rad/min

$= (300 \times 2 \times 3.14)$rad/min

$= (300 \times 2 \times 3.14)$rad/60s

$= \frac{300 \times 2 \times 3.14}{60}$ rad/s $= 10\pi$rad/s

$\Rightarrow$ Linear speed = $v = \omega R$

$= \left(\frac{300 \times 2\pi}{60}\right)(1) = 10\pi$ m/s

$KE = \frac{1}{2}mv^2$

$KE = \frac{1}{2} \times 5 \times (10\pi)^2$

$KE = 100\pi^2 \times 5 \times \frac{1}{2} = 250\pi^2 J.$

49. **(2)** We know that Young's modulus

$Y = \frac{Stress}{Strain} = \frac{F/A}{\Delta L/L} = \frac{F}{A} \times \frac{L}{\Delta L}$

$= \frac{F}{\pi(D/2)^2} \times \frac{L}{\Delta L} = \frac{4FL}{\pi D^2 \Delta L}$

$\Rightarrow D^2 = \frac{4FL}{\pi \Delta L Y} \Rightarrow D = \sqrt{\frac{4FL}{\pi \Delta L Y}}$

As F and are $\frac{L}{\Delta L}$ constants.

Hence, $D \propto \sqrt{\frac{1}{Y}}$

Now, we can find ratio as $\frac{D_{copper}}{D_{iron}} = \sqrt{\frac{Y_{iron}}{Y_{copper}}}$.

50. **(1)** As no external torque acts on the system, angular momentum should be conserved.

Hence $I\omega$ = constant .....(i)

where, I is moment of inertia of the system and ω is angular velocity of the system.

$I_1\omega_1 = I_2\omega_2$

(where ω_1 and ω_2 are angular velocities before and after jumping)

$\Rightarrow I\omega = \frac{I}{2} \times \omega_2$

(as mass reduced to half, hence, moment of inertia also reduced to half)

$\Rightarrow \omega_2 = 2\omega.$

CHEMISTRY

SECTION - A (35 Questions)

51. **(1)** Molarity

$$= \frac{\text{Wt. of solute}}{\text{Mol. wt. of solute}} \times \frac{1000}{\text{Volumeofsoln.(mL)}}$$

$$= \frac{49}{98} \times \frac{1000}{250} = 2M$$

52. **(2)** In $^{88}_{38}Sr$, Atomic number = No. of protons = No. of electrons = 38.

Atomic mass = 88

Number of neutrons = 88 – 38 = 50

53. **(3)** Ethanal (CH_3CHO) is an oxidised product of ethanol. Pyridinium chlorochromate ($C_5H_5\overset{+}{N}H\overset{-}{Cl}CrO_3$) oxidises primary alcohols to aldehydes. Strong oxidising agents such as $KMnO_4$ are used for getting carboxylic acid from alcohols. The oxidation process can be stopped at the reagent of pyridinium chlorochromate and pyridinium dichromate $[(C_5H_5NH_2)^{2+}Cr_2O_7^{2-}]$ in anhydrous medium are used as the oxidising agent. So, the correect option is (3).

$$\underset{\text{Ethanol}}{CH_3CH_2OH} \xrightarrow{PCC} \underset{\text{Ethanal}}{CH_3CHO}$$

54. **(3)** Assertion is correct but reason is wrong statement.

Correct Reason This reaction proceeds through S_N2 mechanism, in which –OH ion attacks at 180° to the halogen atom of 2-bromooctane which leads to the inversion of configuration.

55. **(1)** Triangular planar

56. **(3)** O_2, B_2

57. **(1)** (i) 4p, (ii) 4s, (iii) 3d, (iv) 3p

Ther order of increasing energy

(iv) < (ii) < (iii) < (i)

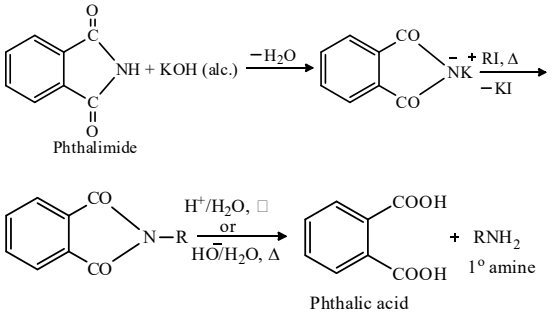
58. **(2)** For exothermic reactions, $H_R > H_P$, hence ΔH is negative

59. **(3)** Iodoform test is used to test presence of $-COCH_3$ group which is converted into –COOH group.

The reaction is shown as

$$\underset{\text{Hex-4-en-2-one}}{CH_3-CH=CH-CH_2-\overset{O}{\overset{\|}{C}}-CH_3} \xrightarrow[\text{(Iodoform reaction)}]{I_2/NaOH \text{ solution}} \underset{\text{Pent-3-en-1-oic acid}}{CH_3-CH=CH-CH_2-\overset{O}{\overset{\|}{C}}-OH}$$

60. **(4)** Source of nitrogen in Gabriel phthalimide synthesis is potassium phthalimide.



61. **(4)** Ionisation enthalpy of an atom is always negative.

62. **(1)** In Wilkinson's catalyst-(a homogenous catalyst), $(Ph_3P)_3RhCl$, Rh is dsp^2 hybridised giving a square planar shape to the compound and is in +1 oxidation state.

63. **(4)** (A) → (iii), (B) → (iv), (C) → (i), (D) → (ii)

64. **(1)** I and IV statements are correct.

65. **(4)** In option (4) a carbon with double bond has two same functional groups (CH_3) attached. The rotation around carbon will not produce a new compound. Hence, geometrical isomerism is not possible.

66. **(2)** $+I$ -effect decreases the stability of carbon anion. Since, (CH_3) group has $+I$ -effect, therefore, it intensifies the negative charge and hence destabilises (A) relative to (B). sp hybridised carbanion is more stabilised than sp^3

$$\underset{(B)^{sp}}{CH\equiv C^-} > \underset{(A)^{sp}}{CH_3-C\equiv C^-} > \underset{(C)\ sp^3}{CH_3-CH_2}$$

Hence, B > A > C

67. **(1)** +800 & +640

68. **(4)** The transition metals exhibit higher enthalpies of atomisation due to strong interatomic interaction arises because of having large number of unpaired electrons in their atoms.

69. **(1)**

Species	Conjugate acid	Conjugate base
HCO_3^-	H_2CO_3	CO_3^{2-}
HSO_4^-	H_2SO_4	SO_4^{2-}
NH_3	NH_4^+	NH_2^-
H_2O	H_3O^+	OH^-

70. **(3)** Sucrose (cane sugar) is a disaccharide. One molecule of sucrose on hydrolysis g one molecule of glucose and one molecule of fructose.

$$\underset{\text{Cane sugar}}{C_{12}H_{22}O_{11}} \xrightarrow[H^+]{H_2O} \underset{\text{D(+) glucose}}{C_6H_{12}O_6} + \underset{\text{D(−) fructose}}{C_6H_{12}O_6}$$

Note:- Sucrose is a dextro-rotatory sugar on hydrolysis produces a laevorotatory mixture So,

known as invert sugar. Sucrose is a non-reducing sugar while maltose and lactose are reducing sugar.

71. **(4)** $Br_2 \rightarrow BrO_3^-$
For Br_2, oxidation number = 0
For BrO_3^-, oxidation number, $x + (-6) = -1$
$\Rightarrow x = +5$

72. **(1)** Electronegativity of Cl, Br, C and Mg follows the order Cl > Br > C > Mg
$*CH_3 \rightarrow CH_2 \rightarrow Cl$ ($-I$ -effect)
$*CH_3 \leftarrow CH_2 \leftarrow Mg^+Cl^-$
$*CH_3 \rightarrow CH_2 \rightarrow Br$ ($-I$ -effect)
$*CH_3–CH_2–CH_3$ ($+I$ -effect)
–/effect of Cl > Br.
Hence, $CH_3–CH_2–Cl$ has the greatest positive charge.

73. **(2)** $\overset{+5}{HClO_3} \rightarrow \overset{+7}{HClO_4}$ (Oxidation)

$\overset{-3}{NH_4^+} \rightarrow \overset{-3}{NH_3}$ (None)

$\overset{-4}{NO_2} \rightarrow \overset{+4}{N_2O_2}$ (None)

$\overset{+4}{HSO_3^-} \rightarrow \overset{+6}{SO_4^{2-}}$ (Oxidation)

$\overset{-1}{H_2O_2} \rightarrow \overset{-2}{H_2O}$ (Reduction)

74. **(1)** (p) At anode : oxidation takes place.
(q) At cathode : reduction takes place.
(r) Salt bridge for migration of ions
(s) Electrons flow from anode to cathode.
(t) Current flows from cathode to anode.

75. **(2)** A and D

76. **(3)** Hexane + CO_2

77. **(4)** Hypo solution ($Na_2S_2O_3$) is used in photography to remove the unaffected AgBr in the form of soluble complex.
$AgBr + Na_2S_2O_3 \rightarrow Na_3[Ag(S_2O_3)_2] + 2NaBr$
Sodium argentothiosulphate

78. **(3)** Solubility changes with temperature. A plant cell shrinks in hypertonic solution. Relative lowering of vapour pressure is a colligative property.

79. **(1)**

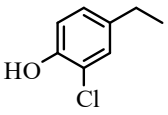
	Hydrocarbons	Boiling point	
A.	n-pentane	309 K due to no branch	
B.	iso-pentane	301 K due to one branch	$CH_3-CH_2-\underset{\displaystyle CH_3}{\overset{}{CH}}-CH_3$
C.	neo-pentane	282.5 K due to two branches	$CH_3-\underset{\displaystyle CH_3}{\overset{\displaystyle CH_3}{\overset{}{C}}}-CH_3$

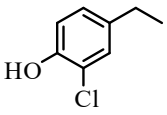
80. **(3)** KCl undergoes dissociation in solution, hence observed molar mass will be lower. Experimentally determined molar mass can be higher or lower depending upon whether solute undergoes dissociation or association.

81. **(4)** Lanthanum hydroxide is more basic than luteium hydroxide since the basicity decreases in the period.
Atomic radius of Zr and Hf are same because of lanthanide contraction

82. **(2)** Cations, total charge, anions, ions, oxidation

83. **(1)** Homolysis process require sunlight, U.V light or high temp. to form Cl radicals.

84. **(1)** X = 

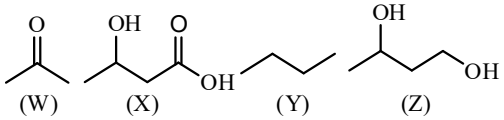
, Y = 

85. **(2)** A-(iii), B-(iv), C-(ii), D-(i)

SECTION - B (Attempt Any 10 Questions)

86. **(2)** $k = \frac{2.303}{(t_2 - t_1)} \log \frac{[A_1]}{[A_2]}$

$k = \frac{2.303}{(1600 - 800)} \log \frac{1.45}{0.88} = \frac{2.303}{800} \times 0.2169$
$= 6.24 \times 10^{-4}\ s^{-1}$

87. **(3)** 

88. **(2)** (ii), (iii) & (iv)

89. **(1)** $NH_2–Hg–O–Hg–I$

90. **(3)** $\frac{0.693}{t_{1/2}} = \frac{2.303}{t} \log \frac{a}{a-x}$

$\frac{0.693}{10} = \frac{2.303}{100} \log \frac{100}{100 - x} \Rightarrow x = 99.9\%$

91. **(2)** $Ph\text{-}CH_2–MgI \xrightarrow{H_2O} Ph\text{-}CH_3 + Mg(OH)I$

92. **(3)** Iron coated with zinc does not get rusted even if cracks appear on the surface because Zn will take part in redox reaction not Fe as Zn in more reactive than Fe. If iron is coated with tin and cracks appear on the surface, Fe will take part in redox reaction because Sn is less reactive than Fe.

93. **(1)** Both A and R are correct and R is the correct explanation of A.

$\overset{5}{CH_3}-\overset{4}{CH_2}-\overset{3}{CH_2}-\overset{2}{HC}=\overset{1}{CH_2}$
Pent-1ene

$\overset{5}{CH_3}-\overset{4}{CH_2}-\overset{3}{HC}=\overset{2}{CH}-\overset{1}{CH_3}$
Pent-2-ene

When two or more compounds differ in the position of subsituent atom or functional group on the carbon skeleton then it is position isomerism. Double bond is a functional group whose position varies.

94. **(2)** $K = k_1 \times k_2 = (6.8 \times 10^{-3}) \times (1.6 \times 10^{-3}) = 1.08 \times 10^{-5}$

95. **(1)** $MgCl_2 \rightleftharpoons Mg^{2+} + 2Cl^-, i = 3$

$$\Delta T_b = iK_b m = 3 \times 0.52 \times \frac{9.43}{94.3 \times 1} = 0.156$$

96. **(4)** The correct increasing order of basic strength is as follows

II < IV < I < III

Greater the electron density towards ring, greater will be its basic strength. Electron withdrawing group decreases basic strength while electron donating group increases basic strength.

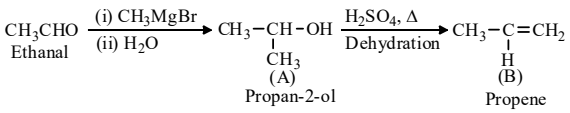
97. **(1)** A and R both are correct, and R is the correct explanation of A.

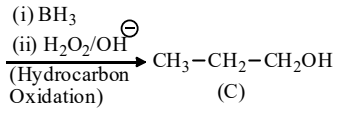
98. **(4)**

Element	%	No. of moles	Molar ratio	Whole no. ratio
P	27.3	27.3/12 = 2.27	1	1
Q	72.7	72.7/16 = 4.54	2	2

Empirical formula = PQ_2

99. **(2)** Chemical reaction can be shown as





Thus, $CH_3CH(CH_3)-OH$ and $CH_3–CH_2–CH_2OH$ are positional isomers.

Hence, option (2) is correct.

100. **(1)** sp^3, tetrahedral

BOTANY

Section - A (35 Questions)

101. **(3)** (Exemplar 11th Question No.5)

102. **(3)**(NCERT XII, Pg 120, Salient Features of Human Genome)

103. **(4)** (NCERT XII, Pg 99, based on Packaging of DNA Helix)

104. **(4)** (NCERT XII, 115, para 3, line 1)

105. **(3)** (Exemplar 11th SAT Questions.5th)

106. **(3)** (Exemplar 12th Question No.07)

107. **(2)** (NCERT 11th, Biological Classification, Exemplar)

108. **(3)** (NCERT 11th, Biological Classification, Summary)

109. **(1)** (NCERT11th, Biological Classification, Exercise based)

110. **(4)** (11th NCERT EXEMPLAR/ PAGE NO. 50)

111. **(1)** [NCERT Exemplar problems - XI page No. 22; Q.No.6]

112. **(1)** (NCERT XII, Pg 117, Para 2, Line 1)

113. **(1)** (NCERT XII, Pg 71, based on INHERITANCE OF ONE GENE)

114. **(3)** (NCERT XII, Pg 80, based on Law of Independent Assortment and Linkage)

115. **(4)** (NCERT XII, Pg 78, based on para 2)

116. **(3)** (NCERT XII, Pg 107, based on Figure 6.8)

117. **(4)** [NCERT class XI,Page 247, (Conceptual) Point 15.4.1 (Second paragraph)]

118. **(2)** [NCERT class XI exemplar, Question number 05]

119. **(2)** [NCERT Exemplar problems - XI page No. 22; Q.No.7]

120. **(4)** (NCERT XI Pg.227, Intro Part)

121. **(3)** (NCERT XI Pg.235, 14.6 Last line)

122. **(3)** (Exemplar 11th SAT Questions.3)

123. **(3)** (NCERT 11th, Living World, Exemplar)

124. **(3)** (NCERT XII, Pg 84, based on Figure 5.11)

125. **(2)** (NCERT 12th, SRFP, Exemplar)

126. **(1)** (11th NCERT exercises Page no.141)

127. **(1)** (NCERT 12th, SRFP, Exemplar)

128. **(2)** (NCERT 12th, SRFP, Exemplar)

129. **(4)** (NCERT XI – conceptual – page no. 223, 13.10.2, 2nd paragraph)

130. **(3)** (NCERT XI – Page no. 216, 13.7.2, 1 and page no. 219, 2nd paragraph)

131. **(2)** [NCERT Exemplar problems - XI page No. 22; Q.No.9]

132. **(4)** (NCERT XII, Pg 89, Based on colourblindness (Sex linkage))

133. **(4)** (11th NCERT EXEMPLAR, page no. 40)

134. **(2)** (11th NCERT EXEMPLAR, page no.39)

135. **(3)** [NCERT exemplar Class XI, Question number 08]

SECTION - B (Attempt Any 10 Questions)

136. **(3)** [NCERT Class XI, Page no. 92, Line no. 07-09 (Conceptual)]
137. **(2)** [NCERT exemplar Class XI,, Question number 01]
138. **(2)** (NCERT 12th, SRFP, Exercise)
139. **(3)** (11th NCERT EXEMPLAR/ PAGE NO. 50)
140. **(4)** (NCERT XI Pg.228, 14.2 Last Para, 6th line)
141. **(4)** (11th PK NCERT Page no 44 Exercises question bank conceptual)
142. **(4)** (NCERT-XII, Pg. 118)
143. **(1)** (NCERT XI – page no. 212, fig. 13.5 and 1st paragraph, page no. 214, fig. 13.7)
144. **(3)** (NCERT 11th, Living World, Exemplar)
145. **(4)** (NCERT 11th, Biological Classification, Exemplar)
146. **(4)** (NCERT-XII, Pg. 115, Para 2, Last 2nd line)
147. **(2)** (Exemplar 12th Question No.06)
148. **(3)** (11th NCERT EXERCISES Page no.141)
149. **(2)** (11th NCERT EXEMPLAR / PAGE NO. 51)
150. **(2)** [NCERT Exemplar problems - XI page No. 23; Q.No.10]

ZOOLOGY

Section - A (35 Questions)

151. **(1)** (NCERT 11th, Biomolecule, Exemplar)
152. **(1)** (NCERT 12th, Evolution, Exercise based)
153. **(4)** (NCERT 12th, Evolution, Summary)
154. **(4)** (12th NCERT EXEMPLAR / PAGE NO. 70)
155. **(3)** (12th NCERT ecology 1st chapter, exponential equation—dN /dt=(b-d) ×N Rate of change in population=2015-2005=10 Years dN/10= (0.028-0.008) ×14=0.28×10=2.8=Initial population 14 million

    Total population =2.8 million +14 million=16.8 near about 17 million)
156. **(4)** (NCERT Page No. 146, Common diseases)
157. **(1)** (NCERT Page No. 157, Cancer)
158. **(3)** (Exemplar 12th Question No.08)
159. **(2)** (Page No. 297; 2nd line of 3rd paragraph)
160. **(3)** [NCERT P.No.302, 1st para & 303, 2nd para Line]
161. **(3)** (12th NCERT EXEMPLAR / PAGE NO. 70)
162. **(2)** [NCERT P.No.310, Last Para]
163. **(2)** [NCERT P.No.196 ,Para just above diagram]
164. **(2)** [NCERT P.No.211 ,Gene therapy 2nd para 2nd line]
165. **(3)** (NCERT 12th exemplar)
166. **(3)** (NCERT P.No.287, Disorders)
167. **(3)** (Exemplar 12th Question No.09)
168. **(2)** [NCERT P.No.310, 4th Line]
169. **(3)** [NCERT P.No.321, Last Para]
170. **(4)** (NCERT 11th exemplar)
171. **(2)** (NCERT P.No.274, Transport of oxygen)
172. **(1)** (NCERT 12th summary, p.no 55)
173. **(4)** (NCERT 11th exemplar frog)
174. **(1)** (NCERT P.No.271, Respiratory volume)
175. **(2)** (NCERT 12th, Evolution, Exemplar)
176. **(3)** (NCERT 12th exemplar)
177. **(1)** (NCERT 11th page no 122, EXERCISE)
178. **(4)** [NCERT P.No.316, 21.1 AND 21.2]
179. **(1)** [NCERT P.No.319, Fig. 21.3]
180. **(4)** (NCERT XI Page No.50 Phylum ctenophora)
181. **(1)** (NCERT XI Page No. 338; 4th paragraph)
182. **(1)** (NCERT 11th, Biomolecule, Exemplar)
183. **(4)** (NCERT P.No. 189)
184. **(2)** (NCERT XI Page No. 54; Phylum-echinodermata)
185. **(2)** (NCERT 11th exemplar cockroach)

SECTION - B (Attempt Any 10 Questions)

186. **(1)** (NCERT 11th, Biomolecule, Exemplar)
187. **(2)** (Exemplar 12th Question No.17)
188. **(3)** (NCERT 12th, Evolution, Exemplar)
189. **(2)** (Page No. 60, 3rd line)
190. **(4)** (NCERT XI Page No. 331; 5th line of 2nd paragraph)
191. **(4)** [NCERT P.No.209, Pest Resistant plants]
192. **(4)** [NCERT P.No.321, 1st para 20th Line]
193. **(3)** (NCERT XI Page No. 291; 5th line of 2nd paragraph)
194. **(1)** [NCERT P.No.307, 9th Line]
195. **(1)** (NCERT P.No. 273, Exchange of gases)
196. **(2)** (NCERT Page No. 138)
197. **(1)** (NCERT Page No. 155, AIDS)
198. **(4)** (NCERT 12th exemplar)
199. **(3)** (NCERT 12th Exemplar)
200. **(2)** (11th NCERT Excercises / PAGE NO. 189)]