AIIMS MBBS ENTRANCE TEST 2019

EXAMINATION PAPER WITH ANSWER & SOLUTIONS

(BASED ON MEMORY RETENTION)

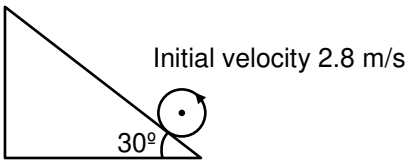
Date: 25-05-2019 (Saturday) | Time: 3.00 pm - 6.30 pm | Evening Session

NOTE:-

1. Questions are collected from the appeared students.
2. The solutions are prepared by the expert faculty team of Resonance Pre-medical division, Kota.
3. Questions may not be in the order or sequence as asked in the actual examination paper.
4. The questions collected may not have all the options similar to the actual paper. Students are advised to see the question and answer / solutions.
5. Actual AIIMS Paper has 200 questions but we have included only those many questions which have been collected from the students as per following table:-

AIIMS-2019 PHYSICS (25-05-19) 2ND SHIFT
PART - A (PHYSICS)

1. A Sphere pure rolls on a rough inclined plane with initial velocity 2.8 m/s. Find the maximum distance on the inclined plane.



(1) 2.74 m (2) 5.48 m (3) 1.38 m (4) 3.2 m

Ans. **(1)**

Sol. $a = \frac{g\sin\theta}{1+k^2/r^2}$

$I = \frac{2}{5}mr^2 = mk^2$

$\frac{k^2}{r^2} = \frac{2}{5}$

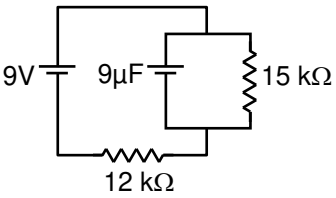
$a = \frac{g\sin\theta}{1+2/5}$

$2.8^2 = 2\frac{g\times\frac{1}{2}}{\frac{7}{2}}\times s$

$S = 2.8^2 \times \frac{7}{20}$

S = 2.744m

2. Calculate charge on capacitor in steady state.



(1) 50 μC (2) 30 μC (3) 45 μC (4) 60 μC

Ans. **(3)**

Sol. $i = \frac{9}{27\times10^3}$

$V_C = 15\times10^3 \times \frac{9}{27\times10^3}$

$q = 9\times10^{-6}\times\frac{15}{3}$

$q = 45 \times 10^{-6}$ C

q = 45 μC

3. In LC oscillation resistance is 100 Ω and inductance and capacitance is 1 H and 10 μF. Find the half power of frequency.

(1) 266.2 (2) 366.2 (3) 166.2 (4) 233.2

Ans. **(1)**

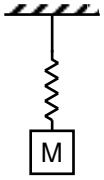
Sol. $f_h = \omega_0 - \frac{R}{2L} = \frac{1}{\sqrt{LC}} - \frac{R}{2L}$

$= \frac{1}{\sqrt{1\times 10\times 10^{-6}}} - \frac{100}{2\times 1}$

$= \frac{1000}{\sqrt{10}} - \frac{100}{2}$

$= 100\left[\sqrt{10} - 0.5\right] = 266.27$

4. Find the maximum tension in the spring if initially spring at its natural length when block is released from rest.



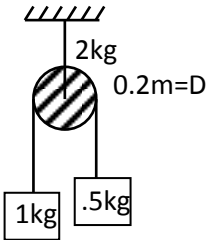
(1) mg (2) mg/2 (3) 3 mg/2 (4) 2 mg

Ans. **(4)**

Sol. $\frac{1}{2}kx^2 = mgx$

$\Rightarrow F_{max} = kx = 2\ mg$

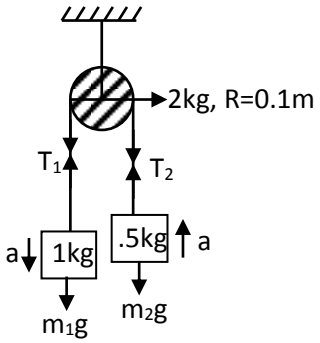
5. For the given figure find the acceleration of 1 kg block if string is massless and mass of pulley is 2 kg and diameter of pulley is 0.2 m :-



(1) 2m/s² (2) 2.5m/s² (3) 0.2m/s² (4) 1m/s²

Ans. **(1)**

Sol.



$m_1g - T_1 = m_1 a$ .....(i)

$T_2 - m_2g = m_2 a$ .....(ii)

$$T_1.R - T_2.R = I\alpha = I\frac{a}{R}$$

$$T_1 - T_2 = \frac{MR^2}{2}.\frac{a}{R^2}$$

$$T_1 - T_2 = .\frac{Ma}{2} \quad \text{.....(iii)}$$

$m_1g - m_2g + T_2 - T_1 = (m_1a + m_2a)$

By adding (i), (ii) and (iii)

$$10 - 5 = \frac{2a}{2} + \frac{a+a}{2}$$

$$5 = \frac{5a}{2} \Rightarrow a = 2m/s^2$$

6. For a refrigerator, heat absorbed from source is 800 J and heat supplied to sink is 500 J then find coefficient of performance is :-

(1) $\frac{5}{8}$ (2) $\frac{8}{5}$ (3) $\frac{5}{3}$ (4) $\frac{3}{5}$

Ans. **(3)**

Sol. Coefficient of performance $= \frac{Q_2}{Q_1 - Q_2} = \frac{500}{800 - 500} = \frac{5}{3}$

7. In a transformer number of turns in primary circuit is 500 and in secondary circuit number of turns is 10 and load resistance is 10 Ω and voltage of secondary coil is 50 V then find the current in primary circuit.

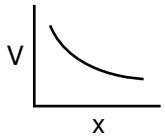
(1) 0.2A (2) 0.3A (3) 0.4A (4) 0.1 A

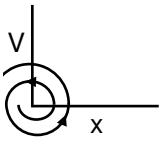
Ans. **(4)**

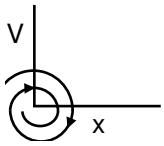
Sol. $i_2 = \frac{V_2}{R_L} = \frac{50}{10} = 5A$

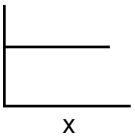
$$\frac{i_1}{i_2} = \frac{N_2}{N_1} \Rightarrow \frac{i_1}{5} = \frac{10}{500} \Rightarrow i_1 = 0.1A$$

8. In damped oscillation graph between velocity and position will be :-

(1) 

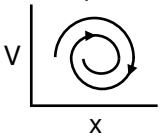
(2) 

(3) 

(4) 

Ans. **(3)**

Sol. In damped oscillation, the amplitude will decrease so the graph of V v/s x will be :-

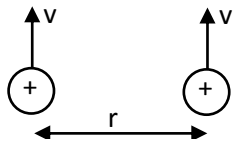


9. If two protons are moving with speed v = 4.5 × 10^5 m/s parallel to each other then find the ratio of electrostatic and magnetic force between them :-

(1) 4.4 × 10^5 (2) 2.2 × 10^5 (3) 3.3 × 10^5 (4) 1.1 × 10^5

Ans. **(1)**

Sol.



$$F_E = \frac{ke^2}{r^2}$$

$$F_M = eVB = e.V.\frac{\mu_0}{4\pi}.\frac{eV}{r^2}$$

$$\frac{F_E}{F_M} = \frac{\frac{ke^2}{r^2}}{\frac{e^2V^2.\mu_0}{4\pi r^2}} = \frac{k.4\pi}{V^2.\mu_0}$$

$$= \frac{9\times10^9\times4\pi}{4.5\times4.5\times10^{10}\times4\pi\times10^{-7}} = \frac{9\times10^6}{4.5\times4.5} = 4.4\times10^5$$

10. Find gravitational field at a distance of 2000 km from centre of earth.
(Given R_{earth} = 6400 km, r = 2000 km, $M_{earth} = 6 \times 10^{24}$ kg) :
(1) 1.53 m/s^2 (2) 7.12 m/s^2 (3) 3.06 m/s^2 (4) 1.8 m/s^2

Ans. **(3)**

Sol. $g' = \frac{GM}{R^3}.r$

$$= \frac{GM}{R^2}.\frac{r}{R} = g.\frac{r}{R}$$

$$= 9.8\times\frac{2000}{6400} = 9.8\times\frac{20}{64} = 3.06 \text{ m/s}^2$$

11. Dimension of capacitance is :
(1) $M^{-1}L^{-2}A^2T^4$ (2) $ML^2A^{-2}T^{-4}$ (3) $MLA^{-1}T^4$ (4) $M^{-1}L^{-1}A^2T^2$

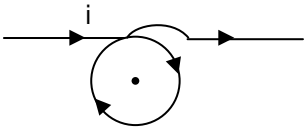
Ans. **(1)**

Sol. $C \neq \frac{\in_0 \in_r A}{d} \Rightarrow \frac{q^2}{2C} = U$

$$\frac{(It)^2}{2C} = U \Rightarrow \frac{[A.T]^2}{M^1L^2T^{-2}} = C$$

$\Rightarrow$ $M^{-1}L^{-2}A^2T^4$

12. In the given figure, find out magnetic field at point B (Given : I = 2.5A, r = 5cm)



(1) $\pi\times\left[1+\frac{1}{\pi}\right]\times10^{-5}T$ (2) $\pi\left[1+\frac{1}{\pi}\right]\times10^{-6}T$

(3) $\pi\left(\frac{\pi+1}{\pi}\right)\times10^{-6}T$ (4) $\left(\frac{\pi+1}{\pi}\right)\times10^{-6}T$

Ans. **(1)**

Sol. $\vec{B}_B = \vec{B}_{wire} + \vec{B}_{Ring}$

$$\vec{B}_{wire} = \frac{\mu_0 i}{4\pi r}(-\hat{k}) + \frac{\mu_0 i}{4\pi r}(-\hat{k}) = \frac{\mu_0 i}{2\pi r}(-\hat{k})$$

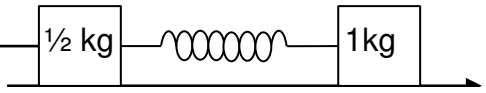
$$\vec{B}_{Ring} = \frac{\mu_0 i}{2r}(-\hat{k})$$

$$\vec{B}_B = \left(\frac{\mu_0 i}{2\pi r} + \frac{\mu_0 i}{2r}\right) - \hat{k}$$

$$B_B = \frac{\mu_0 i}{2r}\left[\frac{1}{\pi} + 1\right] = \frac{4\pi \times 10^{-7} \times 2.5}{2 \times 5 \times 10^{-2}}\left[1 + \frac{1}{\pi}\right]$$

$$= 10\pi \times 10^{-6}\left[1 + \frac{1}{\pi}\right] = \pi \times \left[1 + \frac{1}{\pi}\right] \times 10^{-5} T$$

13. Initially spring is in natural length and both blocks are in rest condition. Then deter mine



maximum extension in spring. K = 20 N/M

(1) $\frac{20}{3}$ cm (2) $\frac{10}{3}$ cm (3) $\frac{40}{3}$ cm (4) $\frac{19}{3}$ cm

Ans. **(1)**

Sol. $a = \frac{F}{m_1 + m_2}$

By work – energy theorem

$$(F - m_1 a)x_1 + (m_2 a)x_2 - \frac{1}{2} k(x_1 + x_2)^2 = 0$$

$$m_2 \times \frac{F}{m_1 + m_2}(x_1 + x_2) = \frac{K}{2}(x_1 + x_2)^2$$

$$(x_1 + x_2) = m_2 \times \frac{F}{m_1 + m_2} \times \frac{2}{k}$$

$$= \frac{1 \times 1}{1.5} \times \frac{2}{20} = \frac{1}{15} m = \frac{100}{15} \text{ cm} = \frac{20}{3} \text{ cm}$$

14. A transformer consists of 500 turn in primary coil and 10 turns in secondary coil with the load of 10Ω. Find out current in the primary coil when the voltage across secondary coil is 50V.

(1) 0.3A (2) 0.1A (3) 0.5A (4) 0.7A

Ans. **(2)**

Sol. $\frac{V_P}{V_S} = \frac{N_P}{N_S} \Rightarrow \frac{V_1}{50} = \frac{500}{10}$

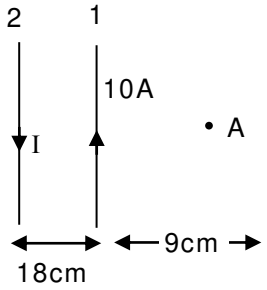
$V_1 = 2500$

$$i_s = \frac{V_s}{R} = \frac{50}{10} = 5A$$

$$\frac{i_P}{i_s} = \frac{V_s}{V_P}$$

$$\frac{i_P}{5} = \frac{50}{2500} \Rightarrow i_P = 0.1A$$

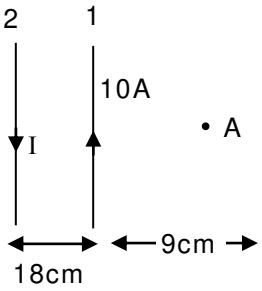
15. In figure two parallel infinitely long current carrying wires are shown. If resultant magnetic field at point A is zero. Then determine current I_1.



(1) 50 A (2) 15 A (3) 30 A (4) 25 A

Ans. **(3)**

Sol.



at A $B_1 + B_2 = 0$

$$\frac{\mu_0 i_1}{2\pi r_1} = \frac{\mu_0 i_2}{2\pi r_2}$$

$$\frac{i_1}{27} = \frac{10}{9}$$

$I = 30A$

16. A carnot engine works between 27ºC and 127ºC. Heat supplied by the source is 500 J. Then heat ejected to the sink is :

(1) 1000 J (2) 667 J (3) 375 J (4) 500 J

Ans. **(3)**

Sol. $\frac{Q_{in}}{Q_{out}} = \frac{T_{in}}{T_{out}}$

$\Rightarrow \quad \frac{500}{Q_{out}} = \frac{400}{300} \quad \Rightarrow \quad Q_{out} = 375$ J

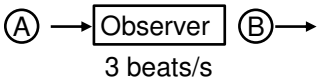
17. Find out work done to expend soup bobble to radius R = 5 cm (surface tension of water = 0.1 N/m)

(1) 2.8×10^{-3} J (2) 6.28×10^{-3} J (3) 3.7×10^{-3} J (4) 5.8×10^{-3} J

Ans. **(2)**

Sol. Work $= 2(4\pi R^2)(T)$

18. Two sources of sound S1 and S2 are moving towards and away from a stationery observer with same speed respectively. Observer detects 3 beats per second. Find speed of sources (approximately).
Given, F1 = F2 = 500 Hz, speed of air = 330 m/s



(1) 1 m/s (2) 2 m/s (3) 3 m/s (4) 4 m/s

Ans. **(1)**

Sol. F = 500 Hz F = 500 Hz

$S_1 \xrightarrow[V]{}$ Observer $S_2 \xrightarrow[V]{}$

Beats = 3 beats/sec

$F1 = \left(\frac{330}{330-V}\right)\times 500$ $F2 = \left(\frac{330}{330+V}\right)\times 500$

Beats = $(F_1 - F_2)$

$3 = \left(\frac{330}{330-V}\right)\times 500 - \left(\frac{330}{330+V}\right)\times 500$

$3 = \frac{500}{330^2 - V^2} \times 2V \times 330$

$V^2 << 330^2$

$3 = \frac{500 \times 330 \times 2V}{330^2}$

$V = \frac{3\times 330}{2\times 500} \quad \Rightarrow \quad V = 0.99$ m/s = approx 1 m/s

19. In hydrogen atom find magnetic field at center in ground. State if Bohr's radius is $r_0 = 5 \times 10^{-11}$ m.

(1) 15.20 T (2) 10.90 T (3) 13.95 T (4) 20.00 T

Ans. **(3)**

Sol. $r = r_o = 5 \times 10^{-11}$ m

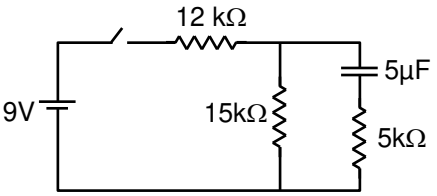
$B = \frac{\mu_o i}{2r} \quad \Rightarrow \quad i = \frac{q}{T} = \frac{qv}{2\pi r}$

$B = \frac{\mu_o}{2r} \times \frac{qv}{2\pi r} \quad \Rightarrow \quad B = \frac{\mu_o ev}{4\pi r^2}$

$= \frac{4\pi\times 10^{-7}\times 1.6\times 10^{-19}\times 2.18\times 10^6}{4\pi\times 25\times 10^{-22}} = \frac{1.6\times 2.18}{25} \times 10^{-7-19+6+22}$

$= 0.1395 \times 100 = 13.95$ T

20.



Find charge on capacitor after 1 sec of opening the switch at t = ∞?

(1) $20e^{-10}$ μC (2) $25e^{-10}$ μC (3) $30e^{-10}$ μC (4) $35e^{-10}$ μC

Ans. **(2)**

Sol. At t = ∞

$i = \frac{9}{27\times 10^3}$

$V_C = i \times 15 \times 10^3$

$q_o = 5 \times 10^{-6} \times \frac{9}{27} \times 15 = 25$ μC

When switch open

$q = q_o e^{-t/RC}$

t = 1 sec

$q = 25 \times e^{-\frac{1}{20\times 10^3\times 5\times 10^{-6}}} = 25 \times e^{-\frac{1000}{100}} = 25e^{-10}$ μC

21. In an isobaric process, the work done by a di-atomic gas is 10J, the heat given to the gas will be:

(1) 35 J (2) 30 J (3) 45 J (4) 60 J

Ans. **(1)**

Sol. For constant pressure process

$$\frac{W}{Q} = \frac{nR\Delta T}{nC_P\Delta T} = \frac{nR\Delta T}{n\left(\frac{f}{2}+1\right)R\Delta T} = \frac{1}{f/2+1}$$

$$\frac{W}{Q} = \frac{1}{\left(\frac{5}{2}+1\right)} = \frac{2}{7} \Rightarrow \quad Q = \frac{7}{2}W = \frac{7}{2} \times 10 = 35 \text{ J}$$

22. A capacitor of capacitance 15nF having dielectric slab of ε_r = 2.5 dielectric strength 30 MV/m and potential difference = 30 volt. Calculate the area of plate

(1) 6.7×10^{-4} m^2 (2) 4.2×10^{-4} m^2 (3) 8.0×10^{-4} m^2 (4) 9.85×10^{-4} m^2

Ans. **(1)**

Sol. $C = \frac{A\varepsilon_o\varepsilon_r}{d}$

$$\Rightarrow \quad 15 \times 10^{-9} = \frac{A \times 8.85 \times 10^{-12} \times 2.5}{d} \quad ...(i)$$

Since, $E = \frac{V}{d}$

$$\Rightarrow \quad 30 \times 10^6 = \frac{30}{d}$$

$d = 10^{-6}$ m

from (i)

$$15 \times 10^{-9} = \frac{A \times 8.85 \times 10^{-12} \times 2.5}{10^{-6}}$$

$$A = \frac{15 \times 10^{-9} \times 10^{-6}}{8.85 \times 10^{-12} \times 2.5}$$

$= 6.7 \times 10^{-4}$ m^2

23. An ideal gas initially at pressure 1 bar is being compressed from 30 m^3 to 10 m^3 volume and its temperature decreases from 320 K to 280 K then find final pressure of gas.

(1) 2.625 bar (2) 3.4 bar (3) 1.325 bar (4) 4.5 bar

Ans. **(1)**

Sol. $P_1 = 1$ bar, $V_1 = 30$ m^3

$V_2 = 10$ m^3

$T_1 = 320$ K, $T_2 = 280$ K

$$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2} \quad \Rightarrow \quad \frac{1 \times 30}{320} = \frac{P_2 \times 10}{280}$$

$P_2 = 2.625$ bar

24. Distance between sun and earth is 2×10^8 km, temperature of sun 6000 K, radius of sun 7×10^5 km, if emmisivity of earth is 0.6, then find out temperature of earth in thermal equilibrium.

(1) 400 K (2) 300 K (3) 500 K (4) 600 K

Ans. **(2)**

Sol. For thermal equilibrium

energy received by earth = Energy emmited by earth

$$\frac{T_s^4.4\pi R_s^2}{4\pi d^2} \times \pi R_e^2 = \sigma.\rho.T_e^4.4\pi R_e^2$$

$$\frac{T_s^4 \times R_s^2}{4 \times d^2 \times e} = T_e^4$$

$$\Rightarrow \frac{(6000)^4 \times (7\times10^8)^2}{4\times(2\times10^{11})^2\times0.6} = T_e^4$$

$$\Rightarrow \frac{36\times36\times7\times7}{4\times4\times0.6}\times10^6 = T_e^4$$

$$\Rightarrow 66.15 \times 108 = T_e^4$$

$$T_e \approx 300 \text{ K}$$

25. Number of visible lines in Balmer series.

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

Ans. **(2)**

Sol. First four lines are only in visible reigon. 5^{th} line goes in u.v. reigon.

26. Ratio of electric and magnetic field due to moving point charge if its speed is 4.5×10^5 m/s.

(1) 2×10^{11} (2) 3×10^{11} (3) 2×10^8 (4) 3×10^{12}

Ans. **(1)**

Sol. $E = \frac{KQ}{r^2}$; $B = \frac{\mu_o}{4\pi}\frac{qV}{r^2}$

$$\frac{E}{B} = \frac{KQ.4\pi}{\mu_o qV} = \frac{1}{4\pi\varepsilon_o}\frac{4\pi}{\mu_o} = \frac{C^2}{V} = \frac{9\times10^{16}}{4.5\times10^5} = 2 \times 10^{11}$$

27. In toroid magnetic field on axis will be radius = 0.5 cm, current = 1.5A, turns = 250, permeability = 700.

(1) 7.5 Tesla (2) 10.5 Tesla (3) 4.5 Tesla (4) 15.5 Tesla

Ans. **(2)**

Sol. $B = \mu_o\mu_r\left[\frac{N}{2\pi r}\right]I$

$$B = 700 \times 4\pi \times 10^{-7}\left[\frac{250\times100}{2\times\pi\times0.5}\right]\times1.5$$

$$= \frac{1400\times10^{-7}\times25\times10^3\times1.5}{0.5}$$

$$= 75 \times 1400 \times 10^{-4} \text{ Tesla}$$

$= 75 \times 14 \times 10^{-2}$ Tesla

$= 1050 \times 10^{-2}$ Tesla

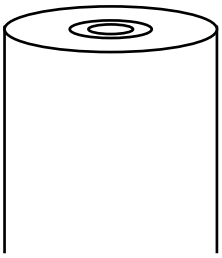
$= 10.5$ Tesla

28. The current density is a solid cylindrical wire of radius R, as a function of radial distance r is given by $J(r) = J_0\left(1-\frac{r}{R}\right)$. The total current in the radial regon r = 0 to $r = \frac{R}{4}$ will be :

(1) $\frac{5J_0\pi R^2}{32}$ (2) $\frac{5J_0\pi R^2}{96}$ (3) $\frac{3J_0\pi R^2}{64}$ (4) $\frac{J_0\pi R^2}{128}$

Ans. (2)

Sol. $di = JdA = J_0\left(1-\frac{r}{R}\right)2\pi rdr \Rightarrow \quad i = \int_{r=0}^{r=\frac{R}{4}} J_0\left(1-\frac{r}{R}\right)2\pi rdr = \frac{J_0 5\pi R^2}{96}$

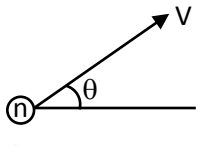


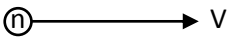
29. In Maxwell's speed distribution curve, for N_2 gas, the average of |relative velocity| between two molecules at 300 k will be :-

(1) 300 m/sec (2) 610 m/sec (3) 920 m/sec (4) zero

Ans. (2)

Sol.





$$|V_{rel}| = \sqrt{V^2+V^2-2(V)(V)\cos\theta} = 2V\left|\sin\frac{\theta}{2}\right|$$

$$\langle V_{rel}\rangle = \frac{\int_0^{\pi} 2V1\left|\sin\frac{\theta}{2}\right|d\theta}{\int_0^{\pi} d\theta} = \frac{4V}{\pi}$$

$$\langle V_{rel}\rangle = \frac{4}{\pi}V_{average} = \frac{4}{\pi}\sqrt{\frac{8RT}{\pi m_0}} = \frac{4}{\pi}\sqrt{\frac{8\times 8.3\times 300}{3.14\times 28\times 10^{-3}}} = 606\,m/sec$$

30. N_2 gas is heated from 300 kg temperature to 600 k through an isobaric process. Then find the change in the entropy of the gas. (n = 1 mole)

(1) 10 J/k (2) 20 J/k (3) 30 J/k (4) 40 J/k

Ans. (2)

Sol. $d\theta = nC_p\, dT$

$$ds = \frac{d\theta}{T} = \frac{nC_P dT}{T}$$

$$\Delta S = nC_p \int_{T_1}^{T_2} \frac{dT}{T} = nC_p \ln\left(\frac{T_2}{T_1}\right)$$

$$\Delta S = 1 \times \frac{7}{2} R \ln\left(\frac{600}{300}\right) = \frac{7}{2} \times 8.3 \times 0.693$$

$$\Delta S \approx 20 J/k$$

31. **Assertion:** In desert area, days get hot fastly and the nights get cold fastly.
Reason: The specific heat capacity for air and land is less than that of water.
(1) If both assertion and reason are true and reason is the correct explanation of assertion.
(2) If both assertion and reason are true but reason is not the correct explanation of assertion.
(3) If assertion is true but reason is false.
(4) If both assertion and reason are false.

Ans. **(1)**

32. **Assertion:** For communication antennae length should be comparable to λ. ($\ell \sim \lambda$)

Reason: It leads to maximum power

(1) If both assertion and reason are true and reason is the correct explanation of assertion.

(2) If both assertion and reason are true but reason is not the correct explanation of assertion.

(3) If assertion is true but reason is false.

(4) If both assertion and reason are false.

Ans. **(3)**

33. **Assertion:** Amplitude modulation shows more interference than frequency modulation with noise.
Reason: Interference is function of amplitude of modulation wave with carrier wave.
(1) If both assertion and reason are true and reason is the correct explanation of assertion.

(2) If both assertion and reason are true but reason is not the correct explanation of assertion.

(3) If assertion is true but reason is false.

(4) If both assertion and reason are false.

Ans. **(2)**

Sol. AM shows more interference with noise
Both assertion & reason are true but reason does not explain assertion.

34. **Assertion:** For an element generally $N \geq Z$ (N = number of neutrons, Z = atomic number)
Reason: Neutrons always experience attractive nuclear force.
(1) If both assertion and reason are true and reason is the correct explanation of assertion.

(2) If both assertion and reason are true but reason is not the correct explanation of assertion.

(3) If assertion is true but reason is false.

(4) If both assertion and reason are false.

Ans. **(2)**

Sol. Both assertion & reason are true but reason does not explain assertion.

35. **Assertion :** Positive feedback is essential for converting a transistor into an oscillator.
Reason : Positive feedback works between cut-off and saturation region.
(1) If both assertion and reason are true and reason is the correct explanation of assertion.
(2) If both assertion and reason are true but reason is not the correct explanation of assertion.
(3) If assertion is true but reason is false.
(4) If both assertion and reason are false.

Ans. **(2)**

36. **Assertion :** Vibrational degree of freedom of a di-atomic gas molecule appears at every high temperature
Reason : Di-atomic gas has two vibrational degree of freedom in one direction.
(1) If both assertion and reason are true and reason is the correct explanation of assertion.
(2) If both assertion and reason are true but reason is not the correct explanation of assertion.
(3) If assertion is true but reason is false.
(4) If both assertion and reason are false.

Ans. **(2)**

37. **Assertion :** NH_3 is liquidities more easily than CO_2.
Reason : Critical temperature of NH_3 is more than CO_2.
(1) If both assertion and reason are true and reason is the correct explanation of assertion.
(2) If both assertion and reason are true but reason is not the correct explanation of assertion.
(3) If assertion is true but reason is false.
(4) If both assertion and reason are false.

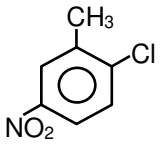
Ans. **(1)**

38. **Assertion :** Even though net external force on a body is zero, momentum need not be conserved.
Reason : The internal interaction between particles of a body cancels out momentum of each other.
(1) If both assertion and reason are true and reason is the correct explanation of assertion.
(2) If both assertion and reason are true but reason is not the correct explanation of assertion.
(3) If assertion is true but reason is false.
(4) If both assertion and reason are false.

Ans. **(4)**

AIIMS-2019 CHEMISTRY (25-05-19) 2ST SHIFT

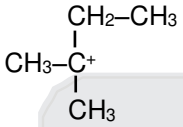
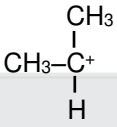
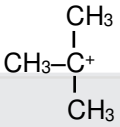
PART - B (CHEMISTRY)

39. IUPAC name of 

(1) 1–Chloro–2–Methyl–4–nitro benzene
(2) 2–Chloro–1–Methyl–5–nitro benzene
(3) 1–Nitro–1–Methyl–4–nitro benzene
(4) 2–Methyl–1–Chloro–4–nitro benzene

Ans. (1)

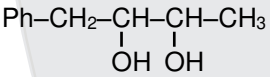
40. Stability order of following carbocation :

(i) 
(ii) 
(iii) 
(iv) $Ph–CH^+–\underline{CH_3}$

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

Ans. (2)

41. $Ph–CH_2–CH=CH–CH_3 \xrightarrow[(ii)\,Alc.KOH]{(i)\,Br_2}$

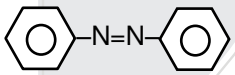
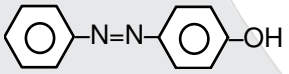
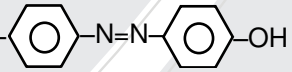
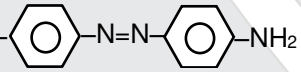
(1) $Ph–CH=CH–CH=CH_2$
(2) 
(3) $Ph–CH_2–C\equiv C–CH_3$
(4) $Ph–C\equiv C–CH_2–CH_3$

Ans. (3)

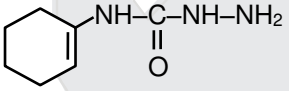
42. **Assertion :** Nylon-6 is condensation polymer
Reason : It is polymer of caprolactum

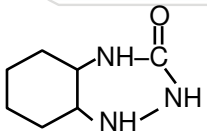
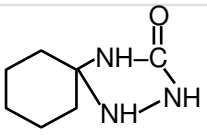
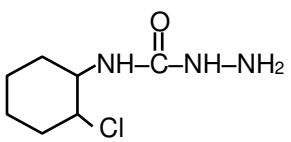
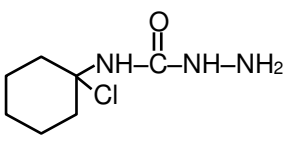
Ans. (1)

43. Phenol + Aniline $\xrightarrow[KOH]{C_6H_5N_2^+Cl^-}$ Major Product : Product will be :

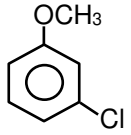
(1) 
(2) 
(3) 
(4) 

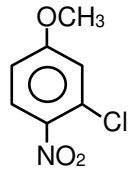
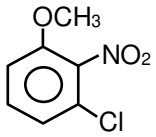
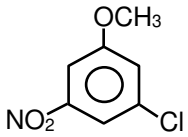
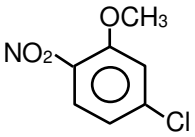
Ans. (2)

44.  $\xrightarrow[(ii)\,\Delta]{(i)\,HCl}$ Major product of following reaction

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

Ans. (2)

45.  $\xrightarrow[H_2SO_4]{HNO_3}$ Major Product, Product will be :.

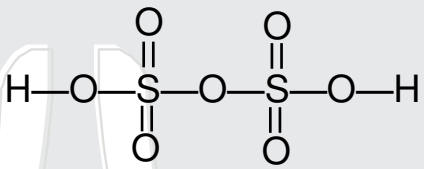
(1)  (2)  (3)  (4) 

Ans. (1)

46. Which of the following statement is correct for oleum ?
(1) It is prepared by adsorption of SO_3 in conc. H_2SO_4
(2) It contains O–O groups
(3) I has six OH groups
(4) None of these

Ans. (1)

Sol. $H_2SO_4(\ell) + SO_3(g) \longrightarrow H_2S_2O_7$ (oleum)

Structure of oleum (pyrosulphuric acid) 

47. How many spectral line of balmer series present in visible region :
(1) 5 (2) 4 (3) 2 (4) 3

Ans. (2)

Sol.

48. For a first order gas phase reaction :

$A_{(g)} \rightarrow 2B_{(g)} + C_{(g)}$

P_0 be initial pressure of A and P_t the total pressure at time 't'. Integrated rate equation is :

(1) $\frac{2.303}{t}\log\left(\frac{P_0}{P_0 - P_t}\right)$ (2) $\frac{2.303}{t}\log\left(\frac{2P_0}{3P_0 - P_t}\right)$

(3) $\frac{2.303}{t}\log\left(\frac{P_0}{2P_0 - P_t}\right)$ (4) $\frac{2.303}{t}\log\left(\frac{2P_0}{2P_0 - P_t}\right)$

Sol. (2)

	$A_{(g)} \longrightarrow$	$2B_{(B)}$	+ $C_{(g)}$
Initial :	P_0	0	0
	P_0–P	2P	P

Total pressure at time (t) = $P_0 - P + 2P + P = P_1$

$\Rightarrow P_t = P_0 + 2P$

$P_t - P_0 = 2P \Rightarrow P = \frac{P_t - P_0}{2}$

$$k = \frac{2.303}{t} \log \left[\frac{P_0}{P_0 - P}\right] = \frac{2.303}{t}\log \left[\frac{P_0}{P_0 - \left(\frac{P_t - P_0}{2}\right)}\right]$$

$$= \frac{2.303}{t} \log \left[\frac{2P_0}{2P_0 - P_t + P_0}\right] = \frac{2.303}{t}\log \left[\frac{2P_0}{3P_0 - P_t}\right]$$

49. **Assertion:** Out of CrO_3 & Al_2O_3, CrO_3 having lower melting point than Al_2O_3.
Reason: Oxidation state of Cr in CrO_3 is high

Ans. (2)

Sol. Both Assertion and reason are correct but reason is not correct explanation of assertion.

50. Out of BeF_2, MgF_2, CaF_2, SrF_2 which has maximum solubility :

(1) BeF_2 (2) MgF_2 (3) CaF_2 (4) SrF_2

Ans. (1)

Sol. Order of solubility $MgF_2 < CaF_2 < SrF_2 < BeF_2$
BeF_2 has highest solubility as Be^{+2} have high hydration energy

51. $[Co(C_2O_4)_3]^{3-}$ is a :

(1) Low spin complex (2) Paramagnetic
(3) High spin (4) sp^3d^2 hybridized

Ans. (1)

sol. Co^{+3} has d^2sp^3 hybridisation so all electron are paired therefore it is Low spin complex and diamagnetic

52. Which of the following has highest ratio of reducting hydrogen / OH :

(1) Orthophosphroric acid (2) Hypophosphorus acid
(3) Phosphorus acid (4) Pyrophosphoric acid

Ans. (2)

Sol. Orthophosphroric acid (H_3PO_4) ratio = $\frac{\text{Reducing Hydrogen}}{\text{OH group}} = \frac{0}{3}$

Hypophosphorus acid (H_3PO_2) ratio = $\frac{\text{Reducing Hydrogen}}{\text{OH group}} = \frac{2}{1}$

Phosphorus acid (H_3PO_3) ratio = $\frac{\text{Reducing Hydrogen}}{\text{OH group}} = \frac{1}{2}$

Pyrophosphoric acid ($H_4P_2O_7$) ratio = $\frac{\text{Reducing Hydrogen}}{\text{OH group}} = \frac{0}{4}$

53. 1 mole of a diatomic is heated through isochoric process from 300 k to 500 K. The entropy is :

(1) 19.14 (2) 38.26 (3) 20.05 (4) 30

Ans. (1)

54. Formula of metal oxide with metal deficiency defect in its crystal is $A_{0.8}O$. The crystal contains A^{2+} and A^{3+} ions. The fraction of metal existing as A^{2+} ions in the crystal is -

(1) 0.96 (2) 0.04 (3) 0.50 (4) 0.31

Ans. (3)

55. Reaction A $\rightleftharpoons$ B + 3C at 25ºC temperature reaction on equilibrium. If equilibrium constant and Gibb's free energy are Y and X respectively. The Gibb's free energy for reaction

$\frac{1}{2}A \rightleftharpoons \frac{1}{2}B + \frac{3}{2}C$ is :

(1) $\sqrt{x}$ (2) x^2 (3) $x^{2/3}$ (4) X/2

Ans. (4)

56. At 527ºC temperature the activation energy is 54.7 KJ/mole. The value of Arrhenius factor is 4×10^{10}. The rate constant will be

(1) 12.28×10^{11} (2) 14.58×10^{13} (3) 12.28×10^{17} (4) 14.58×10^{-13}

Ans. (2)

AIIMS-2019 BIOLOGY (25-05-19) 2nd SHIFT

PART - C (BIOLOGY)

57. Chimeric DNA is

(1) Gene clone
(2) Recombinant-DNA
(3) Transposon
(4) Vector shuttle

Ans (2)

58. Which of the following are homosporous

(1) *Salvinia*, *Equisetum*
(2) *Salvinia*, *Lycopodium*
(3) *Selaginella*, *Salvinia*
(4) *Lycopodium*, *Equisetum*

Ans (4)

59. What is the site of C_3 cycle in C_3 and C_4 plants

(1) In C_3 plant – mesophyll cell and In C_4 plant – Bundle sheath cell
(2) In C_3 plant – Bundle sheath cell and In C_4 plant – mesophyll cell
(3) In C_4 plant – Bundle sheath cell and In C_3 plant – Bundle sheath cell
(4) In C_3 plant – mesophyll cell and In C_4 plant – mesophyll cell

Ans (1)

60. Which of the following set is not natural plant growth regulator

(1) GA_3, IAA, 2IP
(2) IAA, 2IP, Zn
(3) ABA, IBA, GA_3
(4) ABA, GA_3, IAA

Ans (2)

61. Which of the following represent zygomorphic symmetry

(1) Canna, Mustard, Chilly, Datura
(2) Mustard, Canna, Pea, Datura
(3) Pea, Bean, Cassia, Gulmohar
(4) Pea, Bean, Canna, chilly

Ans (3)

62. Match the column I and II

Column I	**Column II**
(i) Chrysophyte	(a) Gonyaulax
(ii) Dinoflagellate	(b) Euglena
(iii) Euglenoids	(c) Diatom
(iv) Slime moulds	(d) Plasmodium

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

Ans (4)

63. Who discovered DNA fingerprinting

(1) Alec Jeffery (2) Jacob Monad

(3) Herbert Boyer (4) Stanley Cohen

Ans (1)

64. Match the column

Column I	**Column II**
(a) Pusa komal	(i) White rust
(b) Himgiri	(ii) Bacterial blight
(c) Brassica	(iii) Yellow mosaic virus
(d) Parbhani kranti	(iv) Leaf and stripe rust

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

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

Ans (1)

65. Match the column I and II

Column I	Column II
(a) Apocarpous	(i) Papaver
(b) Syncarpous	(ii) Michellia
(c) Epiphyllous	(iii) Cashew
(d) Cotyledon	(iv) Aloe

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

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

Ans (2)

66. Match the following

(a) Potato spindle	(i) Virus
(b) Cr-Jacob disease (CJD)	(ii) Viroid
(c) Cholera	(iii) Prion
(d) Leaf rolling and curling	(iv) Bacteria

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

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

Ans (3)

67. Which of the following is correct

(1) Perigynous – plum, peach, rose (2) Epigynous – guava and cucumber

(3) Hypogynous – mustard, rose (4) Both (1) and (2)

Ans (4)

68. If mitochondria is absent in mature RBC what will be the source of energy:

(1) TCA (2) ETS

(3) link reaction (4) Glycolysis

Ans (4)

69. Which group represent micronutrients:

(1) Mn, Zn, Fe, B, Cl, Ni
(2) C, S, O, N, K, Ca
(3) Ca, Mg, K, S, P
(4) C, H, Fe, Mn, Cu, Mo

Ans (1)

70. Which of the following doesn't have any membranous covering:

(1) Mitochondria
(2) Vacuole
(3) Ribosome
(4) Chloroplast

Ans (3)

71. In which of the following phosphorylation in absent:

(1) Glycolysis
(2) kreb cycle
(3) C_4 cycle
(4) ETS

Ans (3)

72. Correct sequence for Alanine code:

(1) GCU, GCC, GCA
(2) GAU, GAC, GAA
(3) AGU, AGC, AGA
(4) GUU, GUC, GUA

Ans (1)

73. In Ti-plasmid, which of the following is removed:

(1) Auxin gene
(2) Virulent gene
(3) Cytokinin gene
(4) Auxin & cytokinin gene

Ans (2)

74. Which mutation causes change in allele:

(1) Chemical
(2) Radiation
(3) Transposons
(4) Spontaneous mutation

Ans (3)

75. Match the column:

Column-I	**Column-II**
(i) Tricoderma	(a) Deuteromycetes
(ii) Yeast	(b) Basidiomycetes
(iii) Bread mould	(c) phycomycetes
(iv) Smut	(d) Ascomycetes

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

Ans (3)

76. Which is not possible by mutation:

(1) Development of new variety (2) Regeneration

(3) Recombination (4) Disease resistant plant

Ans (2)

77. Find incorrect match:

(1) Fleshy leaves – onion (2) Underground stem – Turmeric

(3) Racemose – *Solanum* (4) Phylloclade – *Euphorbia*

Ans (3)

78. Which of the following process is helpful in hybrid seed production:

(1) Embryo rescue (2) Apomixis

(3) Polyembryony (4) Somatic hybridisation

Ans (2)

79. Non-viable seeds are produced by

(1) Somatic embryogenesis (2) Apomixis

(3) Hybridisation (4) Parthenocarpy

Ans (1)

80. Match the correct column

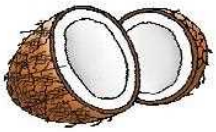
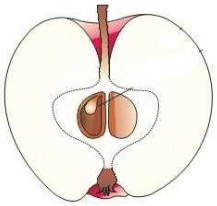
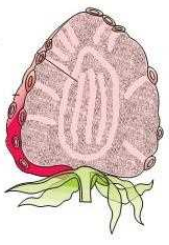
(I)	**(II)**	**(III)**
(a) Parasitism	(i) –, 0	(A) Both get benefitted
(b) Amensalism	(ii) –, –	One get harmed other has no effect
(c) Competition	(iii) +, –	(C) Both get harmed
(d) Mutualism	(iv) +, +	(D) One is harmed and second is benefited

(1) a - iii – D, b - i – B, c - ii – C, d - iv - A (2) a - ii – C, b - i – B, c - iii – D, d - iv - A

(3) a - iii – D, b - i – A, c - ii – C, d - iv – B (4) a - iii – A, b - i – B, c - ii – D, d - iv - A

Ans (1)

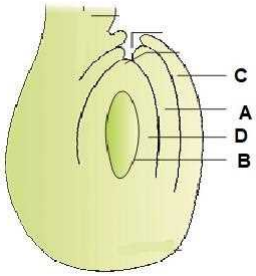
81. Identify which of the following fruits are false fruit?

			
(a)	**(b)**	**(c)**	**(d)**

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

Ans (4)

82. Which of the following is wrong about labelling?



(1) D - Inner integument
(2) B - Embryo sac
(3) C - Outer integument
(4) A - Inner integument

Ans (1)

83. Which statement is correct for apomixis:

(1) Without fertilisation diploid embryo forms
(2) With fertilisation diploid embryo forms
(3) Without fertilisation haploid embryo cell form embryo
(4) With fertilisation haploid embryo cell form embryo

Ans (1)

84. **Assertion :** 2.5 μm or less than 2.5 μm size of SPM is harmful for health.
Reason : Large particles are filtered by nasal cavity & throat

(1) If both assertion and reason are true and reason is the correct explanation of assertion.
(2) If both assertion and reason are true but reason is not the correct explanation of assertion.
(3) If assertion is true but reason is false.
(4) If both assertion and reason are false.

Ans (2)

85. **Assertion :** Baculovirus are biocontrol agents of genus nucleopolyhedrovirus.
Reason : They are effective against plant pathogens

(1) If both assertion and reason are true and reason is the correct explanation of assertion.
(2) If both assertion and reason are true but reason is not the correct explanation of assertion.
(3) If assertion is true but reason is false.
(4) If both assertion and reason are false.

Ans (2)

86. **Assertion :** *Selaginella* & *Salvinia* are homosporous.
Reason : In pteridophyte, *Lycopodium* is precursor of seed habit

(1) If both assertion and reason are true and reason is the correct explanation of assertion.
(2) If both assertion and reason are true but reason is not the correct explanation of assertion.
(3) If assertion is true but reason is false.
(4) If both assertion and reason are false.

Ans (4)

87. **Assertion :** Mitochondria & Chloroplast are connected with similar RNA sequence
Reason : They show prokaryotic organisation
(1) If both assertion and reason are true and reason is the correct explanation of assertion.
(2) If both assertion and reason are true but reason is not the correct explanation of assertion.
(3) If assertion is true but reason is false.
(4) If both assertion and reason are false.
Ans (1)

88. **Assertion :** Parbhani kranti is transgenic variety of *Abelmoschus esculentus*
Reason : Mutation breeding is useful for improving new varieties
(1) If both assertion and reason are true and reason is the correct explanation of assertion.
(2) If both assertion and reason are true but reason is not the correct explanation of assertion.
(3) If assertion is true but reason is false.
(4) If both assertion and reason are false.
Ans (2)

89. **Assertion :** Phenylketonuria, Haemophilia and sickle cell anemia are genetic disorders.
Reason : In phenylketonuria the person has a non-functional enzyme for the conversion of phenylalanine to tyrosine.
(1) If both assertion and reason are true and reason is the correct explanation of assertion.
(2) If both assertion and reason are true but reason is not the correct explanation of assertion.
(3) If assertion is true but reason is false.
(4) If both assertion and reason are false.
Ans (2)

90. Mark the correct one regarding typhlosole
(1) Internal median fold of ventral intestinal wall
(2) Extends from 20^{th} - 35^{th} segments
(3) Increases the surface area for absorption
(4) Decreases the surface area for absorption
Ans (3)

91. Free swimming, radially symmetrical animals with cnidocytes belong to
(1) Coelenterata (2) Platyhelminthes
(3) Ctenophora (4) Echinodermata
Ans (1)

92. Which is not true for cockroach?
(1) 1 pair of compound eyes
(2) Forewings called tegmina used for flight are attached to 1^{st} thoracic segment
(3) 1 pair of maxilla and mandible
(4) Has 10 abdominal segments
Ans (2)

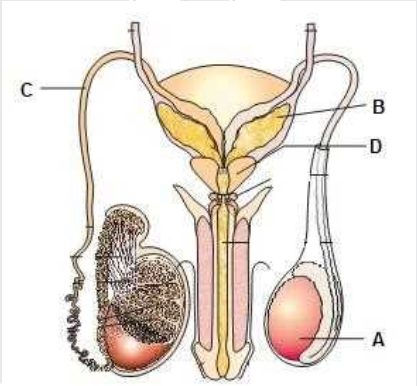
93. Match the following and choose the correct option

(a)		(i)	Cannabis
(b)		(ii)	Diacetyl morphine
(c)		(iii)	Hallucination

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

Ans (2)

94. Choose the correct option



(1)	A. Testis	-	possess 3-4 testicular lobule
(2)	B. Seminal vesicle	-	storage of sperm
(3)	C. Vas deferens	-	help in sperm transfer
(4)	D. Prostate gland	-	secretes seminal fluid

Ans (3)

95. Choose the correct difference from the following

	Pristis		Catla
(1)	3-chambered heart	-	2- chambered heart
(2)	Small placoid scales	-	Large placoid scales
(3)	Ventral mouth	-	Terminal mouth
(4)	Swim bladder present	-	Swim bladder absent

Ans (3)

96. Identify the following diagram

(1) Glandular epithelium
(2) Ciliated epithelium
(3) Squamous epithelium
(4) Areolar connective tissue

Ans (1)

97. The vitamins required to maintain bone density

(1) Vitamin A and C
(2) Vitamin C and D
(3) Vitamin B and C
(4) Vitamin A and E

Ans (2)

98. Oxytocin and ADH are produced by hypothalamus and released from

(1) Anterior pituitary
(2) Posterior pituitary
(3) Pineal gland
(4) Thymus

Ans (2)

99. Match the column

Substrate	**Enzyme**
(A) Ribonucleotide	(i) Chitinase
(B) Chitin	(ii) Cellulase
(C) Cellulose	(iii) Ribonuclease

(1) A – i, B – ii, C – iii
(2) A – iii, B – i, C – ii
(3) A – iii, B – ii, C – i
(4) A – ii, B –i, C – iii

Ans (2)

100. Choose the correct statement

(1) Filariasis occurs by Trichoderma
(2) Housefly is the vector of amoebiasis
(3) Culex acts as vector for malaria
(4) Ascariasis occurs by droplet infection

Ans (2)

101. What is the function of Bowman's capsule and Glomerulus

(1) Filteration of blood
(2) Reabsorption of ions from blood
(3) Reabsorption of hormones from blood
(4) Reabsorption of water from blood

Ans (1)

102. Which of the following is a nucleoside

(1) Adenosine, Adenylic acid, Cytosine (2) Adenosine, Guanosine, Cytidine

(3) Cytidylic acid, adenosine, Adenylic acid (4) Guanylic acid, Cytosine, Adnosine

Ans (2)

103. Choose the incorrect statement for Autonomic nervous system :

(1) Acts on skeletal muscles

(2) Acts on smooth muscles

(3) Consists of ganglia formed by pre and post ganglionic neurons

(4) Consists of sympathetic and parasympathetic nervous system

Ans (1)

104. Which of the following linkage is found in sucrose :

(1) 1–2 glycosidic linkage (2) 1–4 glycosidic linkage

(3) 1–3 glycosidic linkage (4) 1–1 glycosidic linkage

Ans (1)

105. Which of the following were present in prebiotic soup?

(1) Zn, Fe, Al

(2) Proteins, Nucleic acids, Carbohydrates, Lipids

(3) Vitamins

(4) None

Ans (2)

106. **Assertion :** Pneumotaxic centre is situated in Pons

Reason: It can regulate the functioning of rhythm centre

(1) If both assertion and reason are true and reason is the correct explanation of assertion.

(2) If both assertion and reason are true but reason is not the correct explanation of assertion.

(3) If assertion is true but reason is false.

(4) If both assertion and reason are false.

Ans (2)

107. **Assertion :** Cannabinoids are drugs of abuse.

Reason : They affect cardiovascular system and Central nervous system activity.

(1) If both assertion and reason are true and reason is the correct explanation of assertion.

(2) If both assertion and reason are true but reason is not the correct explanation of assertion.

(3) If assertion is true but reason is false.

(4) If both assertion and reason are false.

Ans (1)

108. **Assertion:** Calcium required for skeletal muscle contraction

Reason: Calcium influx releases acetylcholine at neuromuscular junction.

(1) If both assertion and reason are true and reason is the correct explanation of assertion.

(2) If both assertion and reason are true but reason is not the correct explanation of assertion.

(3) If assertion is true but reason is false.

(4) If both assertion and reason are false.

Ans **(1)**

109. **Assertion:** Iodine deficiency may lead to irregular menstrual cycle

Reason: Estrogen and progesterone level becomes low

(1) If both assertion and reason are true and reason is the correct explanation of assertion.

(2) If both assertion and reason are true but reason is not the correct explanation of assertion.

(3) If assertion is true but reason is false.

(4) If both assertion and reason are false.

Ans **(3)**

110. **Assertion**: Deficiency of an element may lead to scurvy.

Reason: Daily requirement of ascorbic acid is 5 mg/day

(1) If both assertion and reason are true and reason is the correct explanation of assertion.

(2) If both assertion and reason are true but reason is not the correct explanation of assertion.

(3) If assertion is true but reason is false.

(4) If both assertion and reason are false.

Ans **(4)**

PART - D (GENERAL KNOWLEDGE) & (APTITUDE & LOGICAL THINKING)

111. How many Candidates can the president of India appoint in Loksabha?

Ans. **02**

112. Which aircraft were used in Air strike in Balakot ?

Ans. **Mirage 2000**

113.  **: : KOLKATA :**  **: ?**

Ans. **Hyderabad**

114. Bladimir Putin : Russia : ? : Syria

Ans. **Basher-Al-Asad**

115. Please arrange the following rivers in order of their length.
Narmada, Ganga, Godavari, Kaveri

Ans. Ganga > Godavari > Narmada > Kaveri

116. Edward snowden is data hacker of USA and he have been granted the right of asylum by which country?

Ans. Russia