प्रा. मोटेगावकर सरांचे

RCC

NEET : 2022 | **PCB Test : 4** | **Time : 03 Hours**

Question Booklet Version	Roll Number	Question Booklet Sr. No.
11 (Write this number on your Answer Sheet)	0	

This is to certify that, the entries of RCC-2022 Roll No. and Answer Sheet No. have been correctly written and verified.

Candidate's Signature

Invigilator's Signature

NTA UPDATED QUESTION PAPER PATTERN

Sr. No.	Subject(s)	Section(s)	No. Of Question(s)	Mark(s)* *(Each Question Carries 04 (Four Marks))	Type Of Question(s)
1.	PHYSICS	SECTION A	35	140	MCQ (Multiple Choice Questions)
		SECTION B	15	40	
2.	CHEMISTRY	SECTION A	35	140	
		SECTION B	15	40	
3.	BOTONY	SECTION A	35	140	
		SECTION B	15	40	
4.	ZOOLOGY	SECTION A	35	140	
		SECTION B	15	40	
		TOTAL MARKS		720	

Note: ■ Correct option marked will be given (4) Marks and incorrect option marked will be minus one (-1) mark. Unattempted/Unonswered Questions will be given no marks.

■ Section B will have 15 questions, out of these 15 Questions, candidates can choose to attempt any10 Questions.

• *Test Syllabus* •

Physics : (11^{th} + 12^{th}) Complete Syllabus

Chemistry : (11^{th} + 12^{th}) Complete Syllabus

Biology : (11^{th} + 12^{th}) Complete Syllabus

Section 'A' : Physics

Section 'A'

1. The density of a cube is measured by measuring its mass and length of its sides. If the maximum error in measurement of mass and length is 4 % and 3 % respectively, the maximum error in the measurement of density would b

1) 9%   2) 13%

3) 12%   4) 7%

Sol. (2)

$$\text{Density }(\rho) = \frac{\text{Mass}}{\text{Volume}} = \frac{M}{L^3}$$

$$\therefore \frac{\Delta\rho}{\rho} = \frac{\Delta M}{M} + 3\frac{\Delta L}{L}$$

[Errors are added]

$$\therefore \frac{\Delta\rho}{\rho} = 4 + 3 \times 3 = \mathbf{13\%}$$

2. If $\vec{A} = \hat{i} + 2\hat{j} - \hat{k}, \vec{B} - \hat{i} + \hat{j} - 2\hat{k}$ What is the angle between $\vec{A}$ and $\vec{B}$

1) π 2) $\frac{\pi}{3}$

3) $\frac{\pi}{2}$ 4) 0

Sol. (2)

$$\vec{A} = \hat{i} + 2\hat{j} - \hat{k},\ \vec{B} = \hat{i} + \hat{j} - 2\hat{k}$$

Angle between $\vec{A}$ and $\vec{B}$ is given by $\cos\theta = \frac{\vec{A} \cdot \vec{B}}{AB}$

$$\text{Thus, } A = |A| = \sqrt{1^2 + 2^2 + 1^2} = \sqrt{6}$$

$$B = |B| = \sqrt{1^2 + 1^2 + 2^2} = \sqrt{6}$$

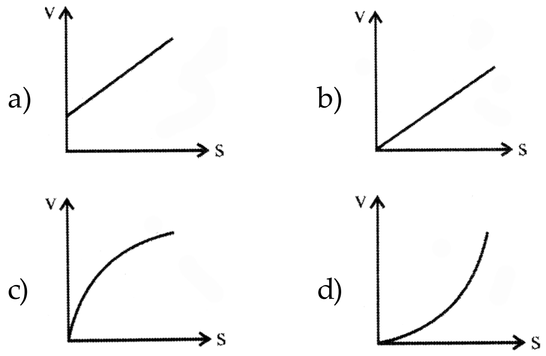
$$\text{and } \vec{A} \cdot \vec{B} = (\hat{i} + 2\hat{j} - \hat{k}) \cdot (-\hat{i} + \hat{j} - 2\hat{k})$$

$$= -1 + 2 + 2 = 3$$

$$\therefore \cos\theta = \frac{3}{\sqrt{6} \times \sqrt{6}} = \frac{3}{6} = \frac{1}{2}$$

$$\therefore \theta = 60° = \frac{\pi}{3}$$

3. A body starting from rest moves along a straight line with a constant accelerration. The variation of speed (v) with distance (s) is given by



1) Figure (4)   2) Figure (1)

3) Figure (3)   4) Figure (2)

Sol. (3)

$\because$ The body starts from rest, $u = 0$

The relation between its speed and the distance travelled is given by $v^2 = 2as$. This is the equation of a parabola similar to $y^2 = 4ax$.

$\therefore$ The graph (fig. 3) represents the variation of speed with distance.

4. For a body projected at angle of 45° to the horizontal, the horizontal range (R) and maximum height (H) are related as

1) R = 16H   2) R = 8H

3) R = 4H   4) R = 2H

Sol. (3) : $H = \frac{v^2\sin^2\theta}{2g} = \frac{v^2}{2g} \times \frac{1}{2} = \frac{v^2}{4g}$

$$\because \sin 45° = \frac{1}{\sqrt{2}}$$

$$R = \frac{v^2\sin 2\theta}{g} = \frac{v^2 \times \sin 90°}{g} = \frac{v^2}{g}$$

$$\therefore \frac{R}{H} = \frac{v^2}{g} \times \frac{4g}{v^2} = 4 \quad \therefore R = 4H$$

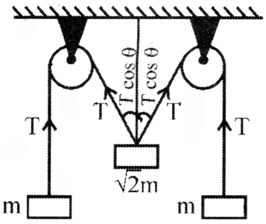
5. The radius of curvature of a metre gauge railway line at a place, where the train is moving with a speed of 10 m/s is 50 m. If there is no side thrust on the rails, than the elevation of the outer rail above the inner rail is

1) 0.1 m   2) 0.2 m

3) 0.3 m   4) 0.4 m

Sol. (2) : $\theta = \tan^{-1}\left(\frac{v^2}{rg}\right)$ and $h = l\sin\theta = 0.2$ m

6. **The pulleys and strings shown in the figure are smooth and of negligible mass. For the system to remain in equilibrium, the angle should be**



1) 60° 2) 45°

3) 30° 4) 0°

Sol. (2)

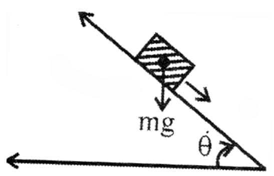
For the equilibrium of masses m and m, the tension $T = mg$ ... (1)

For the equilibrium of mass of $\sqrt{2}$ m, $2T\cos\theta = \sqrt{2}\,mg$ ... (2)

$$\therefore \cos\theta = \frac{\sqrt{2}\,mg}{2T} = \frac{\sqrt{2}\,mg}{2\,mg} = \frac{1}{\sqrt{2}}$$

$\therefore \theta = 45°$

7. **A plank with a box on it at one end is gradually raised about the other end. As the angle of inclination with the horizontal reaches 30°, the box starts to slip and slides 4.0 m down the plank in 4.0 s.**



The coefficients of static and kinetic friction between the box and the plank will be, respectively

1) 0.5 and 0.6

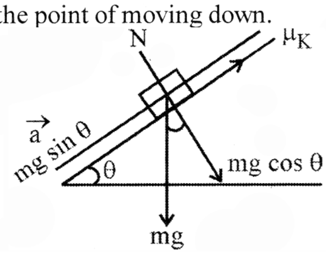
2) 0.4 and 0.3

3) 0.6 and 0.6

4) 0.6 and 0.5

Sol. (4)

In this case, 30° is the angle of repose, because the block is just on the point of moving down.



$$\therefore \mu_s = \tan 30° = \frac{1}{\sqrt{3}} = 0.6$$

where μ_s is the coefficient of static friction.

If θ is slightly more than 30°, the block begins to slide down with an acceleration a, given by

$a = g(\sin\theta - \mu_K\cos\theta)$ ... (1)

where μ_K is the coefficient of kinetic friction.

If the block travels a distance s in time t

then $s = \frac{1}{2}at^2$

$$\therefore a = \frac{2s}{t^2} = \frac{2\times 4}{4^2} = \frac{1}{2}\,m/s^2$$

Using $a = \frac{1}{2}$ in equation (1), we get

$$\frac{1}{2} = 10[\sin 30° - \mu_K\cos 30°] = 10\left[\frac{1}{2} - \mu_K\frac{\sqrt{3}}{2}\right]$$

$$\therefore \frac{1}{10} = [1 - \sqrt{3}\mu_K]$$

$$\therefore \sqrt{3}\mu_K = 1 - \frac{1}{10} = \frac{9}{10} = 0.9$$

$$\therefore \mu_K = \frac{0.9}{\sqrt{3}} = \frac{0.9}{1.732} \doteqdot 0.5$$

8. **A metal ball of mass 2 kg moving with a velocity of 36 km/h has a head on collision with a stationary ball of mass 3 kg. If after the collision, the two balls move together, the loss in kinetic energy due to collision is**

1) 40 J 2) 100 J 3) 60 J 4) 140 J

Sol. (3) : $36\,km/hour = \frac{36000}{3600} = 10\,m/s$

$m_1v_1 + m_2v_2 = (m_1 + m_2)v$

$\therefore 2\times 10 + 0 = (2+3)v$ $\therefore 5v = 20$ $\therefore v = 4\,m/s$

$\therefore$ Loss in Kinetic Energy

$$= \frac{1}{2}m_1v_1^2 + \frac{1}{2}m_2v_2^2 - \frac{1}{2}(m_1 + m_2)v^2$$

$$= \frac{1}{2}\times 2\times(10)^2 + 0 - \frac{1}{2}(2+3)\times 4^2$$

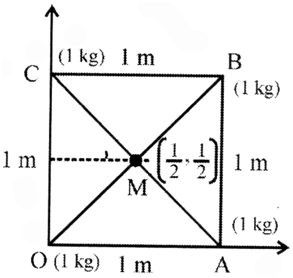
$= 100 - 40 =$ **60 J**

9. Four particles, each of mass 1 kg are placed at the corners of square OABC of side 1 m. O is at the origin of the co-ordinate system. OA and OC are aligned along positive X-axis and positive Y-axis repectively. What is the position vector of their centre of mass ?

1) $\left(\hat{i}-\hat{j}\right)$ 2) $\hat{i}-\hat{j}$

3) $\frac{1}{2}\left(\hat{i}-\hat{j}\right)$ 4) $\frac{1}{2}\left(\hat{i}+\hat{j}\right)$

Sol. (4) :



The positions of the particles are as shown in the figure. Their centre of mass is at M (intersection of diagonals).

The co-ordinates of M are $\left(\frac{1}{2}, \frac{1}{2}\right)$

∴ The position vector of M, is

$$x\hat{i} + y\hat{j} = \frac{1}{2}\hat{i} + \frac{1}{2}\hat{j} = \frac{1}{2}(\hat{i} + \hat{j})$$

10. A molecule consists of two atoms each of mass m and separated by a distance d. If K is the average rotational K.E. of the molecule at a particular temperature, then its angular frequency is

1) $\frac{2}{d}\sqrt{\frac{K}{m}}$ 2) $\frac{d}{2}\sqrt{\frac{K}{m}}$

3) $2d\sqrt{\frac{m}{K}}$ 4) $\frac{d}{4}\sqrt{\frac{m}{K}}$

Sol. (1) : The M.I. of the molecule $= m\left(\frac{d}{2}\right)^2 + m\left(\frac{d}{2}\right)^2$

$$\therefore I = 2m\left(\frac{d^2}{4}\right) = \frac{md^2}{2}$$

The Rotational K.E. of the molecule (K) $= \frac{1}{2}I\omega^2$

$$\therefore \omega = \sqrt{\frac{2K}{I}} = \sqrt{\frac{2K}{md^2} \times 2}$$

$$\therefore \omega = \sqrt{\frac{4K}{md^2}} = \frac{2}{d}\sqrt{\frac{K}{m}}$$

11. A Uniform metre scale of mass 0.2 kg is rotated about an axis passing through its one end and perpendicular to its length at the rate of 60 revolutions/minute. What is its angular momentum?

1) $\frac{2\pi}{15} kg\, m^2/s$ 2) $\frac{4\pi}{15} kg\, m^2/s$

3) $\frac{\pi}{15} kg\, m^2/s$ 4) 1 kg m2/s

Sol. (1) : For the metre scale,

$$I = \frac{mL^2}{3} = \frac{0.2 \times 1^2}{3} = \frac{1}{15}\, kgm^2$$

and $\omega = 2\pi n = 2\pi \times 1 = 2\pi$ rad/s

∴ Angular momentum

$$= I\omega = \frac{1}{15} \times 2\pi = \frac{2\pi}{15}\, kg\, m^2/s$$

12. Acceleration due to gravity is 'g' on the surface of the earth. The value of acceleration due to gravity at a height of 32 km above the earth's surface is

1) 0.9 g 2) 0.99 g

3) 1.01 g 4) 0.8 g

Sol. (2) : $\frac{g_h}{g} = \left(\frac{R}{R+h}\right)^2 = \left(\frac{1}{1+\frac{h}{R}}\right)^2 = \left(1+\frac{h}{R}\right)^{-2}$

if $h << R$, then $\frac{g_h}{g} = 1 - \frac{2h}{R}$

$$\therefore g_h = g\left(1 - \frac{2 \times 32}{6400}\right) = g\left(1 - \frac{1}{100}\right)$$

$$\therefore g_h = \frac{99}{100}g = 0.99\, g$$

13. A wire suspended vertically from one of its ends is stretched by attaching a weight of 20 N to its lower end. If its length changes by 1% and if the Young;s modulus of the material of the wire is 2×10^{11} N/m^2, then the area of cross section of the wire is

1) 1 mm^2 2) 10^{-1} mm^2

3) 10^{-2} mm^2 4) 10^{-3} mm^2

$$Y = \frac{FL}{Al}$$

Sol. (3) : $\therefore A = \frac{FL}{lY} = \frac{20 \times 100}{2 \times 10^{11}} = 10^{-8} m^2 = 10^{-2} mm^2$

14. Molecules on the surface of a liquid in equilibrium possess

1) Minimum K.E 2) Maximum P.E.
3) Minimum P.E 4) Maximum K.E

Sol. (2)

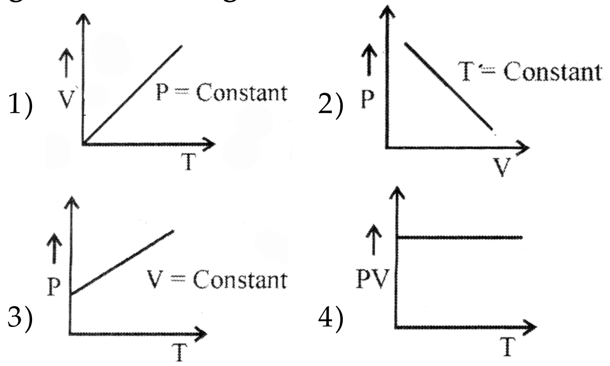
Molecules on the surface of a liquid in equilibrium possess **maximum P.E.**

15. If the temperature of a black body is increased from 27°C to 327°, then the wavelength at which the intensity of spectral radiation has its maximum is

1) Doubled 2) Unchanged
3) Halved 4) Tripled

Sol. (3)

16. Which one of the following graphs correctly gives the ideal gas behaviour ?



Sol. (1)

For an ideal gas, PV = nRT. ... (1)

(a) When P is kept constant, $V \propto T$.

∴ The (V, T) graph is a straight line passing through the origin. (a) is correct.

(b) When T is kept constant, PV = constant ... from (1)

∴ The P - V graph is a rectangular hyperbola. (b) is wrong.

(c) When V is constant, $P \propto T$. The (P – T) graph is a straight line passing through the origin. (c) is wrong.

(d) From (1), $PV \propto T$.

∴ The graph of PV against T is a straight line passing through O. (d) is wrong.

Thus, only (a) is correct.

17. An ideal refrigerator has a freezer at a temperature of –13°C. The coefficient of performance of the refrigerator is 5. What is the temperature of the air, to which heeat is rejected ?

1) 320K 2) 38°C
3) 39K 4) 325°C

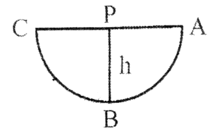
Sol. (2) : For the refrigerator, $K = \frac{T_2}{T_1 - T_2}$

$$\therefore 5 = \frac{(273 - 13)}{T_1 - (273 - 13)} = \frac{260}{T_1 - 260}$$

$\therefore 5T_1 - 1300 = 260$

$\therefore 5T_1 = 1560 \quad \therefore T_1 = 312\text{ K} = 39°C$

18. A simple pendulum with a bob of mass m oscillates from A to C and back A, such that PB = h.



If the acceleration due to gravity is 'g', then the velocity of the bob as it passees through B is

1) Zero 2) 2gh
3) $\sqrt{2gh}$ 4) mgh

Sol. (3)

P.E at A = K.E. at B

$$\therefore Mgh = \frac{1}{2}mv_B^2 \quad \therefore v_B = \sqrt{2gh}$$

19. A transverse disturbance is sent along a sonometer wire of length 1m, and linear density of 0.25 gram/metre, stretched with a tension of 10 N. What is the time taken by the transverse distrurbance to travel along the wire ?

1) $\frac{1}{200}s$ 2) $\frac{1}{100}s$
3) $\frac{1}{300}s$ 4) $\frac{1}{100}s$

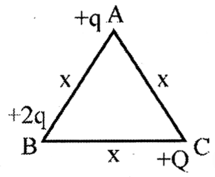
Sol. (1) : $V = \sqrt{\frac{T}{m}} = \sqrt{\frac{10}{25 \times 10^{-5}}} = 200\text{ m/s}$

$$\therefore \text{time} = \frac{\text{distance}}{\text{velocity}} = \frac{1}{200}\text{ s}$$

20. Three point charges q, 2q and Q are kept at the vertices of an equilateral tringle of side x. If the net electrostatic energy of the system is zero, then the ratio $\frac{Q}{q}$ is

1) $-\frac{1}{2}$ 2) $-\frac{1}{3}$ 3) $-\frac{2}{3}$ 4) $-\frac{3}{4}$

Sol. (3)



q, 2q and +Q are kept at the vertices A, B, C of an equilateral ΔABC, having each side = x.

It is given that the net electrostatic energy of the system is zero.

$$\therefore U = \frac{1}{4\pi\varepsilon_0}\left[\frac{q \times 2q}{x} + \frac{2q \times Q}{x} + \frac{Q \times q}{x}\right] = 0$$

$$\therefore \frac{q}{4\pi\varepsilon_0 x}[2q + 2Q + Q] = 0$$

$$\therefore 2q + 3Q = 0 \quad \therefore 3Q = -2q \quad \text{or} \quad \frac{Q}{q} = -\frac{2}{3}$$

21. A capacitor is charged through a P.D. of 100 volts and acquires a charge of 0.1 C. When discharged, it would release an energy

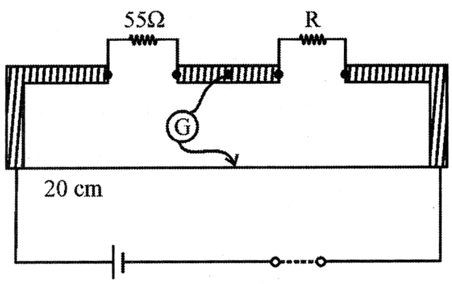
1) 1 J
2) 2 J
3) 5 J
4) 10 J

Sol. (3)

Energy discharged = Energy stored

$$= \frac{1}{2} QV = \frac{1}{2} \times 0.1 \times 100 = 5 \text{ J}$$

22. The following figure shows a metre bridge set up with null deflection in the galvanometer



What is the value of the unknown resistance?

1) 55 Ω
2) 110 Ω
3) 220 Ω
4) 13.75 Ω

Sol. (3) : For a Wheatstone's bridge

$$\frac{55}{R} = \frac{20}{80} \qquad \therefore R = \frac{55 \times 80}{20} = 220\ \Omega$$

23. What is the order of colours of the bands for the carbon resistance of ($1K\Omega \pm 50\Omega$)?

1) Brown, Red, Black, Gold
2) Red, Brown, Black, Silver
3) Brown, Black, Red, Gold
4) Black, Brown, Red, Silver

Sol. (3)

B	B	R	O	Y	G	B	V	G	W
0	1	2	3	4	5	6	7	8	9

The resistance is $1000 \pm 5\%\ \Omega$

The first digit is 1 $\therefore$ The colour is Brown.

The second digit is 0 $\therefore$ The colour is Black.

The third and fourth digits are 00,

$\therefore$ The multiplier is 10^2 $\therefore$ The colour is Red

The tolerance is 5% Hence the colour is Gold

$\therefore$ The colours in order are Brown, Black, Red, Gold

24. When a charged particle moving with velocity $\vec{v}$ is subjected to a magnetic field of induction $\vec{B}$, the force on it is non-zero. This implies that

1) angle between $\vec{v}$ and $\vec{B}$ is necessarily 90°
2) angle between $\vec{v}$ and $\vec{B}$ can have any value other than 90°
3) angle between $\vec{v}$ and $\vec{B}$ can have any value other than zero and 180°
4) angle between $\vec{v}$ and $\vec{B}$ is either zero or 180°

The magnitude of force acting on a charged particle moving with a velocity $\vec{v}$ in a magnetic field $\vec{B}$, is given by

$F = qvB \sin\theta$ where θ is the angle between $\vec{v}$ and $\vec{B}$

If $\theta = 0°$ or $180°$, $F = 0$

Sol. (3) : But it is given that F is not zero.

This implies that angle θ between $\vec{v}$ and $\vec{B}$ can have any value other than 0° and 180°.

25. The magnitudes of the magnetic fields at a distance d from the centre of a short magnet, in transverse and longitudinal positions are in the ratio of

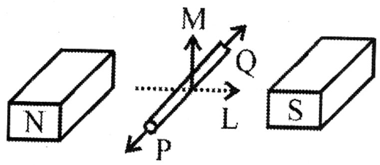
1) 1 : 1
2) 2 : 1
3) 1 : 3
4) 1 : 2

Sol. (4) : Transverse position - Equatorial position

Longitudinal position - Axial position

$$\frac{B_T}{B_L} = \frac{M}{d^3} \times \frac{d^3}{2M} = \frac{1}{2}$$

26. **Maximum potential difference will be induced between the ends of the conductor PQ when the conductor moves in the direction**



1) Q 2) M
3) P 4) L

Sol. (2)

Maximum e.m.f. is induced when the conductor moves perpendicular to the field and cuts the flux i.e. when it moves in the direction of M.

27. **A square of side L metre lies in the xy-plane in a region, where the magnetic field is given by**

$$\vec{B} = B_0\left(2\hat{i} + 3\hat{j} + 4\hat{k}\right)T,$$

where B_0 is a constant. The magnitude of the flux passing through the square is

1) $2B_0L^2$ Wb 2) $3B_0L^2$ Wb
3) $4B_0L^2$ Wb 4) $\sqrt{29}\,B_0L^2$ Wb

Sol. (3)

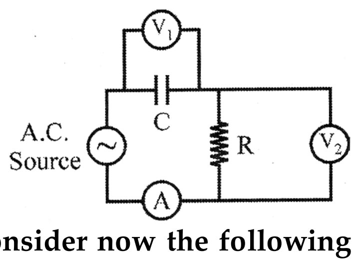
The area of the coil is given by $\vec{A} = L^2\hat{k}$ as the square lies in the xy plane, area vector is directed along the Z-axis.

Flux $\phi = \vec{B}\cdot\vec{A} = B_0(2\hat{i} + 3\hat{j} + 4\hat{k})\cdot L^2\hat{k}$

$(\because k\cdot k = 1 \text{ and } \hat{i}\cdot\hat{k} = \hat{j}\cdot\hat{k} = 0)$

$\therefore \phi = B_0L^2 \cdot 4 = 4B_0L^2$ Wb

28. **The diagram shows a capacitor C and a resistor R connected in series to an a.c. source. V_1 and V_2 are the voltmeters and A is an ammeter.**



Consider now the following statements.
I) Readings in A and V_2 are always in phase
II) Reading in V_1 is ahead in phase with reading in V_2
III) Readings in A and V_1 are always in phase
Which is the correct option from the following?

1) II and III only 2) I only
3) II only 4) I and II only

Sol. (2)

In RC circuit
I and V_2 are in phase
V_2 is ahead of V_1 by phase difference of $\pi/2$

29. **If the P.D. across the inductor (3 mH) is the same as that across the capacitor (30μF) in a series R-L-C circuit, then the frequency of the applied e.m.f. is**

1) 180 Hz 2) 530Hz
3) 890 Hz 4) 5 KHz

Sol. (2)

When the P.D. across L = P.D. across C in a series L, C, R circuit, we get resonance. At resonance, $X_L = X_C$.

$$\therefore \omega L = \frac{1}{\omega C}$$

and the resonant frequency

$$f = \frac{1}{2\pi\sqrt{LC}}$$

$$= \frac{1}{2 \times 3.14} \times \frac{1}{\sqrt{3 \times 10^{-3} \times 30 \times 10^{-6}}} = 530\text{ Hz}$$

30. **The voltage between the plates of a parallel plate capacitor of capacitance 2 μF is changing at the rate of 4V/s. What is the displacement current in the capacitor?**

1) 5 μA 2) 6 μA
3) 7 μA 4) 8 μA

Sol. (4) : $C = 2\mu F = 2 \times 10^{-6}$ F and $\frac{dV}{dt} = 4$ V/s

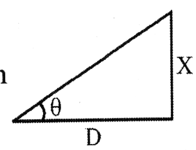
$$I_D = C\frac{dV}{dt} = 2 \times 10^{-6} \times 4 = 8 \times 10^{-6} = 8\ \mu A$$

31. **In Young's double slit experiment, the angular width of a fringe formed on a distant screen is 1°. What is the distance between the two slits, if monochromatic light of wavelength 6000 Å is used?**

1) 0.02 mm 2) 0.05 mm
3) 0.0344 mm 4) 0.012 mm

Sol. (3) : $1° = \frac{\pi}{180}$ radian

Angular width (θ) in radian



$$= \frac{X}{D} = \frac{\lambda D}{d \times D} = \frac{\lambda}{d}$$

$$\therefore d = \frac{\lambda}{\theta} = \frac{\lambda}{\pi/180} = \frac{180 \times 6 \times 10^{-7}}{3.14}$$

$= 0.0344$ mm

32. If light of wavelength 6200$\overset{o}{A}$ falls on a photosensitive surface of work function 2 eV, the kinetic energy of the most energetic photoelectron will be

1) 0.5 eV 2) 1 eV
3) zero 4) 0.75 eV

Sol. (3) : $\frac{1}{2}mv_{max}^2 = h\nu - W_0$

but $h\nu = \frac{hc}{\lambda} = 2$ eV and $W_0 = 2$ eV

$\therefore$ K.E. = 0

33. A 5 MeV a particle is approaching a gold nucleus. What is its impact parameter if it is scattered through 180° ? [For gold Z = 79)

1) 1.5×10^{-14} m 2) 0 m
3) 3×10^{-14} m 4) 3.37×10^{-14} m

Sol. (2)

Impact parameter $b = \frac{1}{4\pi\varepsilon_0}\frac{Ze^2\cot\left(\frac{\theta}{2}\right)}{K}$

where K is the K.E. of the approaching particle.

In this case $\frac{1}{4\pi\varepsilon_0} = 9 \times 10^9$, Z = 79, $e = 1.6 \times 10^{-19}$

$K = 5\text{ MeV} = 5 \times 10^6 \times 1.6 \times 10^{-19}$

$$\therefore b = \frac{9 \times 10^9 \times 79 \times (1.6 \times 10^{-19})^2 \times \cot\left(\frac{180}{2}\right)}{5 \times 10^6 \times 1.6 \times 10^{-19}}$$

Impact parametre b = 0

34. What is the approximate ratio of the nuclear radii of the gold isotope $^{197}_{79}$Au and silver isotope $^{107}_{47}$Au? What is the approximate ratio of their nuclear mass desities?

1) 1.1 2) 1.5
3) 1.25 4) 1.4

Sol. (3) Nuclear radius $R = R_0A^{1/3}$ where $R_0 = 1.1 \times 10^{-15}$ m and A = mass number of the nucleus

$$\therefore \frac{R(^{179}_{79}Au)}{R(^{107}_{47}Ag)} = \left(\frac{197}{107}\right)^{1/3} = 1.25$$

35. What happens to the depletion region of a p-n junction?

1) Decreases if reverse biased
2) Increases if reverse biased
3) Increases if forward biased
4) Remains the same in reverse and forward biasing

Sol. (2) : If a p-n junction is reverse biased, the depletion region increases.

Section 'B'

36. A motor is used to deliver water at a certain rate through a given horizontal pipe. To deliver n-times the water through the same pipe in the same time the power of the motor must be increased as follows.

1) n^2 times 2) n^3 times
3) n^4 times 4) n times

Sol. (2)

37. When a mass of 5 kg is suspended from a spring of negligible mass and spring constant K, it oscillates with a periodic time 2π. If the mass is removed, the length of the spring will decrease by

1) $\frac{g}{k}$ metre 2) g metre
3) 2π metre 4) $\frac{m}{K}$ metre

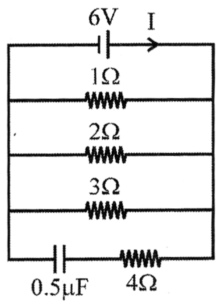
Sol. (2)

38. The pitch of the whistle of an engine appears to drop to $\left(\frac{5}{6}\right)^{th}$ of its original value when it passes a stationary observer. If the speed of sound in air is 350 m/s then the speed of the engine is

1) 35 m/s 2) 70 m/s.
3) 105 m/s 4) 140 m/s

Sol. (2)

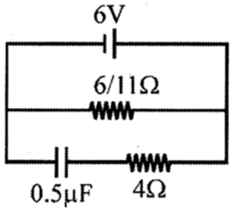
39. In the given circuit diagram, in the steady state the current through the battery and the charge on the capacitor respectively are



1) 2A and 3 μC
2) 11 A and 3 μC
3) $\frac{6}{11}$ A and $\frac{12}{7}$ μC
4) zero ampere and 3 μF

Sol. (2) : The resistances 1 Ω, 2 Ω, 3 Ω are in parallel.

$$\therefore \frac{1}{R} = \frac{1}{1} + \frac{1}{2} + \frac{1}{3} = \frac{11}{6} \quad \therefore R = \frac{6}{11}\,\Omega$$



In the steady state, the capacitor is fully charged and no current flows through it.

∴ No current flows through the 4 Ω resistance.

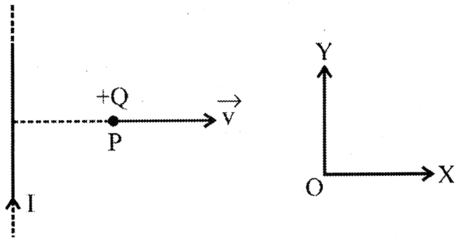
∴ The current through the battery is

$$\therefore I = \frac{E}{R} = \frac{6}{\frac{6}{11}} = 11\text{ A}$$

and the charge on the capacitor is

$Q = CV = 0.5 \times 10^{-6} \times 6 = 3 \times 10^{-6} = \mathbf{3\ \mu C}$

40. A very long straight wire carries a current I. At the instant when a charge + Q at point P has velocity $\vec{v}$ as shown in the figure, the force on the charge is



1) along OY 2) along OX
3) opposite to OY 4) opposite to OX

Sol. (1) : The current carrying wire produces a magnetic field $\vec{B}$. It acts normally into the plane of the paper along the negative Z direction.

Thus $\vec{B}$ is represented as $-B\hat{k}$.

and since the charge in moving along +X-axis, its velocity

$\vec{v} = v\hat{i}$

∴ The force $\vec{F}$ on the charge,

$$\vec{F} = Q(\vec{v} \times \vec{B})$$

$$= Q[(v\hat{i} \times (-B\hat{k})] = QvB(\hat{k} \times i) = qvB\hat{j}$$

Thus the force on Q acts along OY.

41. A solenoid of length 0.4 m and having 500 turns of wire carries a current of 3.0 A. A thin coil having 10 turns of wire and of radius 0.01 m carries a current of 0.4 A. What is the torque required to hold the coil in the middle of the solenoid with its axis perpendicular to the axis of the solenoid (Use π^2= 10)

1) 6×10^{6} N-m 2) 6×10^{-6} N-m
3) 7.5×10^{-6} N-m 4) 4.2×10^{-6} N-m

Sol. (2) : For the solenoid, $B = \mu_0 nI$

$$= 4\pi \times 10^{-7} \times \frac{500}{0.4} \times 3$$

$$= 1.5\pi \times 10^{-3}\text{ T}$$

Dipole moment of the coil (M)

$= NIA = NI\pi R^2 = 10 \times 0.4 \times \pi \times (10^{-2})^2$

$\therefore M = 4\pi \times 10^{-4}\text{ Am}^2$

Torque required = MB sin 90 = MB

$$= 4\pi \times 10^{-4} \times 1.5\pi \times 10^{-3}$$

$$= \mathbf{6 \times 10^{-6}\ N\text{-}m}$$

42. A thin glass prism has a refracting angle of 6°. The angle of incidence is very small. What is the deviation produced by the prism, if the prism is kept in water?
[$_a n_g$ = 1.5, $_a n_w$ =1.33)

1) 0.6° 2) 0.7° 3) 0.75° 4) 0.8°

Sol. (3) : R.I. of glass w.r.t. water,

$$_w n_g = \frac{_a n_g}{_a n_w} = \frac{3/2}{4/3} = \frac{9}{8}$$

and for a small angled prism,

$\delta = A\,(_w n_g - 1)$

$$= 6\left[\frac{9}{8} - 1\right] = 6 \times \frac{1}{8} = \frac{3}{4} = 0.75°$$

43. How far from a convex lens of focal length 20 cm would you place an object to get a real image enlarged three times?

1) 15.6 cm 2) 20.5 cm
3) 26.66 cm 4) 33.85 cm

Sol. (3) : Magnification $= \frac{v}{u} = 3 \quad \therefore v = 3u$

For a real image, $u = -x$, $v = 3x$ and $f = 20$ cm

$$\because \frac{1}{v} - \frac{1}{u} = \frac{1}{f}$$

$$\therefore \frac{1}{3x} - \frac{1}{(-x)} = \frac{1}{20} \quad \therefore \frac{4}{3x} = \frac{1}{20}$$

$$\therefore x = \frac{80}{3} = 26.66\text{ cm}$$

∴ Object distance = 26.66 cm

44. In a biprism experiment, the slit is illuminated with light of wavelength 5000Å. How many fringes will pass a point on the screen, if the path difference is altered by 0.005 cm?

1) 50 2) 100

3) 150 4) 200

Sol. (2)

$$n = \frac{\text{Path difference}}{\lambda} = \frac{0.005 \times 10^{-2}}{5 \times 10^{-7}} = 100$$

45. In a silicon transistor, a change of 7.89 mA in the emitter current, produces a change of 7.8 mA in the collector current, then the base current must change by

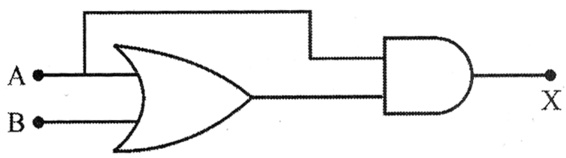
1) 0.9 μA 2) 900 μA

3) 90 μA 4) 9 μA

Sol. (3)

$$\Delta I_b = \Delta I_E - \Delta I_C = (7.89 - 7.8)\ \text{mA} = 0.09\ \text{mA}$$
$$= 9 \times 10^{-2}\ \text{mA} = 9 \times 10^{-2} \times 10^{3}\ \mu\text{A} = 90\ \mu\text{A}$$

46. What is the value of the output X in the following logic gate circut?



1) X = A + B + A 2) X = A . (A + B)

3) X = A + (A . B) 4) X = ABC

Sol. (2)

The output of the OR gate is A + B. For the AND gate, the inputs are A and A + B.

∴ Output $X = A \cdot (A + B)$

47. If the ratio of the amplitudes of two interfering waves is 4 : 3, then the ratio of the maximum and minimum intensities in the interference plattern is

1) 9 : 16 2) 16 : 9

3) 49 : 1 4) 1 : 49

Sol. (3) $\frac{A_1}{A_2} = \frac{4}{3} \quad \therefore A_1 = \frac{4}{3}A_2$

$$\frac{I_{max}}{I_{min}} = \frac{(A_1 + A_2)^2}{(A_1 - A_2)^2} = \frac{49}{1}$$

48. The refracting angle of a prism is A and its refractive index is cot (A/2). What is the minimum deviation produced by the prism?

1) 180° – A 2) 90° – 2A

3) 180° –2A 4) $90° - \frac{3}{2}A$

Sol. (3) $n = \cot\left(\frac{A}{2}\right) = \frac{\cos\left(\frac{A}{2}\right)}{\sin\left(\frac{A}{2}\right)}$ ... (1)

and $n = \frac{\sin\left(\frac{A + \delta_m}{2}\right)}{\sin\left(\frac{A}{2}\right)}$ ... (2)

∴ From (1) and (2),

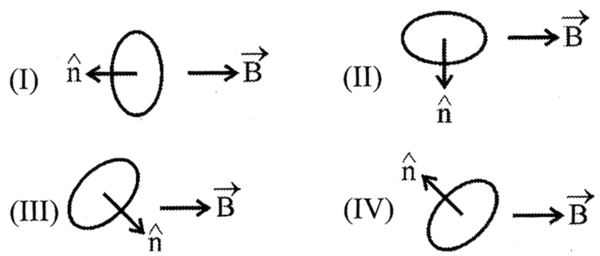
$$\therefore \cos\left(\frac{A}{2}\right) = \sin\left(\frac{A + \delta_m}{2}\right)$$

$$\therefore \sin\left(90° - \frac{A}{2}\right) = \sin\left(\frac{A + \delta_m}{2}\right)$$

$$\therefore \left(90° - \frac{A}{2}\right) = \frac{A}{2} + \frac{\delta_m}{2}$$

$$\therefore \frac{\delta_m}{2} = 90° - A \quad \therefore \delta_m = 180° - 2A$$

49. A current carrying loop is placed in a uniform magnetic field in four different orientations, I, II, III and IV. Arrange them in the decreasing order of potential energy.



1) I > III > II > IV 2) I > II > III > IV

3) I > IV > II > III 4) III > IV > I > II

Sol. (3)

Magnetic potential energy $U = -\vec{M} \cdot \vec{B} = -MB\cos\theta$

Where θ is the angle between $\vec{M}$ and $\vec{B}$

From this we find that U will be maximum when $\theta = 180°$, then $\cos\theta = \cos 180° = -1$ and $U = +MB$

In case (I), $\theta = 180°$, $\therefore U = +MB$ (This is maximum)

In case (II), $\theta = 90°$, $\therefore U = 0$ (This is minimum)

In case (III), θ is acute, $\therefore$ U is –ve

In case (IV), θ is obtuse, $\therefore$ U is +ve

Thus P.E. in the decreasing order is given by

I > IV > II > III.

50. A potentiometer having the potential gradient of 2 mV/cm is used to measure the difference of potential across a resistance of 10 ohm. A length of 50 cm of the potentiometer wire is required to get the null point. What is the current passing through the 10 ohm resistor?

1) 1 mA
2) 2 mA
3) 5 mA
4) 10 mA

Sol. (4)

P.D. across the resistance = IR

P.D. across 50 cm length of the potentiometer wire

$$= 50\text{ cm} \times \frac{2\text{ mV}}{\text{cm}} = 100\text{ mV} = 0.1\text{ V}$$

$$\therefore I = \frac{V}{R} = \frac{0.1}{10} = \frac{1}{100}\text{A} = 10\text{ mA}$$

Section 'B' : Chemistry

Section 'A'

51. The number of atoms present in one mole of an element is equal to Avogadro number. Which of the following element contains the greatest number of atoms ? [XI Part-I N.B. 15]

1) 4g He 2) 46 g Na
3) 0.40 g Ca 4) 12 g He

Sol. (4) $n_{He} = \frac{4}{4} = 1$ $n_{Na} = \frac{46}{23} = 2$

$n_{Ca} = \frac{0.4}{40} = 0.01$ $n_{He} = \frac{12}{4} = 3$

52. The number of radial nodes for 3p orbital is _____ [XI Part-I N.B. 57]

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

Sol. (4) no. of radial nodes = n−l−1

for 3p orbital n = 3, l = 1

= 3−1−1 = 1

53. If travelling at same speeds, which of the following matter waves have the shortest wavelength ? [XI Part-I N.B. 50]

1) Electron 2) Alpha particle (He^{2+})
3) Neutron 4) Proton

Sol. (2) According de broglie's

$\lambda = \frac{h}{mv}$

$\lambda \propto \frac{1}{m}$

m ↑ λ ↓

α- partical mass = 4 amu

54. Which of the following is not an actinoid ? [XI Part-I N.B. 84]

1) Curium (Z = 96)
2) Californium (Z = 98)
3) Uranium (Z = 92)
4) Terbium (Z = 65)

Sol. (4) Terbium (Z = 65) Lanthanoid element

55. Among halogens, the correct order of amount of energy released in electron gain (electron gain enthalpy) is : [XI Part-I N.B. 89]

1) F > Cl > Br > I 2) F < Cl < Br < I
3) F < Cl > Br > I 4) F < Cl < Br < I

Sol. (3) electron gain enthalpy

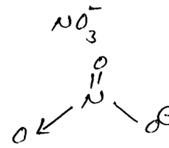
order of halogen grp

F < Cl > Br > I

56. In NO_3^- ion, the number of bond pairs and lone pairs of electrons on nitrogen atom are [XI Part-I N.B. 102]

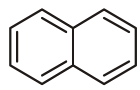
1) 2, 2 2) 3, 1
3) 1, 3 4) 4, 0

Sol. (4)



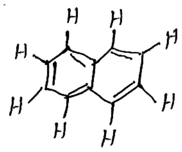
4-bond pair
0- lone pair
of 'N' atom

57. Number of π bonds and σ bonds in the following structure is [XI Part-I N.B. 107]



1) 6, 19 2) 4, 20
3) 5, 19 4) 5, 20

Sol. (3)



π-bonds = 5
σ-bonds = 19

58. As the temperature increases, average kinetic energy of molecules increases. What would be the effect of increase of temperature on pressure provided the volume is constant ? [XI Part-I N.B. 147]

1) increases 2) decreases
3) remains same 4) becomes half

Sol. (1) Average kinetic energy

$KE = \frac{3}{2} nRT$

$KE \propto T$

KE increases ; T increases

59. **The entropy change can be calculated by using the expression $\Delta S = \frac{q_{rev}}{T}$. When water freezes in a glass beaker, choose the correct statement amongst the following.** **[XI Part-I N.B. 185]**

1) ΔS(system) decreases but ΔS(surroundings) remains the same
2) ΔS(system) increases but ΔS(surroundings) decreases
3) ΔS(system) decreases but ΔS(surroundings) increases
4) ΔS(system) decreases but ΔS(surroundings) also decreases

Sol. (3) water freezes (liq ⟶ solid) entropy decreases of system
Surronding Entropy increase

60. **The pH of neutral water at 25°C is 7.0. As the temperature increases, ionisation of water increases, however, the concentration of H^+ ions and OH^- ions are equal. What will be the pH of pure water at 60°C ?** **[XI Part-I N.B. 217]**

1) Equal to 7.0
2) Greater than 7.0
3) Less than 7.0
4) Equal to zero

Sol. (3) pH = 7 neutral solⁿ at 25°C
Temp increases H⁺, and OH⁻ conc increases pH decreases
so pH less than 7

61. **Which of the following options will be correct for the stage of half completion of the reaction $A \rightleftharpoons B$** **[XI Part-I N.B. 208]**

1) $\Delta G^0 = 0$
2) $\Delta G^0 > 0$
3) $\Delta G^0 < 0$
4) $\Delta G^0 = -RT \ln 2$

Sol. (1) reaction is half completed
[A] = [B] $\left(K = \frac{[B]}{[A]}\right)$
$\Delta G^\circ = -RT \ln K$
$\Delta G^\circ = -RT \ln 1$ $\Delta G^\circ = 0$

62. **Which of the following elements does not show disproportionation tendency ?** **[XI Part-II N.B. 272]**

1) Cl
2) Br
3) F
4) I

Sol. (3) F undergoes only two oxidation states are possible (i.e 0, −1)

63. **Only one element of ______ forms hydride.** **[XI Part-II N.B. 288]**

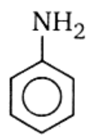
1) group 6
2) group 7
3) group 8
4) group 9

Sol. (1) Only one element of chromium from group 6 that is CrH.

64. **Dead burnt plaster is** **[XI Part-II N.B. 311]**

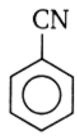
1) $CaSO_4$
2) $CaSO_4 \cdot \frac{1}{2} H_2O$
3) $CaSO_4 \cdot H_2O$
4) $CaSO_4 \cdot 2H_2O$

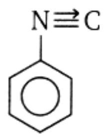
Sol. (1) Dead burt plaster is $CaSO_4$.

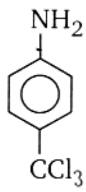
65. 

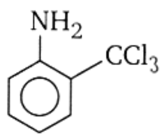
+ $CHCl_3$ + KOH → $\underset{\text{major product}}{P}$

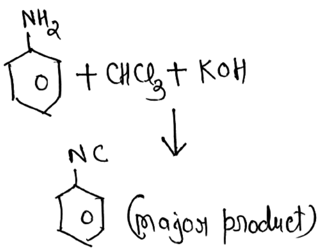
Identify the structure of 'P' **[XII Part-II N.B. 401]**

1) 

2) 

3) 

4) 

Sol. (2) 

This is called Carbyl amine reaction

66. **Co-polymer among the following. [XII Part-II N.B. 440]**
1) Natural rubber 2) Dextron
3) HDPE 4) both (1) and (3)

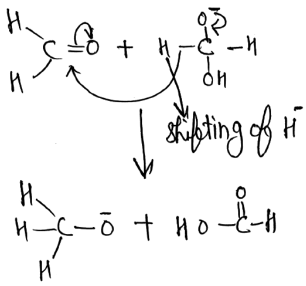
Sol. **(2)**

67. **In the Cannizzaro reaction, which is the slowest step? [XII Part-II N.B. 372]**

$$2PhCHO \xrightarrow{OH^-} PhCH_2OH + PhCOO^-$$

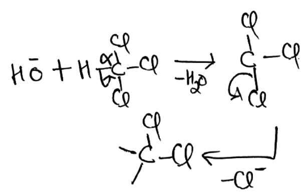
1) The attack of OH^- at the carbon atom of carbonyl group
2) The transfer of hydride to the carbonyl group
3) The abstraction of proton from the carboxylic acid
4) The deprotonation of $PhCH_2OH$

Sol. **(2)**



68. **In Reimer-Tieman reaction, $>CCl_2$ is formed by which elimination [XII Part-II N.B. 343]**
1) α-elimination 2) β-elimination
3) γ-elimination 4) δ-elimination

Sol. **(1)**



So $>CCl_2$ is formed by α- elimination

69. **The edge lengths of the unit cells in terms of the radius of spheres constituting fcc, bcc and simple cubic unit cell are respectively ________. [XII Part-I N.B. 12]**

1) $2\sqrt{2}r, \frac{4r}{\sqrt{3}}, 2r$ 2) $\frac{4r}{\sqrt{3}}, 2\sqrt{2}r, 2r$

3) $2r, 2\sqrt{2}r, \frac{4r}{\sqrt{3}}$ 4) $2r, \frac{4r}{\sqrt{3}}, 2\sqrt{2}r$

Sol. **(1)** FCC $\sqrt{2}a = 4r$ $a = 2\sqrt{2}r$
BCC $\sqrt{3}a = 4r$ $a = \frac{4}{\sqrt{3}}r$
Simple cubic $a = 2r$

70. **We have three aqueous solutions of NaCl labelled as 'A', 'B' and 'C' with concentrations 0.1M, 0.01M and 0.001 M, respectively. The value of van't Hoff factor for these solutions will be in the order ______. [XII Part-I N.B. 57]**
1) $i_A < i_B < i_C$ 2) $i_A > i_B > i_C$
3) $i_A = i_B = i_C$ 4) $i_A < i_B > i_C$

Sol. **(3)** NaCl it is acts strong electrolyte
i = Total no. of ions
vant hoff factors independ of concentration $i_A = i_B = i_C$

71. **On the basis of information given below mark the correct option.**

Information : On adding acetone to methanol some of the hydrogen bonds between methanol molecules break. [XII Part-I N.B. 47]
1) At specific composition methanol-acetone mixture will form minimum boiling azeotrope and will show positive deviation from Raoult's law
2) At specific composition methanol-acetone mixture forms maximum boiling azeotrope and will show positive deviation from Raoult's law
3) At specific composition methanol-acetone mixture will form minimum boiling azeotrope and will show negative deviation from Raoult's law
4) At specific composition methanol-acetone mixture will form maximum boiling azeotrope and will show negative deviation from Raoult's law

Sol. **(1)** Mixture of methanol acetone acts as positive deviation and minimum boiling point

72. **Which of the statements about solutions of electrolytes is not correct ? [XII Part-I N.B. 80]**
1) Conductivity of solution depends upon size of ions
2) Conductivity depends upon viscosity of solution
3) Conductivity does not depend upon solvation of ions present in solution
4) Conductivity of solution increasesss with temperature

Sol. **(3)** Conductivity depends upon solvation of ions present in solution.

73. **$\Lambda^0_{m(NH_4OH)}$ is equal to ______. [XII Part-I N.B. 83]**

1) $\Lambda^0_{m(NH_4OH)} + \Lambda^0_{m(NH_4Cl)} - \Lambda^0_{(HCl)}$

2) $\Lambda^0_{m(NH_4Cl)} + \Lambda^0_{m(NaOH)} - \Lambda^0_{(NaCl)}$

3) $\Lambda^0_{m(NH_4Cl)} + \Lambda^0_{m(NaCl)} - \Lambda^0_{(NaOH)}$

4) $\Lambda^0_{m(NaOH)} + \Lambda^0_{m(NaCl)} - \Lambda^0_{(NH_4Cl)}$

Sol. **(2)** According Kohlrausch law

$\Lambda^{o}_{m(NH_4OH)} = \Lambda^{o}_{m(NH_4Cl)} + \Lambda^{o}_{m(NaOH)} - \Lambda^{o}_{m(NaCl)}$

74. In the presence of a catalyst, the heat evolved or absorbed during the reaction ______.

[XII Part-I N.B. 131]

1) increases
2) decreases
3) remains unchanged
4) may increase or decrease

Sol. **(3)** In the presence of a catalyst. the heat evolved or absorbed during the reaction remain unchanged.

75. A first order reaction is 50% completed in 1.26×10^{14} s. How much time would it take for 100% completion ?

[XII Part-I N.B. 106]

1) 1.26×10^{15} s
2) 2.52×10^{14} s
3) 2.52×10^{28} s
4) infinite

Sol. **(4)** first order reaction never completed 100% of the reaction. Hence time taken 100% completion of a reaction is infinite

76. Which of the following statements is wrong ?

[XII Part-I N.B. 181]

1) Single N-N bond is stronger than the single P–P bond
2) PH_3 can act as a ligand in the formation of coordination compound with transition elements
3) NO_2 is paramagnetic in nature
4) Covalency of nitrogen in N_2O_5 is four

Sol. **(1)** N–N single bond is weaker than p-p bond due to smaller size of N lone pair of electrons repulsion between the two 'N' atoms.

77. In solid state PCl_5 is a _____. **[XII Part-I N.B. 182]**

1) covalent solid
2) Octahedral structure
3) ionic solid with $[PCl_6]^+$ octahedral and $[PCl_4]^-$ tetrahedra
4) ionic solid with $[PCl_4]^+$ tetrahedral and $[PCl_6]^-$ octahedra

Sol. **(4)** ionic solid with $[PCl_4]^+$ tetrahedral and $[PCl_6]^-$ octahedral.

78. The correct IUPAC name of $[Pt(NH_3)_2Cl_2]$ is

[XII Part-I N.B. 249]

1) Diamminedichloridoplatinum (II)
2) Diamminedichloridoplatinum (IV)
3) Diamminedichloridoplatinum (0)
4) Dichlroidodiammineplatinum (IV)

Sol. **(1)** $[Pt(NH_3)_2Cl_2]$ Pt - oxidation state - 2

Diamminedichlorido platinum II

79. What kind of isomerism exists between $[Cr(H_2O)_6]Cl_3$ (violet) and $[Cr(H_2O)_5Cl]Cl_2.H_2O$ (greyish-green) ?

[XII Part-I N.B. 251]

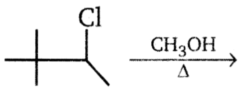
1) linkage isomerism
2) solvate isomerism
3) ionisation isomerism
4) coordination isomerism

Sol. **(2)** $[Cr(H_2O)_6]Cl_3$ &

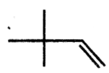
$[Cr(H_2O)_5Cl]Cl_2 \cdot H_2O$

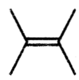
exists solvate (hydrate) isomerism

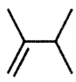
80. Find the major product of the following reaction

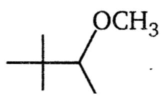


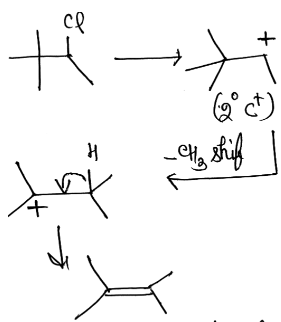
[XI Part-II N.B. 388]

1) 

2) 

3) 

4) 

Sol. **(2)** 

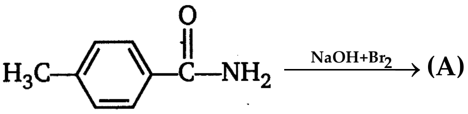
In, the presence of polar protic solvent (CH_3OH) at relatively higher temp. it gives E_1

81. Which solvent is more suitable for S_N1 and S_N2 reaction respectively

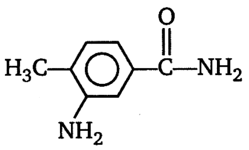
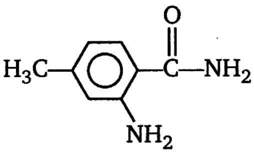
[XII Part-II N.B. 304]

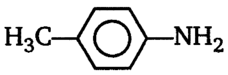
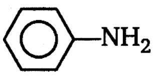
1) Polar protic and polar aprotic
2) Polar aprotic and polar protic
3) Polar protic and polar protic
4) Polar aprotic and polar aprotic

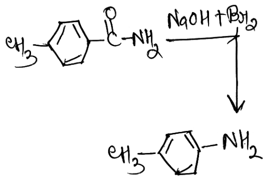
Sol. (1) For S_N^1 and S_N^2 reaction, polar protic and polar aprotic solvent respectively are suitable

82. 

Major product **[XII Part-II N.B. 394]**

1)  2) 

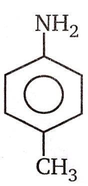
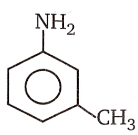
3)  4) 

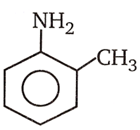
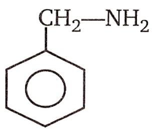
Sol. (3) 

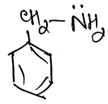
This is Hofman bromo amide degradation reaction

83. Which of the following is strongest base?

[XII Part-II N.B. 399]

1)  2) 

3)  4) 

Sol. (4) 

In this compound, lone pair of electron of N is not involve in resonance and so, it will be more basic

84. Which of the following are purine bases ?

[XII Part-II N.B. 428]

1) Guanine 2) Adenine
3) Thymine 4) Both (1) and (2)

Sol. (4)

85. Which of the following enhances lathering property of soap ? **[XII Part-II N.B. 459]**

1) Sodium carbonate 2) Sodium rosinate
3) Sodium stearate 4) Trisodium phosphate

Sol. (2)

Section 'B'

86. An element belongs to 3rd period and group-13 of the periodic table. Which of the following properties will be shown by the element ? [XI Part-II N.B. 316]

1) Good conductor of electricity
2) Liquid, metallic
3) Liquid, non-metal
4) Solid, non-metallic

Sol. (1) 3rd period and gp-13

i.e Al -atom

$1s^2 2s^2 2p^6 3s^2 3p^1$

Al acts as good conductor of electricity

87. Which of the following order of energies of molecular orbitals of N_2 is correct ? **[XI Part-I N.B. 130]**

1) $(\pi 2p_y) < (\sigma 2p_z) < (\pi^* 2p_x) \approx (\pi^* 2p_y)$
2) $(\pi 2p_y) > (\sigma 2p_z) > (\pi^* 2p_x) \approx (\pi^* 2p_y)$
3) $(\pi 2p_y) < (\sigma 2p_z) > (\pi^* 2p_x) \approx (\pi^* 2p_y)$
4) $(\pi 2p_y) > (\sigma 2p_z) < (\pi^* 2p_x) \approx (\pi^* 2p_y)$

Sol. (1) $N_2 = 14\bar{e}$

According to MOT

$\sigma_{1s} < \sigma^*_{1s} < \sigma_{2s} < \sigma^*_{2s} <$

$(\pi_{2p_x} = \pi_{2p_y}) < \sigma_{2p_z} < (\pi^*_{2p_x} = \pi^*_{2p_y})$

88. **The enthalpies of elements in their standard states are taken as zero. The enthalpy of formation of a compound** **[XI Part-I N.B. 176]**

1) is always negative
2) is always positive
3) may be positive or negative
4) is never negative

Sol. **(3)** The enthalpy of formation of a compound may be positive or negative as it can be exothermic (or) Endothermic.

89. **Which of the following will produce a buffer solution when mixed in equal volumes ? [XI Part-I N.B. 226]**

1) 0.1 mol dm^{-3} NH_4OH and 0.1 mol dm^{-3} HCl
2) 0.05 mol dm^{-3} NH_4OH and 0.1 mol dm^{-3} HCl
3) 0.1 mol dm^{-3} NH_4OH and 0.05 mol dm^{-3} HCl
4) 0.1 mol dm^{-3} CH_4COONa and 0.1 mol dm^{-3} NaOH

Sol. **(3)** Option verification

$NH_4OH + HCl \longrightarrow NH_4Cl + H_2O$

1 mole 1 mole 1 mole

0.1 0.05 0.05

↓ ↓ Limiting

unreacted

0.1 − 0.05

= 0.05 mole.

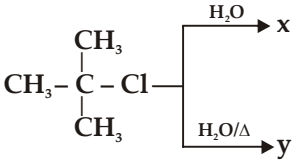
In the container 0.05 mole NH_4OH + 0.05 mole NH_4Cl acts as basic buffer

90. **Silicon has a strong tendency to form polymers like silicones. The chain length of silicone polymer can be controlled by adding** **[XI Part-II N.B. 329]**

1) $MeSiCl_3$
2) Me_2SiCl_2
3) Me_3SiCl
4) Me_4Si

Sol. **(3)**

91.



Identify x and y **[XII Part-II N.B. 303]**

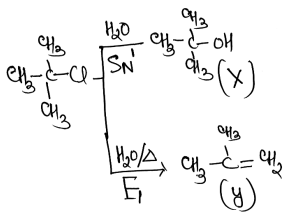
1) x is $CH_3-\underset{CH_3}{\overset{CH_3}{\underset{|}{\overset{|}{C}}}}-OH$ by S_N2 & y is $CH_3-\underset{CH_3}{\overset{CH_3}{\underset{|}{\overset{|}{C}}}}-OH$ by S_N1

2) x is $CH_3-\underset{}{\overset{CH_3}{\overset{|}{C}}}=CH_2$ by E_1 & y is $CH_3-\underset{}{\overset{CH_3}{\overset{|}{C}}}=CH_2$ by E_2

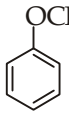
3) x is $CH_3-\underset{CH_3}{\overset{CH_3}{\underset{|}{\overset{|}{C}}}}-OH$ by E_1 & y is $CH_3-\underset{}{\overset{CH_3}{\overset{|}{C}}}=CH_2$ by S_N1

4) x is $CH_3-\underset{CH_3}{\overset{CH_3}{\underset{|}{\overset{|}{C}}}}-OH$ by S_N1 & y is $CH_3-\underset{}{\overset{CH_3}{\overset{|}{C}}}=CH_2$ by E_1

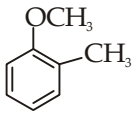
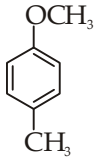
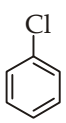
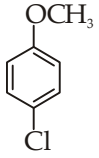
Sol. **(4)**

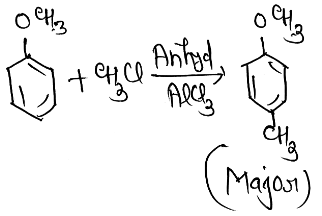


3° R-X gives S_N1 in the presence of polar protic solvent like H_2O and gives E_1 in the presence of polar protic solvent (H_2O) at relatively higher temperature.

92.  **+ CH_3Cl** $\xrightarrow{\text{Anhyd.}AlCl_3}$ **major product is**

[XII Part-II N.B. 350]

1) 
2) 
3) 
4) 

Sol. (2) 

93. Zone refining is based on the principle that ______. **[XII Part-I N.B. 165]**

1) impurities of low boiling metals can be separated by distillation
2) impurities are more soluble in molten metal than in solid metal
3) different components of mixture are differently adsorbed on an adsorbent
4) vapours of volatile compound can be decomposed in pure metal

Sol. (2)

94. In the preparation of HNO_3, we get NO gas by catalytic oxidation of ammonia. The moles of NO produced by the oxidation of two moles of NH_3 will be ______. **[XII Part-I N.B. 179]**

1) 2 2) 3
3) 4 4) 6

Sol. (1) $4NH_3 + 5O_2 \longrightarrow 4NO + 6H_2O$

95. $KMnO_4$ acts as an oxidising agent in acidic medium. The number of moles of $KMnO_4$ that will be needed to react with one mole of sulphite ions in acidic solution is **[XI Part-II N.B. 277]**

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

Sol. (1) $2MnO_4^- + 5SO_3^{2-} + 6H^+ \longrightarrow 2Mn^{2+} + 5SO_4^{2-} + 3H_2O$

2 mole $KMnO_4 \longrightarrow$ 5 mole SO_3^{2-}

$x \longleftarrow$ 1 mole SO_3^{2-}

$x = \frac{2}{5}$ mole of $KMnO_4$

96. The CFSE for octahedral $[CoCl_6]^{4-}$ is 18,000 cm^{-1}. The CFSE for tetrahedral $[CoCl_4]^{2-}$ will be **[XII Part-I N.B. 258]**

1) 18,000 cm^{-1} 2) 16,000 cm^{-1}
3) 8,000 cm^{-1} 4) 20,000 cm^{-1}

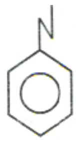
Sol. (3) $\Delta_t = \frac{4}{9}\Delta_o$

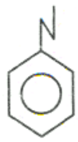
$= \frac{4}{9} \times 18000 = 8000\ cm^{-1}$

97. The major products (P, Q) in the given reaction are:

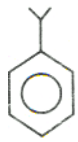
 $+ Cl\cdot CH_2CH_2CH_3 \xrightarrow{AlCl_3} P \xrightarrow[(II)\ H_2O]{(I)\ O_2,\ \Delta} Q + \text{Phenol}$

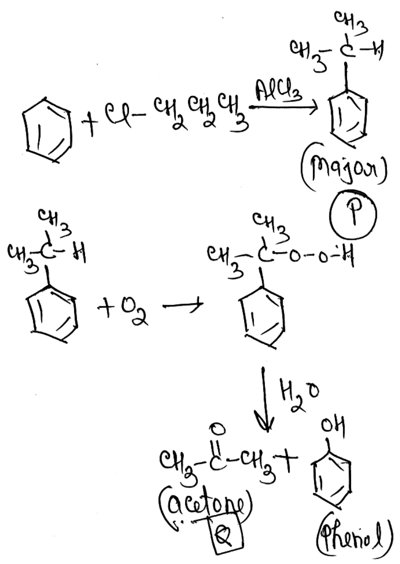
[XII Part-II N.B. 332]

1)  and CH_3CHO

2)  and CH_3COCH_3

3)  and CH_3COCH_3

4)  and CH_3CH_2CHO

Sol. (3) 

98. In Carius method of estimation of halogen, 0.15 g of an organic compound gave 0.12 g of AgBr. Find out the percentage of bromine in the compound.

[XI Part-II N.B. 367]

1) 34.04% 2) 45%
3) 50% 4) 70%

Sol. (1) mass of organic compound = 0.15 gm

mass of AgBr = 0.12

$\% \text{ Br} = \dfrac{80 \times \text{mass of AgBr} \times 100}{188 \times \text{mass of compound}}$

$= \dfrac{80 \times 0.12 \times 100}{188 \times 0.15}$

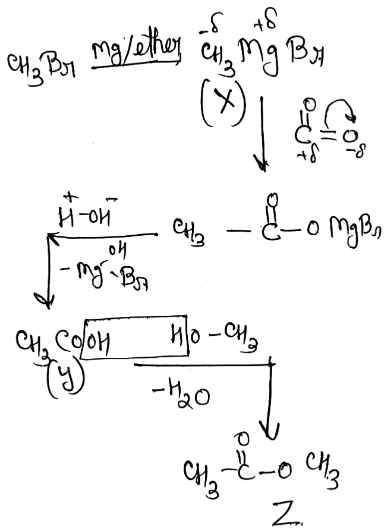
$= 34.04\%$

99. Identify the compounds (X), (Y) and (Z) in the following reaction : [XII Part-II N.B. 376]

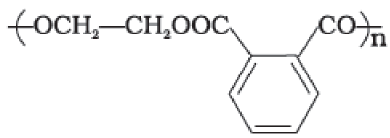
$$CH_3Br \xrightarrow{Mg/ether} X \xrightarrow[(ii)Water]{(i)CO_2} Y \xrightarrow[\Delta]{CH_3OH, H^+} Z$$

1) $X = CH_3MgBr$, $Y = CH_3COOH$, $Z = CH_3COOCH_3$
2) $X = CH_3CH_2Br$, $Y = CH_3CH_2OH$, $Z = CH_3CH_2CH_2CH_3$
3) $X = CH_3CH_2MgBr$, $Y = CH_3CH_2COOH$, $Z = CH_3CH_2COCH_3$
4) $X = CH_3COOH$, $Y = CH_3CH_2COCH_3$, $Z = CH_3COOCH_3$

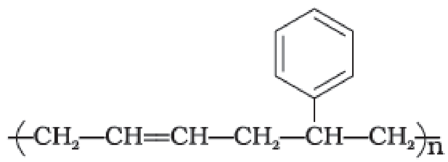
Sol. (1)

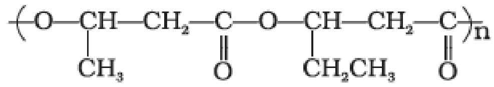


100. On which of the following polymers ethylene glycol is one of the monomer units ? [XII Part-II N.B. 437]

1) 

2) $-(CH_2-CH_2)_n-$

3) 

4) 

Sol. (1)

Section 'C' : Botany

Context & Exercise Based Questions

Section-A

101. Match the columns I and II select the correct option

	Column-I		Column-II
i.	Wheat	a.	Primata
ii.	Mango	b.	Diptera
iii.	Housefly	c.	Sapindales
iv.	Man	d.	Poales

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

Ans.(2)

102. What would be the ψ_p of a flaccid cell?

1) –ve 2) +ve
3) Zero 4) Negligible

Ans.(3)

103. Central portion of nodules are red pink in legumes due to

1) Myoglobin 2) Haemoglobin
3) Leg-haemoglobin 4) Carbinoglobin

Ans.(3)

104. Match the following column and select correct options

Column-I	Column-II
A) Hydroponic	i) Deficiency symptoms of Fe, Mg and Ca.
B) Manganese toxicity	ii) Ca, Mg, Cu and K
C) Necrosis	iii) Purified water and mineral
D) Delay flowering	iv) N,K,Mg, S Fe, Mn
E) Chlorosis	v) Zn and Mo

1) A-i, B-ii, C-iii, D-iv, E-v
2) A-v, B-iv, C-iii, D-ii, E-i
3) A-iii, B-i, C-ii, D-v, E-iv
4) A-i, B-iii, C-ii, D-ii, E-v

Ans.(3)

105. The phenomenon called 'Apical dominance' in plants is due to a phytohormone

1) Auxins 2) gibberellins
3) Cytokinins 4) ABA

Ans.(1)

106.

	Column-I		Column-II
i	Auxins	p	Speed up the maturity period in conifers leading to early seed production
ii	Gibbrellins	q	Causes respiratory climactic
iii	Cytokinins	r	Promote abscission of older mature leaves and fruit
iv	Ethylene	s	Helps to withstand desiccation
		t	Promotes nutrient mobilisation

1) i-r, ii-s, iii-p, iv-q 2) i-r, ii-s, iii-q, iv-p
3) i-r, ii-p, iii-t, iv-q 4) i-s, ii-q, iii-t, iv-p

Ans.(3)

107. Zoospores are _A_ and a zygote is _B_

1) A-diploid, B-diploid
2) A-Haploid, B-diploid
3) A-Haploid, B-diploid
4) A-diploid, B-haploid

Ans.(3)

108. Mac Arther explained the concept of Resource partitioning by using __ closely related species of warblers

[NCERT 12th, Page 235, 2nd Para, Last 4 lines]

1) 3 2) 4
3) 5 4) 6

Ans.(3)

109. Which of the following is/are true for "Acacia" plant [Que. is desinged by using two topics i.e. org and pop. and morphology of flowering plants, 12th NCERT, Page 234, 2nd para, line 7,8,9]

a) Thorns are present
b) Phyllodes are present
c) Photosynthetic petioles are present
d) It has most common morphological defense against herbivores

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

Ans.(1)

110. What is the correct sequence of different stages during primary succession [NCERT 12th, Page-252,]

a) Submerged stage b) Phytoplankton

c) Reed Swamp d) Scrub stage

e) Marsh Meadow stage

f) Forest

g) Submerged free floating plant stage.

1) a, b, c, d, e, f 2) b, a, g, c, e, d, f

3) b, a, g, e, c, g, d, f 4) b, g, a, c, d, e, g, f

Ans.(2)

111. Primary producers convert ___ of the energy, in sunlight, available to them into NPP.

[NCERT 12th, Page 248, Fig. 144 (d), description of the fig.]

1) 1% 2) 10%

3) 5% 4) 15%

Ans.(1)

112. Assertion : For many taxonomic groups, species inventories are more complete in temperature than tropical countries.

Reason : Large proportion of species, are waiting to be discovered in tropics

[NCERT 12th, Page-259, See-15.1.1, line 9,10,11]

1) If both Assertion and Reason are true and the Reason is the correct explanation of the Assertion

2) If both Assertion and Reason are true but the Reason is not the correct explanation of the Assertion

3) If Assertion is true statement and Reason is false

4) If both Assertion and Reason are false - statements

Ans.(1)

113. Global species diversity was estimated by ___ which was about ____ [NCERT 12th, Page-259, last 3 lines]

1) Edward Wilson, 5 million

2) Robert May, 7 million

3) Odem, 5 million

4) Humbolt, 7 million

Ans.(2)

114. Which of the following is true about "ozone layer" [NCERT 12th, Page-282, Fig. 16.8]

a) Ozone layer is thinnest over antarctica

b) Thickness of ozone layer is calculated in "Dobson unit"

c) Ozone hole, over antarctica developes each year between late August and early october

1) a, b, c 2) b, c

3) a, c 4) a, b

Ans.(1)

115. Govt of India has introduced JFM in 1980 for

[NCERT 12th, Page-285, Last Para]

1) Growth of New forest

2) Working closely with local communities for protecting and managing forest

3) To cut the jungles and forests neatly

4) None of these

Ans.(2)

116. Deutromycetes is also known as fungi imperfect because :

1) Members are not well differentiated

2) Mycelium is aseptate and coenocytic

3) Members do not produce zoospores

4) It lacks sexual reproduction.

Ans.(4)

117. A photosynthetic organism was studied and was found to be having two flagella - one long and another short. Also when such organism was deprived of sunlight, it starts acting as predator. Which of the following feature can also be expected in such organism?

1) Presence of pellicle

2) Presence of a thick cell wall

3) Presence of photosynthetic pigments dissimilar to that of plants

4) Terrestrial mode of life

Ans.(1)

118. ________ (also known as Bog moss) and _____ belong to same class of Bryophyta

1) Sphagnum, Funaria

2) Sphagnum, Riccia

3) Riccia, Sphagnum

4) Riccia, Marchantia

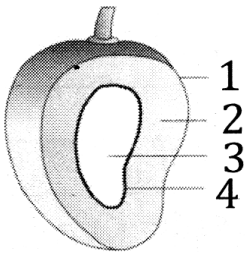
Ans.(1)

119. Incorrect about green algae :

1) Members possess pyrenoids as storage bodies in chloroplasts.
2) Cell wall consists of outer layer of cellulose and inner layer of pectose.
3) Spores for asexual reproduction are produced in zoosporangia and are flagellated.
4) Dominant photosynthetic pigments are chlorophyll a and chlorophyll b.

Ans.(2)

120. 1 - 4 are indicated in section of mango. Select the option with correct identification :



1) 1 = Testa, 2 = Tegmen, 3 = Endosperm, 4 = Endosperm
2) 1 = Testa, 2 = Tagmen, 3 = Seed, 4 = Endosperm
3) 1 = Epicarp, 2 = Mesocarp, 3 = Seed, 4 = Endocarp.
4) 1 = Pericarp, 2 = Mesocarp, 3 = Seed, 4 = Endocarp.

Ans.(3)

121. Which angiosperm family is correctly matched with its floral formula?

1) Potato family $\Rightarrow \oplus \, ♀♂ \, K_{(5)} \, \overset{\frown}{C_{(5)} A_5} \, \underline{G}_{(2)}$
2) Lily family $\Rightarrow Br \oplus ♀♂ \, P_{3+3} \, A_{3+3} \, \underline{G}_1$
3) Fabaceae family $\Rightarrow \% \, ♀♂ \, K_{(5)} \, C_{1+2+(2)} \, A_{(5)} \underline{G}_1$
4) Malvaceae family $\Rightarrow Br \oplus ♀♂ Epi \, K_{(5)} \, \overset{\frown}{C_5 \; A_{(\infty)}} \, \underline{G}_2$

Ans.(1)

122. Sclerenchyma is observed in all of the following except one

1) Pulp of guava
2) Major components of organs
3) Leaves of tea
4) Fruit wall of nuts

Ans.(2)

123. Read the statements (A-E) and answer the question following them.

A. Permanent tissues in plants do not have the capability of division.

B. After grazing by herbivores, grasses regenerate their lost parts by the action of intercalary meristem.

C. Interfascicular cambium is an example of apical meristem.

D. Metaxylem is a type of primary xylem.

E. Vessels are found in majority of seed plants.

How many statements are false?

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

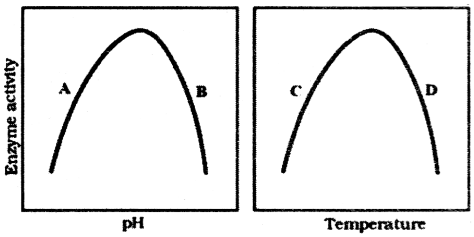
Ans.(2)

124. Two graphs are shown

Graph - 1 : Between enzyme activity and pH

Graph - 2 : Between enzyme activity and temperature

A, B, C and D are stages of rise or fall in enzyme activity select the correct option -



1) Phase A occurs due to inactivation of enzyme.
2) Phase C occurs due to denaturation of enzyme.
3) At the end of B enzyme is most active.
4) At the end of D enzyme becomes denatured.

Ans.(4)

125. Select the incorrect statement

1) Only green parts of plant could evolve O_2
2) Action spectrum of photosynthesis roughly resembles the absorption spectrum of chlorophyll a.
3) All organisms directly depend on plants for food.
4) Light energy is transformed to chemical energy during photosynthesis.

Ans.(3)

126. During photosynthesis splitting of water results in production of protons. These protons accumulate in chloroplast at following site

1) Stroma
2) Lumen of thylakoid
3) Inter-membrane space
4) Cytoplasm and stroma both.

Ans.(2)

127. During glycolysis, ATP is utilized between

1) 1, 3 - bisphosphogly cerate $\rightarrow$ 3 - phosphoglycerate
2) Phosphoenol pyruvate $\rightarrow$ Pyruvate
3) Glucose $\rightarrow$ Glucose - 6 - Pyruvate
4) Phosphoenol pyruvate $\rightarrow$ Pyruvate

Ans.(3)

128. Select the incorrect option

1) Development of zygote is followed by development of endosperm.
2) Pea seed is non-albuminous type.
3) Cotyledon of monocot is termed as scutellum.
4) Perisperm is observed in seeds of beet.

Ans.(1)

129. Statement A - Embryo develops near to the micropylar end of the embryo sac.

Statement B - Coleoptile encloses the shoot apex and few leaf primordial.

1) Only statement A is correct.
2) Only statement B is correct.
3) Both statement A and B are correct
4) Both statement A and B are incorrect

Ans.(3)

130. Mendel conducted hybridization exp. using several " True breeding pure lines" mendel could select pure lines by selecting one who,

a) Shows, the stable trait inheritance

b) Have undergone, continous self pollination

c) Stable expression for several generation

[NCERT-70, Last para]

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

Ans.(4)

131. "Punnet square" method is used to determine.

[NCERT-73, punnett squ.]

1) Genotype of parents
2) Possible number of offspring in a cross
3) The cross, either mono or dihybrid
4) None of these

Ans.(4)

132. If the result of test cross is 1 : 1, what does it indicate?

1) The dwarf plant taken was homozygous dwarf
2) The dwarf plant taken was heterozygous dwarf
3) The tall plant taken was homozygous tall.
4) The tall plant taken was heterozygous tall.

Ans.(4)

133. Which set of enzymes is involved in DNA replication?

1) DNA polymerase, RNA polymerase V.
2) DNA polymerase, peptidyl transferase.
3) RNA polymerase, DNA ligase
4) DNA ligase, DNA polymerase.

Ans.(4)

134. Identify the incorrect statement regarding transcription?

1) RNA is the product
2) Adenine pairs with uracil.
3) The whole strand of DNA is involved.
4) Transcription follows the rule of complementarity

Ans.(3)

135. In a DNA segment, all of the following are regions of transcription unit except

1) Promoter 2) Structural
3) Terminator 4) Elongator

Ans.(4)

Section-B

136. What occupies the spaces between the cell wall and the shrunken protoplast in the plasmolysed cell?

1) Hypotonic solution
2) Concentrated solution
3) Dilute solution
4) Pure solvent

Ans.(2)

137. The ions related with degradation of ozone layer is [NCERT 12th, Page-282]
1) Ar 2) Cl
3) Zn 4) N

Ans.(2)

138. We will lose all the wealth of biodiversity in ___ if present rate of species loss continues, [NCERT-12th, Page-259, Para just below ecological diversity]
1) Less than 1 century 2) Less than 2 centuries
3) Less than 3 centuries 4) Less than 4 centuries

Ans.(2)

139. Sexual deceit is shown by
1) orchid and bees 2) Fig and wasp
3) Warbler 4) Burnacles

Ans.(1)

140. In 1981, Value of "r" for human population in India was [NCERT 12th, Page 230, 3rd Para]
1) 0.0205 2) 0.00678
3) 0.12 4) 0.346

Ans.(1)

141. Spores of slime moulds are
1) Less resistant and survive for few weeks
2) Less resistant and survive for few months
3) Highly resistant and survive for few years
4) Highly resistant and survive for many years.

Ans.(4)

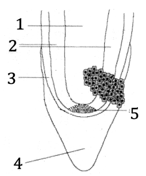
142. Isogamous reproduction is observed in
1) Volvox, Spirogyra 2) Spirogyra, Fucus
3) Volvox, Fucus
4) Spirogyra, Chlamydomonas

Ans.(4)

143. Which set of angiosperms posses endospermic seeds?
1) Bean, Maize 2) Castor, Wheat
3) Gram, Cucurbita 4) Pea, Orchids

Ans.(2)

144. Section of root is given. Select the option with correct identification :



1) 1 - pith, 3 - Intercalary meristem
2) 2 - cortex, 5 - root apical meristem
3) 1 - central cylinder, 5 - lateral meristem
4) 3 - protoderm, 4 - root apical meristem.

Ans.(2)

145. Vitamin present in coenzymes NAD and NADP is
1) Niacin
2) Thiamine
3) Ascorbic acid
4) Riboflavin.

Ans.(1)

146. Incorrect about non-cyclic photophosphorylation is
1) PS - I is involved
2) PS - II is involved
3) ATP is synthesized
4) Occur in stromal lamellae.

Ans.(4)

147. Select the incorrect match :
1) Complex I in electron transport chain - NADH is oxidized
2) Citric acid cycle - Grana
3) Pyruvic acid - Key product of glycolysis
4) Alcoholic fermentation - Yeast

Ans.(2)

148. Fleshy fruits are found in all of the given plants except one
1) Mustard
2) Orange
3) Mango
4) Guava.

Ans.(1)

149. In which of the following cases, F_1 progeny does not resemble any of the parental type
1) Dominance - recessive relationship
2) Pleiotropy
3) Co - dominance
4) Incomplete dominance.

Ans.(4)

150. In case of hnRNA, during transcription in eukaryotes
1) Splicing and capping - tailing are not required
2) Splicing is required but capping-tailing is not done
3) Splicing is not required but capping-tailing is done
4) Splicing and capping-tailing are required

Ans.(4)

Section 'D' : Zoology

Section-A

151. Which out of the following cannot be included in Arthropods?

1) Lobsters 2) *Bombyx*

3) *Anopheles* 4) Oysters

Ans.(4)

152. Digestion in Cuttlefish is

1) Intracellular 2) Extracellular

3) Complete 4) more than 1 correct

Ans.(3)

153. Mark the odd one out in the given series, respectively [NCERT exercise questions No.10, Page 122, 11th]

a) Areolar connective tissue, blood, neuron, tendon

b) RBC, WBC, Plateletes, cartilage

c) Maxilla, Mandible, Labrum, Antennae

1) Tendon, Cartilage 2) Tendon, WBC

3) Neuron cartilage 4) Neuron, RBC

Ans.(3)

154. Match teh correct pairs

[NCERT 11th, Exercise Que. No. 11, Page-122]

Column-I	Column-II
a) Compound epithelium	i) Skin
b) Compound eye	ii) Mosaic vision
c) Open circulatory system	iii) Cockroach
d) Typhlosole	iv) Earthworm

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

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

Ans.(3)

155. Which of the following is correct

1) Cells of all living organisms have a nucleus

2) Both animal and plant cells have a well defined cell wall

3) In prokaryotes, there are no membrane bound organelles

4) Cells are formed denovo from abiotic materials

Ans.(3)

156. Which of the following is not correct

1) Robert Brown discovered the cell

2) Schleiden and Schwann formulated the cell theory

3) Virchow explained that cells are formed from pre-existing cells

4) A unicellular organisms carries out its life activities within a single cell

Ans.(1)

157. Plant and animal cell divisions differ in

1) Cytokinesis 2) Prophase

3) Metaphase 4) telophase

Ans.(1)

158. Chiasma represents the sites of

1) Synapsis 2) Crossing over

3) Disjunction 4) Terminalisation

Ans.(2)

159. Out of the following given statements, true statement is/are

a) H-zone of striated muscle fibres represents both thick and thin filament

b) There are 11 pairs of ribs in man

c) Sternum is present on the ventral side of the body **[NCERT Exercise Que No. 4, 11th, Page-314]**

1) a only 2) b only

3) c only 4) b and c

Ans.(3)

160. Match the correct pairs

[NCERT Exercise que. No. 6, Page-314, 11th]

Column-I	Column-II
a) Smooth muscle	i) Myoglobin
b) Tropomyosin	ii) Thin filament
c) Red muscle	iii) Suture
d) Skull	iv) Involuntary

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

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

Ans.(2)

161. What is the advantage, for retaining the bulk of nutrient rich cytoplasm in secondary oocyte **[NCERT 12th, Que. 11 Page-49, Line-3,4]**

1) Cytoplas has nutrition, which is used by zygote during its's transport through oviduct
2) Cytoplasm contains all the nuclear material from primary oocyte
3) Sec. oocyte is the only cells formed from primary oocyte
4) All of these

Ans.(1)

162. How many eggs do you think, were released, by the ovary of female dog, which gave birth to 6 pupples

1) 6 eggs
2) 2 eggs
3) 1 egg
4) 12 eggs

Ans.(1)

163. A contraceptive with "Very few side effects and high contraceptive value" is
[NCERT 12th, Page-61, 2nd para, last two Lines]

1) SAHELI
2) Daily OC Pills
3) IUD
4) Condom

Ans.(1)

164. According to 2011 census, the growth rate of India was **[NCERT 12th, Page-59, 2nd Para, line 14,15,16]**

1) 2%
2) 20/1000/year
3) 0.02 new individual per single old invididual
4) All of these

Ans.(4)

165. *Saccharum barberi*, a sugarcane variety

1) Originally grown in South India having thicker stem and high sugar content
2) Originally grown in North India having thicker stem and high sugar content
3) Originally growing in North India having poor sugar content and yield
4) Originally grown in South India having poor sugar content and yield

Ans.(3)

166. Important biofertilizer in paddy fields is
[NCERT 12th, Page-188, Last para, 3,4 Lines]

1) Cyanobacteria
2) Mycorrhiza
3) Rhizobium
4) Azotobacter

Ans.(1)

167. What is the shape of tobacco mosaic virus

1) Comma
2) Rod
3) Spherical
4) Polygonal

Ans.(2)

168. The technique of bombarding plant cells with high velocity microparticles of gold or tungsten, coated with DNA, is

1) Microinjection
2) Biolistic method
3) Heat shock method
4) By disarmed pathogen vector

Ans.(2)

169. If we have to break open the cell to release DNA along with other macromolecules, which of the following enzyme is used to break bacterial cell wall?

1) Cellulose
2) Lysozyme
3) Chitinase
4) Pectinase

Ans.(2)

170. Identify the transgenic food crop which helps in solving the problem of night blindness.

1) Bt soyabean
2) Flavr savr tomatoes
3) Golden rice
4) Bt Brinjal

Ans.(3)

171. The volume of air during force expiration and forced inspiration is called :
[NCERT-XI, Page-272, Para-5th]

1) Supplementary volume
2) Complementary volume
3) Vital capacity
4) Total lung capacity

Ans.(3)

172. Match the columns : **[NCERT-XI, Page-258, Diag- 16.1]**

	Column A (Salivary		**Column B (Position)**
A	Parotid	1	Lower jaw
B	Sub Maxillary	2	Cheek
C	Sub lingual	3	Below tongue

1) A-1 B-3 C-2
2) A-1 B-2 C-3
3) A-2 B-1 C-3
4) A-2 B-3 C-1

Ans.(3)

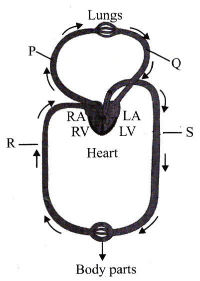
173. Bring out the matching pair :
[NCERT-XI, Page-263, Para-2nd Last]
1) Renin-Protein
2) Invertase/Sucrase-sucrose
3) Trypsin-Starch
4) amylase-Lactose

Ans.(2)

174. The disease erythroblastosis foetalis of human baby is due to - [NCERT-XI, Page-281, Para-18.1.3.2 or 1st]
1) Incompatibility of blood groups of the couple
2) Maladjustment of Rh factor
3) Incompatibility of blood group of embryo and mother
4) All the above

Ans.(3)

175. Select teh correct option :
[NCERT-XI, Page-287, Diag. 18.4]



	Pulmonary artery	Dorsal aorta
1)	P	R
2)	P	S
3)	Q	R
4)	Q	S

Ans.(2)

176. In nephron, most of electrolytes and most of water are absorbed respectively in
1) PCT,DCT
2) PCT, collecting duct
3) PCT, PCT
4) DCT, collecting duct

Ans.(3)

177. Which of the following is not the component of nephric filtrate?
1) RBC only
2) RBC + Plateletes only
3) Formed elements only
4) Formed elements + Proteins

Ans.(4)

178. Diabetes insipidus is under control of -
[NCERT-XI, Page-334, Para-2nd]
1) ACTH
2) TSH
3) ADH
4) Aldosterone

Ans.(3)

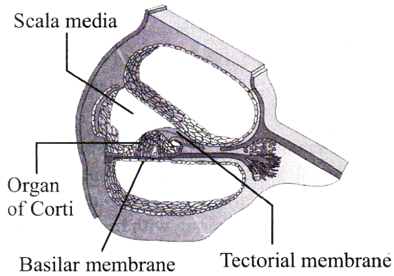
179. Cretinism is due to less secretion of -
[NCERT-XI, Page-335, Para-1st]
1) Thyroid
2) Pituitary
3) Parathyroid
4) Adrenal

Ans.(1)

180. Fovea is [NCERT-XI, Page-324, Fig-3rd]
1) Fibrous coat of eye ball
2) Vascular coat of eye ball
3) Point where the visual acuity (resolution) is the greatest
4) Chemical sensitive coat of eye ball

Ans.(3)

181. Which structure act as auditory receptor in the given figure of cochlea?
[NCERT-XI, Page-326, Para-2nd]



1) Scala media
2) Organ of corti
3) Basilar membrane
4) Tectorial membrane

Ans.(2)

182. Which of the following is used as an atmospheric pollution indicator?
[NCERT-XII, Page-132, Para- 1st]
1) Lepidoptera
2) Lichens
3) Lycopersicon
4) Lycopodium

Ans.(2)

183. Analogous organs arise due to :
[NCERT-XII, Page-131, Para- 1st]
1) Divergent evolution
2) Artificial selection
3) Genetic drift
4) Convergent evolution

Ans.(4)

184. At which stage of HIV infection does one usually show symptoms of AIDS?

[NCERT-XII, Page-156, Para-1st]

1) Within 15 days of sexual contact with an infected person
2) when the infecting retrovirus enters host cells
3) When viral DNA is produced by reverse transcriptase
4) When HIV replicates rapidly in helper T-lymphocytes and damages large number of these

Ans.(4)

185. Most common use of morphine is as

1) Depressant 2) Anti depressant
3) Sedative & pain killer 4) Hallucinogen

Ans.(3)

Section-B

186. Which of the following statement is wrong?

1) Atlas 66 is a wheat variety having high protein content
2) Hidden hunger causes due to lack of essential nutrients in diet
3) Rice can be made rich in iron by biofortification
4) Consumption of biofortified food may lead to reduce lifespan and mental abilities

Ans.(4)

187. The DNA fragments separated on an agarose gel can be visualised after staining with

1) Bromophenol blue 2) Acetocarmine
3) Aniline blue 4) Ethidium bromide

Ans.(4)

188. Match the animals of Column-I with their respective classes in Column-II and choose the correct answer

	Column-I		Column-II
i	*Aptenodytes*	a.	Aves
ii	*Hemidactylus*	b.	Chondrichthyes
iii	*Carcharodon*	c.	Mammalia
iv	*Pteropus*	d.	Reptilia
		e	Osteichthyes

Select the code for the correct answer fro the options given below

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

Ans.(4)

189. Match the correct pairs

[NCERT Exercise que. No.9, Page-314, 11th]

Column-I	Column-II
a) Atlas/Axis	i) Ball and Socket joint
b) Carpal/ metacarpals of thumb	ii) Hinge joint
c) Between phalanges	iii) Pivote joint
d) Femur/ Acetabulum	iv) Saddle joint
e) Between pubic bones of acetabulum	v) Fibrous joint
	vi) Cartilagenous joint

1) a-iii, b-iv, c-ii, d-i, e-vi
2) a-iii, b-iv, c-ii, d-i, e-v
3) a-i, b-ii, c-iii, d-iv, e-v
4) a-iii, b-iv, c-v, d-vi, e-i

Ans.(1)

190. Match the correct pairs of structures and their functions

[NCERT Exercise, Que.No.15, Page-56, Class-12th]

Column-I	Column-II
a) Corpus luteum	i) Sperm lysins are stored
b) Acrosome	ii) Implantation
c) Fimbriae	iii) Locomotory structure of spermatozoa
d) Endometrium	iv) To receive ovum inside the oviduct
	v) Production of progesteron
e) Sperm tail	

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

Ans.(4)

191. All of the following products are produced by alcohol fermentation except

[NCERT 12th, Page-181, NCERT based Que-10.1]

1) Roqueforte cheese 2) Bread

3) Toddy 4) Idli

Ans.(1)

192. Organisms that have more than one nucleus per cell

1) Fungi 2) Paramoecium

3) More than 1 correct 4) Amoeba

Ans.(3)

193. Which of the following steps not involved in respiration? **[NCERT-XI, Page-270, Para-3rd]**

1) Diffusion of gases across alveolar membrane

2) Transport of gases by the blood

3) Provide nutrients, O_2 to all the living cells of body

4) Utilisation of O_2 by the cells for catabolic reactions and resultant release of CO_2

Ans.(3)

194. When maltase acts, result is :

[NCERT-XI, Page-263, Para-2nd Last]

1) Glucose+Glucose

2) Glucose+Galactose

3) Glucose+Fructose

4) Cellobiose+Fructose

Ans.(1)

195. Thrombokinase is associated with -

[NCERT-XI, Page-281, Para-2nd]

1) Production of erythrocytes from the bone marrow

2) Pulmonary and systemic circulation

3) Cardiac cycle and its regulation

4) Enzymatic reactions in coagulations of blood

Ans.(4)

196. Liquid which collects in the cavity of bowman's capsule is :

[NCERT-XI, Page-293, Last Para]

1) Blood plasma minus blood proteins

2) Glycogen and water

3) Urea, glycogen and water

4) Urea

Ans.(1)

197. The function of thyrocalcitonin is -

[NCERT-XI, Page-335, Para-3rd]

1) Lowers Ca^{2+} level in blood

2) Elevates K^{+} level in blood

3) Elevates Ca^{2+} level in blood

4) None of the above

Ans.(1)

198. Appearance of antibiotic-resistant bacteria is an example of : [NCERT-XII, Page-132, Para- 2nd]

1) Adaptive radiation

2) Transduction

3) Prexexisting variation in the population

4) Divergent evolution

Ans.(3)

199. Read the following statement and choose incorrect one -

[NCERT-XII, Page-146, Para-1st]

1) Intestinal perforation and death may occurs in severe cases of typhoid

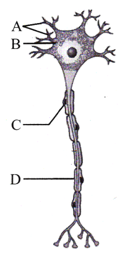
2) In severe cases of pneumonia, the lips and finger may turn gray to bluish in colour

3) Health simply means absence of disease or physical fitness

4) according to WHO, India is now free from polio

Ans.(3)

200. Which of the following is correctly identified w.r.t neuron? [NCERT-XI, Page-317, Diag. 21.1]



1) C-Non myelinated nerve fibre

2) A- Nissl's granules

3) D-Electrically insulating layer

4) B-Nucleus

Ans.(3)