Test Booklet Code

T3

NEET (UG) 2024

Questions, Answer Key & Solutions

Date: 05 May, 2024 | TIME: (02:00 PM to 05:20 PM)

Duration: 200 minutes (03 Hrs. 20 Min.) | Max. Marks: 720

Important Instructions:

1. The Answer Sheet is inside this Test Booklet. When you are directed to open the Test Booklet, take out the Answer Sheet and fill in the particulars on ORIGINAL Copy carefully with **blue/black** ball point pen only.
2. The test is of **3 hours 20 minutes** duration and Test Booklet contains **200** multiple-choice questions (four options with a single correct answer) from **Physics, Chemistry and Biology (Botany and Zoology). 50** questions in each subject are divided **into two Sections (A and B)** as per details given below :
   (a) **Section A** shall consist of **35 (Thirty-five)** Questions in each subject (Questions Nos – 1 to 35, 51 to 85, 101 to 135 and 151 to 185). All questions are compulsory.
   (b) **Section B** shall consist of **15 (Fifteen)** questions in each subject (Question Nos - 36 to 50, 86 to 100, 136 to 150 and 186 to 200). In Section B, a candidate needs to **attempt any 10 (Ten) questions out of 15 (Fifteen)** in each subject.
   Candidates are advised to read all 15 questions in each subject of Section B before they start attempting the question paper. In the event of a candidate attempting more than ten questions, **the first ten questions answered by the candidate shall be evaluated.**
3. Each question carries **4 marks**. For each correct response, the candidate will get 4 marks. For each incorrect response, **one mark** will be deducted from the total scores. **The maximum marks are 720.**
4. Use **Blue/Black Ball Point Pen only** for writing particulars on this page/marking responses on Answer Sheet.
5. Rough work is to be done on the space provided for this purpose in the Test Booklet only.
6. On completion of the test, the candidate **must hand over the Answer Sheet (ORIGINAL and OFFICE Copy) to the Invigilator** before leaving the Room/Hall. The candidates are allowed to take away this Test Booklet with them.
7. **The CODE for this Booklet is T3. Make sure that the CODE printed on the Original Copy of the Answer Sheet is the same as that on this Test Booklet.** In case of discrepancy, the candidate should immediately report the matter to the Invigilator for replacement of both the Test Booklet and the Answer Sheet.
8. The candidates should ensure that the Answer Sheet is not folded. Do not make any stray marks on the Answer Sheet. Do not write your Roll No. anywhere else except in the specified space in the Test Booklet/Answer Sheet.
9. Use of white fluid for correction is **NOT** permissible on the Answer Sheet.
10. Each candidate must show on-demand his/her Admit Card to the Invigilator.
11. No candidate, without special permission of the centre Superintendent or Invigilator, would leave his/her seat.
12. The candidates should not leave the Examination Hall without handing over their Answer Sheet to the Invigilator on duty and sign (with time) the Attendance Sheet twice. **Cases, where a candidate has not signed the Attendance Sheet second time, will be deemed not to have handed over the Answer Sheet and dealt with as an Unfair Means case.**
13. Use of Electronic/ Manual Calculator is prohibited.
14. The candidates are governed by all Rules and Regulations of the examination with regard to their conduct in the Examination Room/Hall. All cases of unfair means will be dealt with as per the Rules and Regulations of this examination.
15. **No part of the Test Booklet and Answer Sheet shall be detached under any circumstances.**
16. The candidates will write the Correct Test Booklet Code as given in the Test Booklet/Answer Sheet in the Attendance Sheet.
17. Compensatory time of one hour five minutes will be provided for the examination of three hours and 20 minutes duration, whether such candidate (having a physical limitation to write) uses the facility of scribe or not.

In case of any ambiguity in translation of any question, English version shall be treated as final.
प्रश्नों के अनुवाद में किसी अस्पष्टता की स्थिति में, अंग्रेजी संस्करण को ही अन्तिम माना जायेगा।

Name of the Candidate (in Capital letters): _____

Roll Number: in figures: _____ in words: _____

Name of Examination Centre (in Capital letters) : _____

Candidate's Signature: _____ Invigilator's Signature: _____

PART : PHYSICS

1. A tightly wound 100 turns coil of radius 10 cm carries a current of 7 A. The magnitude of the magnetic field at the centre of the coil is (Take permeability of free space as $4\pi\times10^{-7}$ SI units):

(1) 4.4 mT (2) 44 T (3) 44 mT (4) 4.4 T

Ans. **(1)**

Sol. $B=\frac{\mu_0 Ni}{2R}=\frac{4\pi\times10^{-7}\times100\times7}{2\times10\times10^{-2}}$

$=4.4mT$

2. Match List-I with List-II

List-I (Material)	List-II (Susceptibility χ)))
A. diamagnetic	I. χ = 0
B. Ferromagnetic	II. $0>\chi\geq-1$
C. Paramagnetic	III. $\chi>>1$
D. Non-magnetic	IV. $0<\chi<\varepsilon$ (a small positive number)

Choose the correct answer from the option given below:

(1) A-III, B-II,C-I,D-IV (2) A-IV, B-III,C-II,D-I

(3) A-II, B-III,C-IV,D-I (4) A-II, B-I,C-III,D-IV

Ans. **(3)**

Sol. diamagnetic Susceptibility χ is negative so $0>\chi\geq-1$

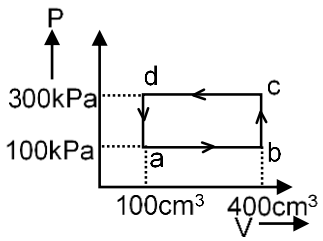
Non-magnetic Susceptibility χ is zero so χ = 0

Ferromagnetic Susceptibility χ is $\chi>>1$

Paramagnetic Susceptibility χ is $0<\chi<\varepsilon$ (a small positive number)

So answer is A-II, B-III,C-IV,D-I

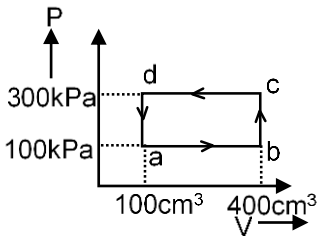
3. A thermodynamic system is taken through the cycle abcda. the work done by the gas along the path bc is



(1) $-90\ J^3$ (2) -90 J (3) Zero (4) 30 J

Ans. **(3)**

Sol.



The process bc is constant volume process

So work done is $W=\int p.dv$ $v=0$ so work done also 0

4. An unpolarised light beam strikes a glass surface at Brewster's angle. Then
(1) both the reflected and refracted light will be completely polarised
(2) the reflected light will be completely polarised but the refracted light will be partially polarised.
(3) the reflected light will be partially polarised.
(4) the refracted light will be completely polarised.

Ans. **(2)**

Sol. Theory base

5. In an ideal transformer, the turns ratio is $\frac{N_p}{N_s}=\frac{1}{2}$. The ratio Vs : V_p is equal to (the symbols carry their usual meaning):

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

Ans. **(4)**

Sol. Given That $\frac{N_p}{N_s}=\frac{1}{2}$

relation of ideal transformer is $\frac{V_s}{V_p}=\frac{N_s}{N_p}=\frac{2}{1}$

6. A logic circuit provides the output Y as per the follwing truth table :

A	B	Y
0	0	1
0	1	0
1	0	1
1	1	0

The expression for the output Y is

(1) $\overline{B}$ (2) B (3) $A.B+\overline{A}$ (4) $\overline{A.B}+\overline{A}$

Ans. **(1)**

Sol.

A	B	Y
0	0	1
0	1	0
1	0	1
1	1	0

$Y=\overline{B}$

B	$Y=\overline{B}$
0	1
1	0
0	1
1	0

7. In a vernier calipers, (N+1) divisions of vernier scale coincide with N divisions of main scale. If 1 MSD represents 0.1 mm, the vernier constant (in cm) is :

(1) 100 N (2) 10 (N+1) (3) $\frac{1}{10N}$ (4) $\frac{1}{100(N+1)}$

Ans. (4)

Sol. $LC = 1MSD - 1VSD$

(N+1) VSD = N(MSD)

$1VSD = \frac{N(0.1)}{N+1}$

$LC = \left(1-\frac{N}{N+1}\right)0.1mm$

$LC = \left[\frac{N+1-N}{N+1}\right]0.1\,mm$

$LC = \frac{1}{10(N+1)}mm$

$LC = \frac{1}{100(N+1)}cm$

8. The maximum elongation of a steel wire of 1m length if the elastic limit of steel and its Young's modulus, respectively, are and 8×10^{8} Nm^{-2} and 2×10^{11} Nm^{-2} is :

(1) 40 mm (2) 8 mm (3) 4 mm (4) 0.4 mm

Ans. (3)

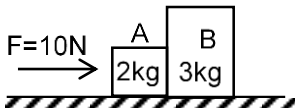
Sol. $Y = \frac{strees}{strain}$

$strain = \frac{stress}{Y}$ L = 1

$strain = \frac{8\times10^{8}}{2\times10^{11}} = 4\times10^{-3} = 4\,mm$

$strain = \frac{\Delta L}{L} = 4\,mm$

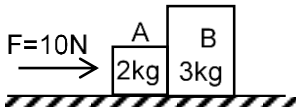
9. A horizontal force 10 N is applied to a block A as shown in figure. The mass of block A and B are 2 kg and 3 kg, respectively The blocks slide over a frictionless surface. The force exerted by block A on block B is :



(1) 6 N (2) 10 N (3) zero (4) 4 N

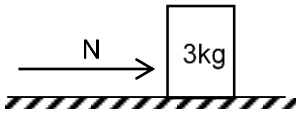
Ans. (1)

Sol.



acc. for a system mass F = ma

$$a = \frac{F}{m} = \frac{10}{5} = 2\ m/s^2$$



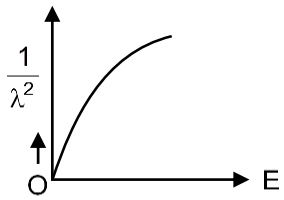
$$N = 3 \times 2 = 6\ N$$

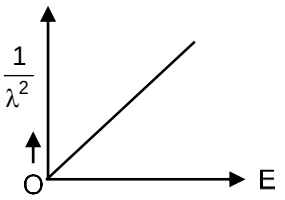
10. If the monochromatic source in Young's double slit experiment is replaced by white light, then
(1) There will be a central bright white fringe surrounded by a few coloured fringes.
(2) all bright fringes will be of equal width.
(3) interference pattern will disappear.
(4) there will be a central dark fringe surrounded by a few coloured fringes.

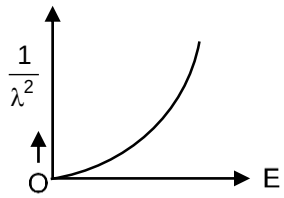
Ans. **(1)**

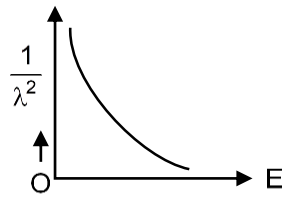
Sol. Theory Based

11. The graph which shows lite variation of $\left(\frac{1}{\lambda^2}\right)$ and its kinetic energy, E is (where λ is de Broglie wavelength of a free particle):

(1) 

(2) 

(3) 

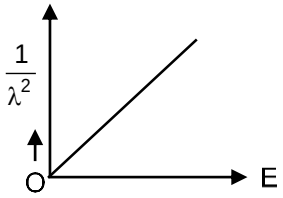
(4) 

Ans. **(2)**

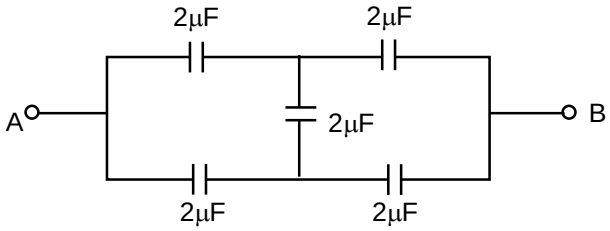
Sol. $$\lambda = \frac{h}{\sqrt{2mKE}}$$

$$K.E = \frac{h^2}{2m\lambda^2}$$

$$KE \propto \frac{1}{\lambda^2}$$



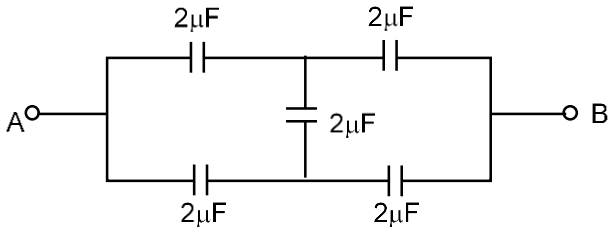
12. In the following circuit, the equivalent capacitance between terminal A and terminal B is :

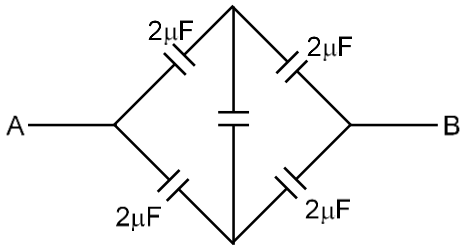


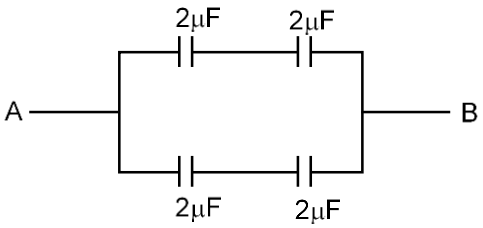
(1) 0.5 μ F (2) 4 μ F (3) 2 μ F (4) 1 μ F

Ans. **(3)**

Sol.

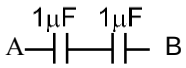






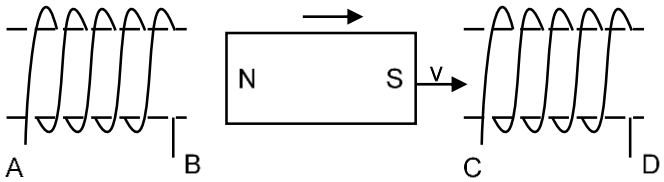
series = $C_{eq} = \frac{C_1C_2}{C_1+C_2} \Rightarrow \frac{2\times2}{2+2} = \frac{4}{4} = 1\mu F$

parallel $\Rightarrow$



C_{eq} = 2 μF

13.



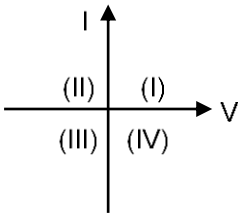
In the above diagram, a strong bar magnet is moving towards solenoid-2 from solenoid-1. The direction of induced current in solenoid-1 and that in solenoid-2, respectively, are through the directions :

(1) AB and CD (2) BA and DC (3) AB and DC (4) BA and CD

Ans. **(3)**

Sol. Theory based.

14. Consider the following statements A and B and identify the correct answer :

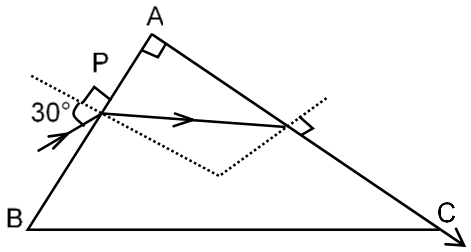


A. For a solar-cell, the I-V characteristics lies in the IV quadrant of the given graph.
B. In a reverse biased pn junction diode, the current measured in (μA), is due to majority charge carriers.
(1) Both A and B are correct. (2) Both A and B are incorrect.
(3) A is correct but B is incorrect. (4) A is incorrect but B is correct.

Ans. **(3)**

Sol. Theory based.

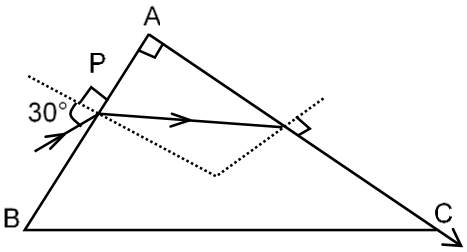
15. A light ray enters through a right angled prism at point P with the angle of incidence 30° as shown in figure. It travels through the prism parallel to its base BC and emerges along the face AC. The refractive index of the prism is :



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

Ans. **(4)**

Sol.



$n \sin\theta_i = 1$

$\sin\theta_i = \frac{1}{n}$

$\sin 30^o = n \sin(90 - \theta)$

$\frac{1}{2} = n\sqrt{1 - \frac{1}{n^2}}$

$\left(\frac{1}{2n}\right)^2 = 1 - \frac{1}{n^2}$

$\frac{1}{4n^2} = 1 - \frac{4}{4n^2}$

$$\frac{5}{4n^2} = 1$$

$$n^2 = \frac{5}{4}$$

$$n = \sqrt{\frac{5}{4}} = \frac{\sqrt{5}}{2}$$

16. Given below are two statements : one is labelled as Assertion A and the other is labelled as Reason R.
Assertion A : The potential (V) at any axial point at 2 m distance r from the centre of the dipole of dipole moment vector $\vec{P}$ of magnitude, 4×10^{-6} C m, is $\pm 9 \times 10^3$ V.

(Take $\frac{1}{4\pi \in_0} = 9 \times 10^3$ SI units)

Reason R : $V = \pm \frac{2P}{4\pi \in_0 r^2}$, where r is the distance of any axial point, situated at 2m from the centre of the dipole.

In the light of the above statements, choose the correct answer from the options given below :
(1) A is true but R is false.
(2) A is flase but R is true.
(3) Both A and R are true and R is the correct explanation of A.
(4) Both A and R are true and R is not the correct explanation of A.

Ans. **(1)**

Sol. $= \frac{kp\vec{.}r}{r^3}$

$$= \frac{kp}{r^2}$$

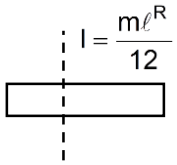
$$V = \frac{kp}{r^2}$$

$$= \frac{9\times10^9 \times 4\times10^{-6}}{4} = 9\times10^3 V$$

17. The moment of inertia of a thin rod about an axis passing through its mid point and perpendicular to the rod, is 2400 g cm^2. The length of the 400 g rod is nearly:
(1) 20.7 cm (2) 72.0 cm (3) 8.5 cm (4) 17.5 cm

Ans. **(3)**

Sol.



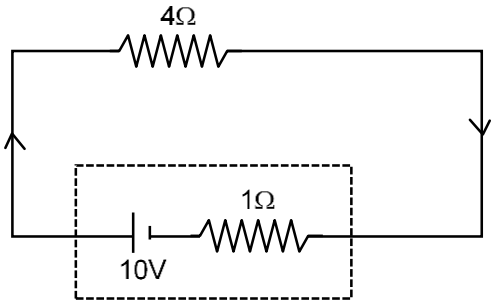
$$2400 = \frac{400\times\ell^2}{12}$$

$$\ell = 3\times2\sqrt{2}$$

$$\ell = 6\sqrt{2}$$

$= 6 \times 1.41 = 8.46 \approx 8.5$

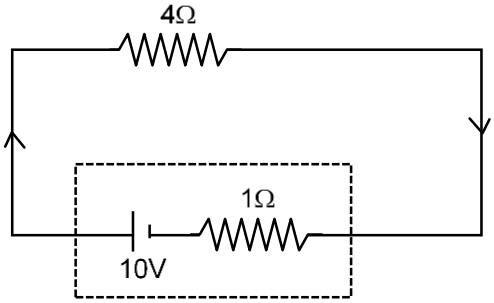
18. The terminal voltage of the battery, whose emf is 10 V and internal resistance 1Ω, when connected through an external resistance of 4Ω as shown in the figure is :



(1) 8V (2) 10 V (3) 4V (4) 6V

Ans. **(1)**

Sol. E = 10V, R = 1Ω, r = 4Ω



$V = \in - Ir$

$I = \frac{10}{5} = 2\,Amp$

$V = 10 - 2 \times 1 = 8V$

19. Match List I with List II

List I Spectral lines of hydrogen for transitions from)		**List II (Wavelengths (nm)**	
A.	$n_2 = 3$ to $n_1 = 2$	I.	410.2
B.	$n_2 = 4$ to $n_1 = 2$	II.	434.1
C.	$n_2 = 5$ to $n_1 = 2$	III.	656.3
D.	$n_2 = 6$ to $n_1 = 2$	IV.	486.1

Choose the correct answer from the options given below :

(1) A-IV, B-III, C-I, D-II

(2) A-I, B-II, C-III, D-IV

(3) A-II, B-I, C-IV, D-III

(4) A-III, B-IV, C-II, D-I

Ans. **(4)**

Sol. $\frac{1}{\lambda} = 10^{-7}\left[\frac{1}{2^2} - \frac{1}{3^2}\right]$

$= \frac{500}{36} \times 10^{-7} \times 10^{-2}$

In this case n_1 value is fixed (2) and n_2 value increased, so

$n_2 \propto \frac{1}{\lambda}$

$n_2 \uparrow \lambda\downarrow$

Answer will be

A-III, B-IV, C-II, D-I

20. If c is the velocity of light in free space, the correct statements about photon among the following are :

A. The energy of a photon is $E = h\nu$

B. The velocity of a photon is c.

C. The momentum of a photon, $p = \frac{h\nu}{c}$

D. In a photon-electron collision, both total energy and total momentum are conserved.

E. Photon possesses positive charge

Choose the correct answer from the options given below :

(1) A, C and D only (2) A, B, D and E only

(3) A and B only (4) A, B, C and D only

Ans. **(4)**

Sol. A, B, C and D only

Theory based.

21. $^{290}_{82}X \xrightarrow{\alpha} Y \xrightarrow{e^+} Z \xrightarrow{\beta^-} P \xrightarrow{e^-} Q$

In the nuclear emission stated above, the mass number and atomic number of the product Q respectively are

(1) 288, 82 (2) 286, 81 (3) 280, 81 (4) 286, 80

Ans. **(2)**

Sol. $_{82}X^{290} \longrightarrow {}_2He^4 + {}_{80}Y^{286} \longrightarrow {}_1e^0 + {}_{79}Z^{286} \longrightarrow {}_{-1}e^0 + {}_{80}P^{286} \longrightarrow {}_{-1}e^0 + {}_{81}Q^{286}$

$Q = {}_{81}Q^{286}$

22. At any instant of time t, the displacement of any particle is given by 2t – 1 (SI unit) under the influence of force of 5N. The value of instantaneous power is (in SI unit) :

(1) 7 (2) 6 (3) 10 (4) 5

Ans. **(3)**

Sol. $x = 2t - 1$

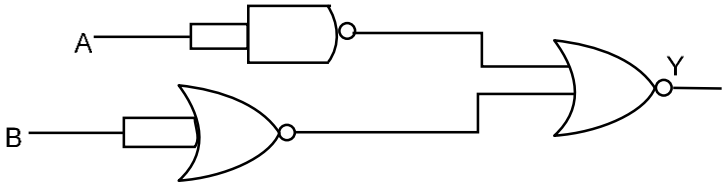
$F = 5$

$v = \frac{dx}{dt} = \frac{d}{dt}(2t-1)$

$v = 2$

$P = Fv = 5 \times 2 = 10$

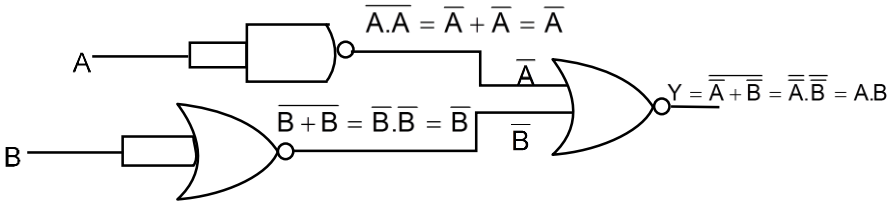
23. The output (Y) of the given logic gate is similar to the output of an/a :



(1) OR gate (2) AND gate (3) NAND gate (4) NOR gate

Ans. **(2)**

Sol.



24. The mass of a planet is $\frac{1}{10}$th that of the earth and its diameter is half that of the earth. The acceleration due to gravity on that planet is :

(1) 4.9 ms^{-2} (2) 3.92 ms^{-2} (3) 19.6 ms^{-2} (4) 9.8 ms^{-2}

Ans. **(2)**

Sol. $\frac{M}{10}, \frac{R}{2}$

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

$g' = \frac{1}{10} \times 4 \times 9.8 = 0.4 \times \frac{9.8}{10} = 3.92\ ms^{-2}$

25. Given below are two statements :

Statement I : Atoms are electrically neutral as they contain equal number of positive and negative charges.

Statement II : Atoms of each element are stable and emit their characteristic spectrum.

In the light of the above statements, choose the most appropriate answer from the options given below :

(1) Statement I is correct but Statement II is incorrect.

(2) Statement I is incorrect but Statement II is correct

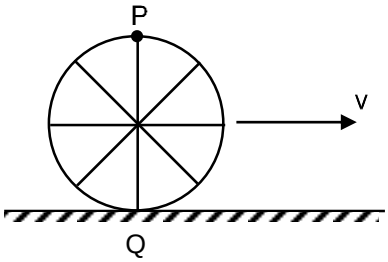
(3) Both Statement I and Statement II are correct

(4) Both Statement I and Statement II are incorrect.

Ans. **(3)**

Sol. Theory Based

26. A wheel of a bullock cart is rolling on a level road as shown in the figure below. If its linear speed is v in the direction shown, which one of the following options is correct (P and Q are any highest and lowest points on the wheel, respectively) ?



(1) Both the points P and Q move with equal speed
(2) Point P has zero speed.
(3) Point P moves slower than point Q.
(4) Point P moves faster than point Q.

Ans. **(4)**

Sol. at point P

$v + \omega r = 2v$

27. A particle moving with uniform speed in a circular path maintains :
(1) constant velocity but varying acceleration.
(2) varying velocity and varying acceleration
(3) constant velocity.
(4) constant acceleration.

Ans. **(2)**

Sol. Theory Based

28. A thin flat circular disc of radius 4.5 cm is placed gently over the surface of water. If surface tension of water is 0.07 Nm^{-1}, then the excess force required to take it away from the surface is :
(1) 1.98 mN (2) 99 N (3) 19.8 mN (4) 198 N

Ans. **(3)**

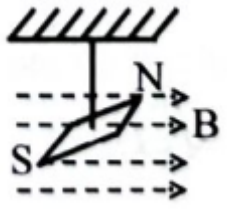
Sol. $F = 2\pi rT$

$= 2 \times \frac{22}{7} \times 4.5 \times 10^{-2} \times 0.07$

$= 2 \times 22 \times \frac{9}{2} \times 10^{-4}$

$= 19.8$ N

29. In a uniform magnetic field of 0.049 T, a magnetic needle performs 20 complete oscillations in 5 seconds as shown. The moment of inertia of the needle is 9.8×10^{-6} kg m^2. If the magnitude of magnetic moment of the needle is $x \times 10^{-5}$ Am^2, then value of 'x'is :



(1) 50 π^2 (2) 1280 π^2 (3) 5 π^2 (4) 128 π^2

Ans. **(2)**

Sol. $T = 2\pi\sqrt{\frac{I}{MB}}$ [T = 5/20 = 1/4]

$T^2 = 4\pi^2 \frac{I}{MB}$

$M = 4\pi^2 \frac{I}{T^2 \times B}$

$M = 4\pi^2 \times \frac{9.8\times10^{-6}}{\frac{1}{16}\times0.049} = \frac{16\times4\pi^2\times98\times10^{-6}\times10^3}{49\times10}$

$= \frac{32\times4\pi^2\times10^{-3}}{10}$

$= 128\pi^2 \times 10^{-4}$

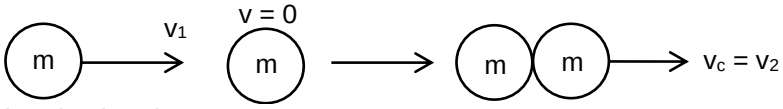
$= 1280\pi^2 \times 10^{-5}$

30. Two bodies A and B of same mass undergo completely inelastic one dimensional collision. The body A moves with velocity v_1 while body B is at rest before collision. The velocity of the system after collision is v_2. The ratio $v_1 : v_2$ is :

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

Ans. **(4)**

Sol.



$(P_{total})_i = (P_{total})_f$

$mv_1 + 0 = (2m)v_2$

$\frac{v_1}{v_2} = \frac{2}{1}$

31. If $x = 5\sin\left(\pi t + \frac{\pi}{3}\right)m$ represents the motion of a particle executing simple harmonic motion, the amplitude and time period of motion, respectively, are :

(1) 5 cm, 1 s (2) 5 m, 1 s (3) 5 cm, 2 s (4) 5 m, 2 s

Ans. **(4)**

Sol. $x = 5\sin(\pi t + \frac{\pi}{3})$ $x = A\sin(\omega t + \phi)$

A = 5 m and $\omega = \pi$

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

32. The quantities which have the same dimensions as those of solid angle are :

(1) strain and arc (2) angular speed and stress

(3) strain and angle (4) stress and angle

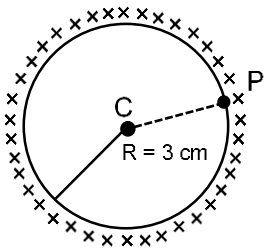
Ans. **(3)**

Sol. solid angle = dimension less

strain and angle = dimensionless

33. A thin spherical shell is charged by some source. The potential difference between the two points C and P (in V) shown in the figure is :

(Take $\frac{1}{4\pi \in_0} = 9\times10^9$ SI units)



(1) 0.5×10^5 (2) zero (3) 3×10^5 (4) 1×10^5

Ans. **(2)**

Sol. For this spherical shell

$V_{center} = V_{surface} = \frac{KQ}{R}$

$V_{center} - V_{surface} = 0$

34. A bob is whirled in a horizontal plane by means of a string with an initial speed of ω rpm. The tension in the string is T. If speed becomes 2ω while keeping the same radius, the tension in the string becomes :

(1) $\frac{T}{4}$ (2) $\sqrt{2}T$ (3) T (4) 4T

Ans. **(4)**

Sol. $T = m\omega^2 r \Rightarrow T \propto \omega^2$

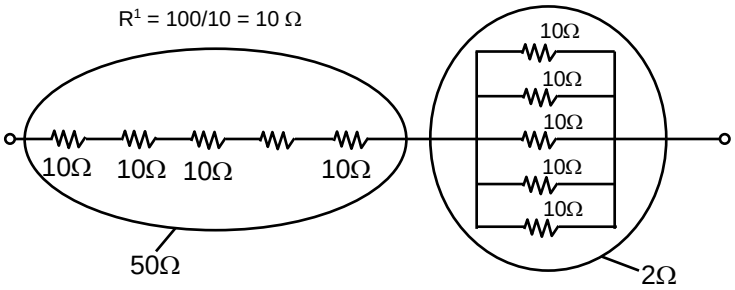
$w \rightarrow z$ times $\Rightarrow T \propto (2)^2 = 4$ times

35. A wire of length 'l' and resistance 100Ω is divided into 10 equal parts. The first 5 parts are connected in series while the next 5 parts are connected in parallel. The two combinations are again connected in series. The resistance of this final combination is :

(1) 55 Ω (2) 60 Ω (3) 26 Ω (4) 52 Ω

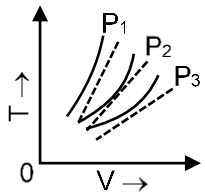
Ans. **(4)**

Sol.



$R_{eq} = 50 + 2 = 52\ \Omega$

36. The following graph represents the T-V curves of an ideal gas (where T is the temperature and V the volume) at three pressures P_1, P_2 and P_3 compared with those of Charles's law represented as dotted line



Then the correct relation is :

(1) $P_2 > P_1 > P_3$ (2) $P_1 > P_2 > P_3$ (3) $P_3 > P_2 > P_1$ (4) $P_1 > P_3 > P_2$

Ans. **(2)**

Sol. For ideal gas $PV = nRT$ so $T = \frac{P}{nR}V$, so $T \propto V$ and the slope till be $\frac{P}{nR}$

For $\text{slope}_1 > \text{slope}_2 > \text{slope}_3 \Rightarrow P_1 > P_2 > P_3$

So Answer will be (2)

37. A parallel plate capacitor is charged by connecting it to a battery through a resistor. If I is the current in the circuit then in the gap between the plates :

(1) displacement current of magnitude equal to I flows in a direction opposite to that of I.

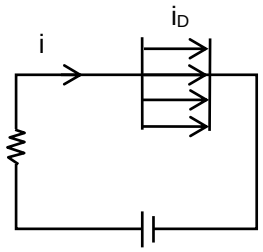
(2) displacement current of magnitude greater than I flows but can be in any direction.

(3) there is no current.

(4) displacement current of magnitude equal to I flows in the same direction as I.

Ans. **(4)**

Sol.



$i_D = i_{conduction}$

and in same direction

38. The property which is not of an electromagnetic wave travelling in free space is that :

(1) they travel with a speed equal to $\frac{1}{\sqrt{\mu_0 \in_0}}$.

(2) they originate from charges moving with uniform speed.

(3) they are transverse in nature.

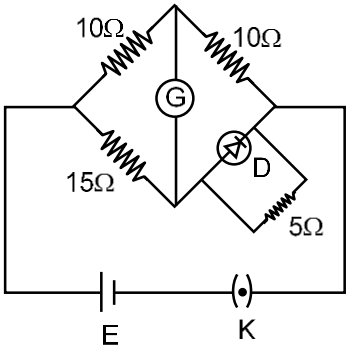
(4) the energy density in electric field is equal to energy density in magnetic field.

Ans. **(2)**

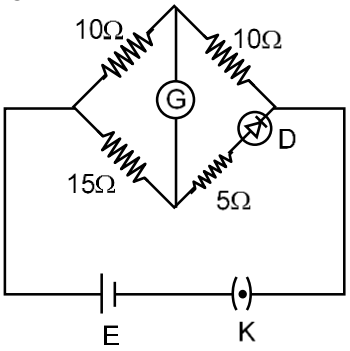
Sol. Electromagnetic waves are produced by accelerating charge not by charges moving with uniform velocity.

39. Choose the correct circuit which can achieve the bridge balance.

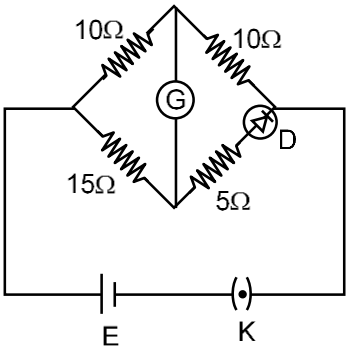
(1)



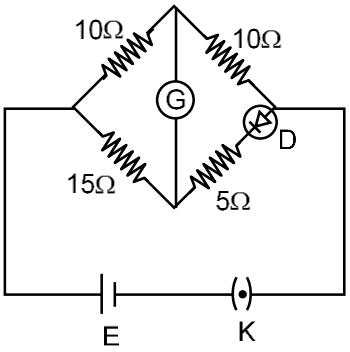
(2)



(3)

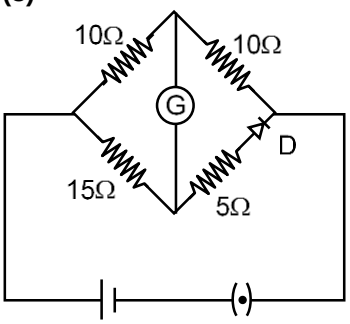


(4)



Ans. **(3)**

Sol.

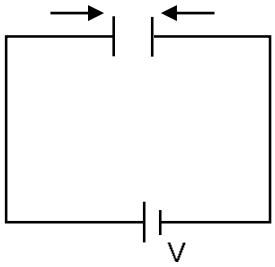


If the resistance of the diode in forward bias is 10Ω and its barrier potential is zero, then the wheatstone bridge can be balanced.

40. If the plates of a parallel plate capacitor connected to a battery are moved close to each other, then
A. the charge stores in it, increases.
B. the energy stored in it, decreases.
C. its capacitance increases.
D. the ratio of charge to its potential remains the same.
E. the product of charge and voltage increases.
Choose the most appropriate answer from the options given below :
(1) B, D and E only
(2) A, B and C only
(3) A, B and E only
(4) A, C and E only

Ans. **(4)**

Sol.



V = constant

$d\downarrow \Rightarrow C = \frac{\varepsilon_0 A}{d}$ will increase

(A) so charge q = CV will also Increase

(B) $U = \frac{1}{2}CV^2$ will increase

(C) C will increase

(D) $\frac{q}{V} = C$ will increase

(E) qV will also increase

41. A force defined by $F = \alpha t^2 + \beta t$ acts on a particle at a given time t. The factor which is dimensionless, if α and β are constants, is :

(1) $\alpha\beta t$ (2) $\frac{\alpha\beta}{t}$ (3) $\frac{\beta t}{\alpha}$ (4) $\frac{\alpha t}{\beta}$

Ans. (4)

Sol. $F = \alpha t^2 + \beta t$

$[\alpha t^2] = [\beta t]$

$\Rightarrow [\alpha t] = [\beta] \Rightarrow \frac{\alpha t}{\beta} = \text{dimensionless}$

42. A metallic bar of Young's modulus, 0.5×10^{11} Nm^{-2} and coefficient of linear thermal expansion 10^{-5} $^oC^{-1}$, length 1 m and area of cross-section 10^{-3} m^2 is heated from 0°C to 100°C without expansion or bending. The compressive force developed in it is :

(1) 100×10^3 N (2) 2×10^3 N (3) 5×10^3 N (4) 50×10^3 N

Ans. (4)

Sol. $F = \gamma A \propto \Delta T = (0.5 \times 10^{11})(10^{-3})(10^{-5})(100)$

$F = 50 \times 10^3$ N

43. A small telescope has an objective of focal length 140 cm and an eye piece of focal length 5.0 cm. The magnifying power of telescope for viewing a distant object is :

(1) 17 (2) 32 (3) 34 (4) 28

Ans. (4)

Sol. M.P. in normal configuration

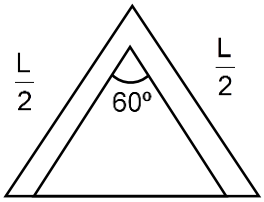
$M.P. = \frac{f_0}{f_e} = \frac{140}{5} = 25$

44. An iron bar of length L has magnetic moment M. It is bent at the middle of its length such that the two arms make an angle 60° with each other. The magnetic moment of this new magnet is :

(1) 2 M (2) $\frac{M}{\sqrt{3}}$ (3) M (4) $\frac{M}{2}$

Ans. (4)

Sol.



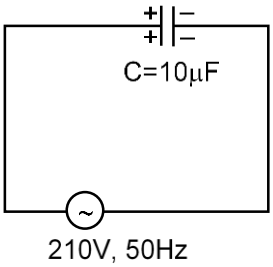
$$\ell_{eq} = \frac{L}{2}$$

$M = (m)(L)$

$M_2 = (m)\, L_{eq}$

$$M_2(m)\left(\frac{L}{2}\right) = \frac{M}{2}$$

45. A 10 μF capacitor is connected to a 210 V, 50 Hz source as shown in figure. The peak current in the circuit is nearly ($\pi = 3.14$) :



(1) 1.20 A (2) 0.35 A (3) 0.58 A (4) 0.93 A

Ans. **(4)**

Sol. $\omega = 2\pi f = 2\pi \times 50 = 100\ \pi$

$$X_C = \frac{1}{C\omega} = \frac{1}{10\times10^{-6}\times100\pi} = \frac{10^3}{\pi}$$

$$V_{rms} = \frac{V_0}{\sqrt{2}} = 210 \Rightarrow V_0 = 210\ \sqrt{2} \approx 300 \text{ volt}$$

$$i_0 = \frac{V_0}{|Z|} = \frac{300}{10^3/\pi} = \frac{3\times\pi}{10} = 0.93 \text{ A}$$

46. Two heaters A and B have power rating of 1kW and 2kW, respectively. Those two are first connected in series and then in parallel to a fixed power source. The ratio of power outputs for these two cases is :

(1) 1 : 2 (2) 2 : 3 (3) 1 : 1 (4) 2 : 9

Ans. **(4)**

Sol. $$P = \frac{V^2}{R} \Rightarrow R = \frac{V^2}{P} \Rightarrow P \propto \frac{1}{\text{Power rating}}$$

$\Rightarrow R_1 = 2R,\ R_1 = R$

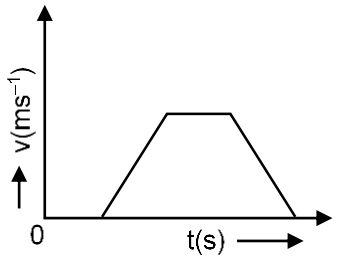
(i) $R_{eq} = 2R + R = 3R \Rightarrow P_1 = \frac{V^2}{R_{eq}} = \frac{V^2}{3R}$

(ii) $R_{eq} = \frac{(R)(2R)}{R+2R} = \frac{2R}{3} \Rightarrow P_2 = \frac{V^2}{R_{eq}} = \frac{V^2}{2R/3} = \frac{3V^2}{2R}$

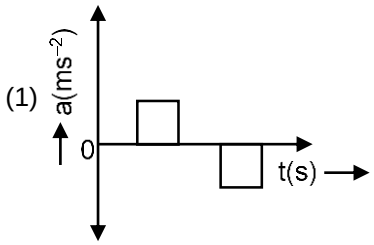
$$\frac{P_1}{P_2} = \frac{(R_{eq})_2}{(R_{eq})_1} = \frac{2R/3}{3R} = \frac{2}{9}$$

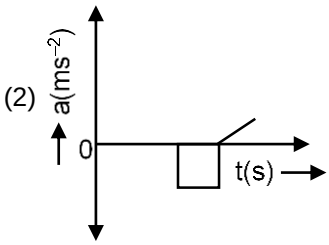
Ans. will be (4)

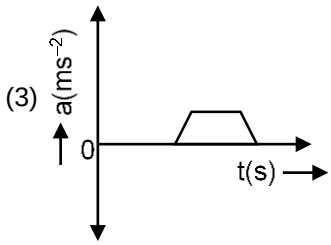
47. The velocity (v) – times (t) plot of the motion of a body is shown below :

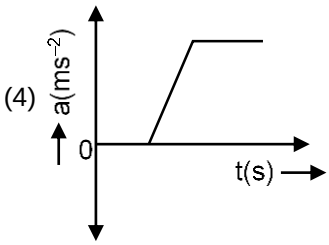


The acceleration (a) – time (t) graph that best suits this motion is :

(1) 

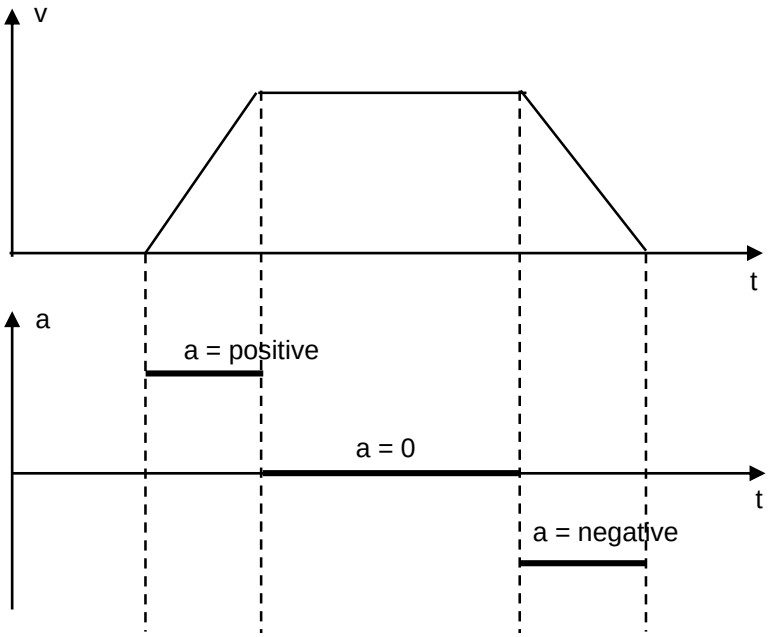
(2) 

(3) 

(4) 

Ans. (1)

Sol.



Answer will be (1)

48. If the mass of the bob in a simple pendulum is increased to thrice its original mass and its length is made half its original length, then the new time period of oscillation is $\frac{x}{2}$ times its original time period. Then the value of x is :

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

Ans. (4)

Sol. $T = 2\pi\sqrt{\frac{\ell}{g}} \Rightarrow T \propto \sqrt{\ell}$

$\ell = \frac{1}{2}$ times $\Rightarrow T \propto \sqrt{\frac{1}{2}} \propto \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$ times

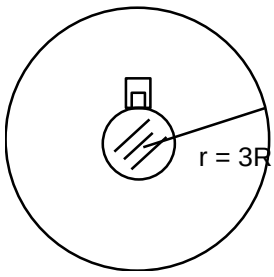
$\Rightarrow x = \sqrt{2}$, Answer will be (4)

49. The minimum energy required to launch a satellite of mass m from the surface of earth of mass M and radius R in a circular orbit at an altitude of 2R from the surface of the earth is:

(1) $\frac{GmM}{2R}$ (2) $\frac{GmM}{3R}$ (3) $\frac{5GmM}{6R}$ (4) $\frac{2GmM}{3R}$

Ans. (3)

Sol.



$W_{us} = TE \uparrow = TE_f - TE$

$W_{us} = \left(-\frac{GMm}{2(3R)}\right) - \left(0 + \left(-\frac{GMm}{R}\right)\right)$

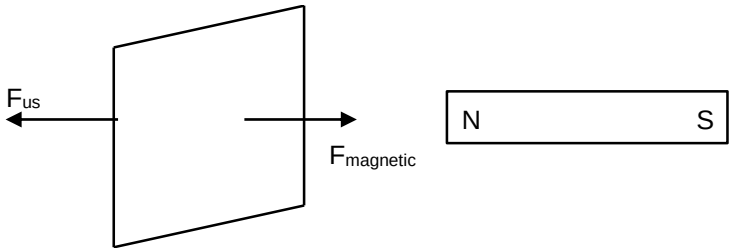
$W_{us} = \frac{5GMm}{6R}$ Ans. will be (3)

50. A sheet is placed on a horizontal surface in front of a strong magnetic pole. A force is needed to:
(A) hold the sheet there if it is magnetic.
(B) hold the sheet there if it is non-magnetic.
(C) move the sheet away from the pole with uniform velocity if it is conducting.
(D) move the sheet away from the pole with uniform velocity if it is both, non-conducting and non- polar.
Choose the correct statement(s) from the options given below:
(1) A, C and D only
(2) C only
(3) B and D only
(4) A and C only

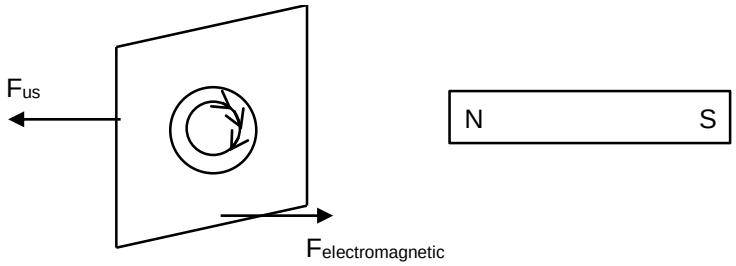
Ans. (4)

Sol.

(A)



(C)



(A) If the shset is magnetic, then it will feel either attraction force or repulsive force from the magnet. So, to hold the place we also have to apply some force.

(C) If the place is conducting and it is moved away, then eddy current will be produced in the sheet, and an electromagnetic force of attraction will be generated. To overcome that force, we have to apply some force.

PART : CHEMISTRY

51. Match List I with List II.

List I (Conversion)	**List II (Number of Faraday required)**
A. 1 mol of H_2O to O_2	I. 3F
B. 1 mol of MnO_4^- to Mn^{2+}	II. 2F
C. 1.5 mol of Ca from molten $CaCl_2$	III. 1F
D. 1 mol of FeO to Fe_2O_3	IV. 5F

Choose the correct answer from the options given below :

(1) A-II, B-III, C-I, D-IV (2) A-III, B-IV, C-II, D-I (3) A-II, B-IV, C-I, D-III (4) A-III, B-IV, C-I, D-II

Ans. **(3)**

Sol. (A) $H_2O \rightarrow \frac{1}{2} O_2(g) + 2H^+ + 2e^-$

2F

(A - II)

(B) $MnO_4^- + 8H^+ + 5e \rightarrow Mn^{2+} + 4H_2O$

5F

(B - IV)

(C) $Ca + 2Cl^- \rightarrow CaCl_2 + 2e^-$

1.5 mol 3 mol

3F

(C - I)

(D) $2FeO + H_2O \rightarrow Fe_2O_3 + 2H^+ + 2e^-$

1 mol 1F

(D - III)

52. Which reaction is **NOT** a redox reaction?

(1) $H_2 + Cl_2 \rightarrow 2HCl$ (2) $BaCl_2 + Na_2SO_4 \rightarrow BaSO_4 + 2NaCl$

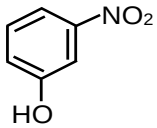
(3) $Zn + CuSO_4 \rightarrow ZnSO_4 + Cu$ (4) $2KClO_3 + I_2 \rightarrow 2KIO_3 + Cl_2$

Ans. **(2)**

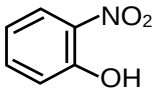
Sol. $BaCl_2 + Na_2SO_4 \rightarrow BaSO_4 + 2NaCl$

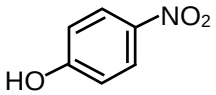
This not redox reaction, this is precipitation reaction.

53. Intramolecular hydrogen bonding is present in

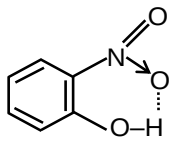
(1) 

(2) HF

(3) 

(4) 

Ans. **(3)**

Sol. 

Intramulecular H-bonding

54. Fehling's solution 'A' is

(1) alkaline solution of sodium potassium tartrate (Rochelle's salt)

(2) aqueous sodium citrate

(3) aqueous copper sulphate

(4) alkaline copper sulphate

Ans. **(3)**

Sol. aqueous copper sulphate (Fehling's solution 'A')

Alkaline solution of sodium potassium tartrate (Rochelle's salt) (Fehling's solution 'B')

55. 1 gram of sodium hydroxide was treated with 25 mL of 0.75 M HCl solution, the mass of sodium hydroxide left unreacted is equal to

(1) Zero mg (2) 200 mg (3) 750 mg (4) 250 mg

Ans. **(4)**

Sol. $NaOH + HCl \longrightarrow NaCl + H_2O$

Mole $\frac{1}{40}$ mol $0.75 \times 25 \times 10^{-3}$ mole

25×10^{-3} mol 18.75×10^{-3}

$(25 \times 10^{-3} - 18.75 \times 10^{-3})$mol

remaining mass of NaOH = $[25 - 18.75] \times 10^{-3} \times 40$

$= [6.25 \times 40] \times 10^{-3}$ gram

= 250 mg

56. Match List I with List II.

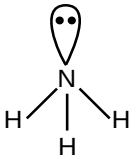
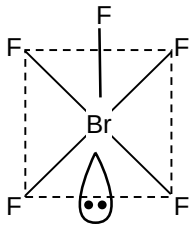
List I (Compound)	**List II (Shape/geometry)**
A. NH_3	I. Trigonal Pyramidal
B. BrF_5	II. Square Planar
C. XeF_4	III. Octahedral
D. SF_6	IV. Square Pyramidal

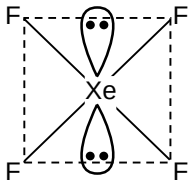
Choose the correct answer from the options given below :

(1) A-III, B-IV, C-I, D-II (2) A-II, B-III, C-IV, D-I (3) A-I, B-IV, C-II, D-III (4) A-II, B-IV, C-III, D-I

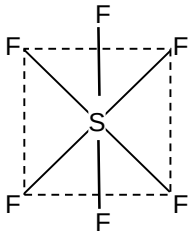
Ans. **(3)**

Sol.

Compound	**Share/geometry**	
(A) NH_3		Trigonal pyramidal
(B) BrF_5		Square pyramidal

(C) XeF_4 

Square pyramidal

(D) SF_6 

Octahedral pyramidal

57. The E^o value for the Mn^{3+}/Mn^{2+} couple is more positive than that of Cr^{3+}/Cr^{2+} or Fe^{3+}/Fe^{2+} due to change of

(1) d^4 to d^5 configuration (2) d^3 to d^5 configuration

(3) d^5 to d^4 configuration (4) d^5 to d^2 configuration

Ans. **(1)**

Sol. d^5 configuration have extra stability due to half-filled configuration as 3rd ionisation energy of Mn is much larger (due to change of d^5 to d^4). **(Reference of NCERT)**

But due to change in d^4 to d^5 is mainly responsible for much higher E^o of $Mn^{3+}|Mn^{2+}$

58. Match List I with List II.

List I **(Process)**	**List II** **(Conditions)**
A. Isothermal process	I. No heat exchange
B. Isochoric process	II. Carried out at constant temperature
C. Isobaric process	III. Carried out at constant volume
D. Adiabatic process	IV. Constant pressure

Choose the correct answer from the options given below :

(1) A-I, B-II, C-III, D-IV (2) A-II, B-III, C-IV, D-I (3) A-IV, B-III, C-II, D-I (4) A-IV, B-II, C-III, D-I

Ans. **(2)**

Sol.

	Process	**Condition**
A.	Isothermal process	Carried out at constant temperature
B.	Isochoric process	Carried out at constant volume
C.	Isobaric process	Carried out at constant pressure
D.	Adiabatic process	No Heat exchange.

A – II, B – III, C – IV, D - I

59. Activation energy of any chemical reaction can be calculated if one knows the value of

(1) orientation of reactant molecules during collision.

(2) rate constant at two different temperature.

(3) rate constant at standard temperature.

(4) probability of collision.

Ans. **(2)**

Sol. From Arrhenious equation

$$K = Ae^{-\frac{Ea}{RT}}$$

$$\Rightarrow \quad \log\left(\frac{k_2}{k_1}\right) = \frac{Ea}{2.303R}\left[\frac{1}{T_1} - \frac{1}{T_2}\right]$$

So by knowing Rate constant at two different temperatures we can calculate activation energy.

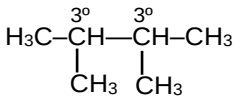
60. A compound with a molecular formula of C_6H_{14} has two tertiary carbons. Its IUPAC name is :

(1) 2,3-dimethylbutane (2) 2,2-dimethylbutane

(3) n-hexane (4) 2-methylpentane

Ans. **(1)**

Sol.



(2,3-dimethyl butane)

61. 'Spin only' magnetic moment is same for which of the following ions?

A. Ti^{3+} B. Cr^{2+}

C. Mn^{2+} D. Fe^{2+}

E. Sc^{3+}

Choose the most appropriate answer from the options given below :

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

Ans. **(3)**

Sol.

	Ion	**No. of unpaired electron**
A.	Ti^{3+}	$3d^1 \Rightarrow 1$
B.	Cr^{2+}	$3d^4 \Rightarrow 4$
C.	Mn^{2+}	$3d^5 \Rightarrow 5$
D.	Fe^{2+}	$3d^6 \Rightarrow 4$
E.	Sc^{3+}	$3d^0 \Rightarrow 0$

Same is number of unpaired electron same is magnetic moment (spin only).

62. Arrange the following elements in increasing order of electronegativity :

N, O, F, C, Si

Choose the correct answer from the options given below :

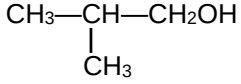
(1) O < F < N < C < Si (2) F < O < N < C < Si (3) Si < C < N < O < F (4) Si < C < O < N < F

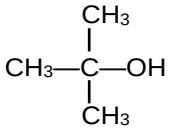
Ans. **(3)**

Sol. Order of electronegativity.

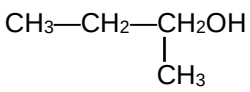
$\Rightarrow$ Si < C < N < O < F

63. Which one of the following alcohols reacts instantaneously with Lucas reagent ?

(1) 

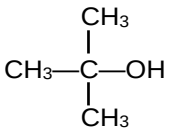
(2) 

(3) $CH_3—CH_2—CH_3—CH_2OH$

(4) 

Ans. **(2)**

Sol.



Reactivity of alcohol towards lucas reagent $\Rightarrow$ 3º alcohol > 2º alcohol > 1º alcohol

64. Given below are two statements:

Statement I : Both $[Co(NH_3)_6]^{3+}$ and $[CoF_6]^{3-}$ complexes are octahedral but differ in their magnetic behaviour.

Statement II : $[Co(NH_3)_6]^{3+}$ is diamagnetic whereas $[CoF_6]^{3-}$ is paramagnetic.

In the light of the above statements, choose the correct answer from the options given below:

(1) Statement **I** is true but Statement **II** is false. (2) Statement **I** is false but Statement **II** is true.

(3) Both statement **I** and Statement **II** are true. (4) Both statement **I** and Statement **II** are false.

Ans. **(3)**

Sol. $\left[Co(NH_3)_6\right]^{3+} \Rightarrow$ $3d^6 4s^0 \Rightarrow t_{2g}^{2,2,2}, eg^{0,0} \Rightarrow d^2sp^3$, octahedral

$\Rightarrow$ as complex have No unpaired electron so it is diamagnetic.

$[CoF_6]^{3-} \Rightarrow 3d^6 4s^0 \Rightarrow t_{2g}^{2,1,1}\ eg^{1,1} \Rightarrow sp^3sd^2$; octahedral

$\Rightarrow$ as complex have unpaired electron so it is paramagnetic.

65. Given below are two statements:

Statement I : The boiling point of hydrides of Group 16 elements follow the order $H_2O > H_2Te > H_2Se > H_2S$.

Statement II : On the basis of molecular mass, H_2O is expected to have lower boiling point than the other members of the group but due to the presence of extensive H-bonding in H_2O, it has higher boiling point.

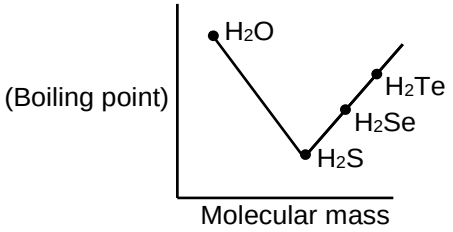
In the light of the above statements, choose the correct answer from the options given below:

(1) Statement **I** is true but Statement **II** is false. (2) Statement **I** is false but Statement **II** is true.

(3) Both statement **I** and Statement **II** are true. (4) Both statement **I** and Statement **II** are false.

Ans. **(3)**

Sol.



Boiling point order

Order $\Rightarrow H_2O > H_2Te > H_2Se > H_2S$

Due to hydrogen bonding H_2O have higher boiling point.

66. Match List I with List II

	List I **Quantum Number**		**List II** **Information provided**
(A)	m_l	(I)	shape of orbital
(B)	m_s	(II)	size of orbital
(C)	l	(III)	orientation of orbital
(D)	n	(IV)	orientation of spin of electron

Choose the correct answer from the options given below:

(1) A – III, B – IV, C – II, D – I (2) A – II, B – I, C – IV, D – III

(3) A – I, B – III, C – II, D – IV (4) A – III, B – IV, C – I, D – II

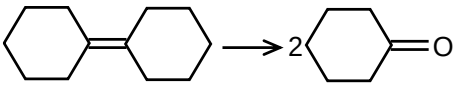
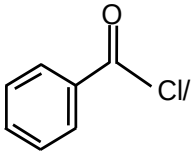
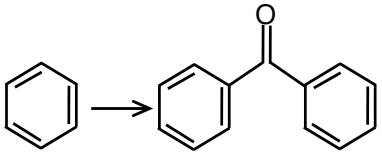
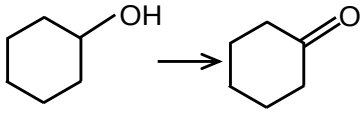
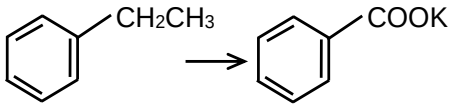
Ans. **(4)**

Sol.

	Quantum Number	**Information Provided**
(A)	m_ℓ	Orientation of orbital
(B)	m_s	Orientation of spin of electron
(C)	ℓ	Shape of orbital
(D)	n	Size of orbital

Sol. A – III, B – IV, C – I, D – II

67. Match List I with List II

	List I (Reaction)		**List II (Reagents/Condition)**
(A)		(I)	 Anhyd.$AlCl_3$
(B)		(II)	CrO_3
(C)		(III)	$KMnO_4/KOH, \Delta$
(D)		(IV)	(i) O_3 (ii) $Zn–H_2O$

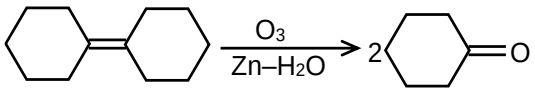
Choose the correct answer from the options given below:

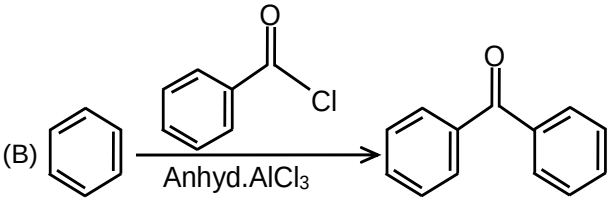
(1) A – IV, B – I, C – II, D – III (2) A – I, B – IV, C – II, D – III

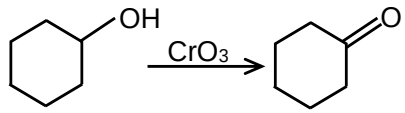
(3) A – IV, B – I, C – III, D – II (4) A – III, B – I, C – II, D – IV

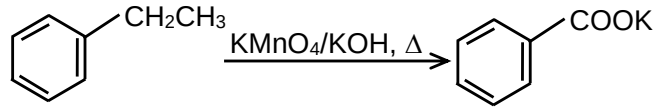
Ans. **(1)**

Sol. (1) A – IV, B – I, C – II, D – III

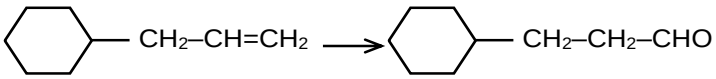
(A) 

(B) 

(C) 

(D) 

68. Identify the correct reagents that would bring about the following transformation.



(1)(i) BH_3, (ii) $H_2O_2/O^{\ominus}H$, (iii) alk. $KMnO_4$, (iv) $H_3O^{\oplus}$

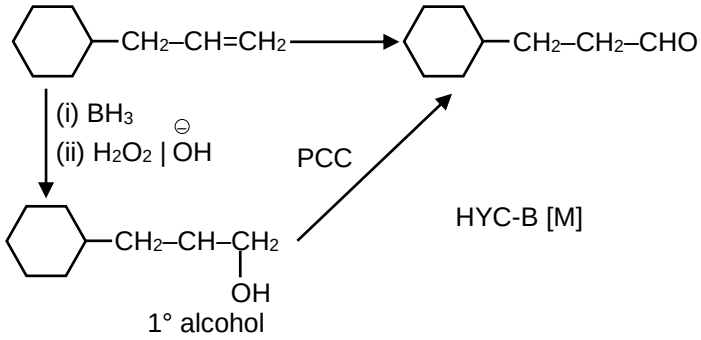
(2) (i) H_2O/H^+, (ii) PCC,

(3) (i) H_2O/H^+, (ii) CrO_3

(4) (i) BH_3, (ii) $H_2O_2/O^{\ominus}H$, (iii) PCC

Ans. **(4)**

Sol.



69. The reagents with which glucose does **not** react to give the corresponding tests/products are

A. Tollen's reagent

B. Schiff's reagent

C. HCN

D. NH_2OH

E. $NaHSO_3$

Choose the correct options from the given below:

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

Ans. **(1)**

Sol. (1) Glucose does not react to Schiff reagent and $NaHSO_3$

70. Match List I with List II

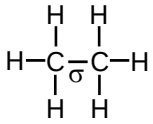
	List I (Molecule)		**List II (Number and types of bonds between two carbons atoms)**
(A)	ethane	(I)	one σ-bond and two π-bonds
(B)	ethene	(II)	two π-bonds
(C)	carbon molecule, C_2	(III)	one σ-bond
(D)	ethyne	(IV)	two σ-bond and one π-bond

Choose the correct answer from the options given below:

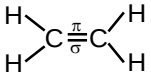
(1) A – III ; B – IV ; C – II ; D – I (2) A – III ; B – IV ; C – I ; D – II

(3) A – I ; B – IV ; C – II ; D – III (4) A – IV ; B – III ; C – II ; D – I

Ans. **(1)**

Sol. (A)  (1 σ)

Ethane

(B)  (1 σ and 1π)

(Ethene)

(C) Carbon molecule (C_2) (2 π bond)

According to MOT last electron present in π2px and π2py therefore only π bond form.

(D) H – C ≡ C – H (1 σ and 2π)

71. Among Group 16 elements, which one does **NOT** show –2 oxidation state?

(1) Te (2) P_O (3) O (4) Se

Ans. **(2)**

Sol. 16^{th} group element O S Se Te Po

Po does not show –2 oxidation state.

72. For the reaction $2A \rightleftharpoons B + C$, $K_C = 4 \times 10^{-3}$. At a given time, the composition of reaction mixture is: $[A] = [B] = [C] = 2 \times 10^{-3}M$.

Then, which of the following is correct?

(1) Reaction has a tendency to go in backward direction.

(2) Reaction has gone to completion forward direction.

(3) Reaction is at equilibrium.

(4) Reaction has a tendency to go in forward direction.

Ans. **(1)**

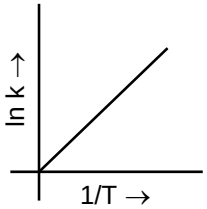
Sol. $2A \rightleftharpoons B + C$ $K_c = 4 \times 10^{-3}$

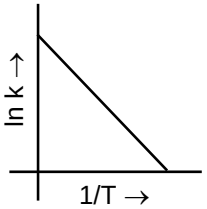
2×10^{-3} 2×10^{-3} 2×10^{-3}

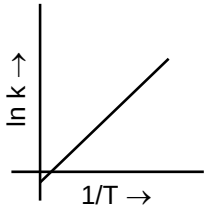
$Q_C = \frac{(2\times10^{-3})(2\times10^{-3})}{(2\times10^{-3})^2} = 1.$

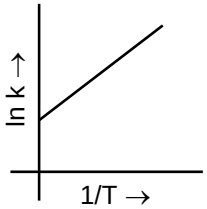
As $Q_C > K_C$ So reaction move backward direction.

73. Which plot of ln k vs $\frac{1}{T}$ is consistent with Arrhenius equiton?

(1) 

(2) 

(3) 

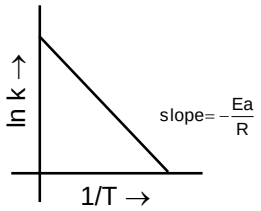
(4) 

Ans. **(2)**

Sol. According to Arrhenious equation

$K = A\,e^{-\frac{Ea}{RT}}$

$\ln k = \ln A - \left(\frac{Ea}{R}\right)\frac{1}{T}$



74. In which of the following equilibria, K_P and K_C are **NOT** equal?

(1) $CO_{(g)} + H_2O_{(g)} \rightleftharpoons CO_{2(g)} + H_{2(g)}$ (2) $2BrCl_{(g)} \rightleftharpoons Br_{2(g)} + Cl_{2(g)}$

(3) $PCl_{5(g)} \rightleftharpoons PCl_{3(g)} + Cl_{2(g)}$ (4) $H_{2(g)} + I_{2(g)} \rightleftharpoons 2HI_{g)}$

Ans. **(3)**

Sol. For reaction $\Delta n_g = 0 \Rightarrow k_p = k_c$

For reaction $PCl_{5(g)} \rightleftharpoons PCl_{3(g)} + Cl_{2(g)}$

$\Delta n_g = 1$

$k_p = k_c\,(RT)$

75. Given below are two statements:

Statement I : The boiling point of three isomeric pentanes follows the order
n-pentane > isopentane > neopentane

Statement II : When branching increases, the molecule attains a shape of sphere. This results in smaller surface area for contact, due to which the intermolecular forces between the spherical molecules are weak, thereby lowering the boiling point.

In the light of the above statements, choose the most appropriate answer from the options given below:

(1) Statement **I** is correct but Statement **II** is incorrect.

(2) Statement **I** is incorrect but Statement **II** is correct.

(3) Both statement **I** and Statement **II** are correct.

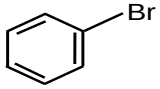
(4) Both statement **I** and Statement **II** are incorrect.

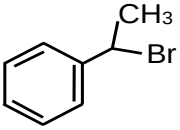
Ans. **(3)**

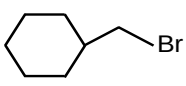
Sol. **Statement I :** Order of boiling point in isomeric pentane
n-pentane > isopentane > neopentane

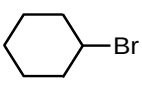
Statement II : When branching increases, the molecule attains a shape of sphere. This results in smaller surface area for contact, due to which the intermolecular forces between the spherical molecules are weak, thereby lowering the boiling point.

76. The compound that will undergo S_N1 reaction with the fastest rate is

(1) 

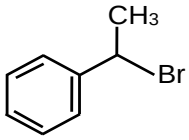
(2) 

(3) 

(4) 

Ans. **(2)**

Sol. Rate of $SN^1 \propto$ stability of carbocation



77. The energy of an electron in the ground state (n = 1) for He^+ ion is –x J, then that for an electron in n = 2 state for Be^{3+} ion in J is :

(1) – 4x (2) $-\frac{4}{9}x$ (3) – x (4) $-\frac{x}{9}$

Ans. **(3)**

Sol. $E_{He^+} = (E_H) \times \frac{Z^2}{n^2}$

$$(E_H) \times \frac{(2)^2}{1} = (E_H) \times \frac{(2)^2}{1} = -x$$

$$(E_{Be^{3+}}) = (E_H) \times \frac{(4)^2}{(2)^2} = (E_H) \times \frac{(4 \times 4)}{(2 \times 2)} = (E_H) \times \frac{(4)}{1} = -x$$

78. In which of the following processes entropy increases ?

A. A liquid evaporates to vapour.

B. Temperature of a crystalline solid lowered from 130 K to 0 K.

C. $2\,NaHCO_{3\,(s)} \rightarrow Na_2CO_{3\,(s)} + CO_{2\,(g)} + H_2O_{(g)}$

D. $Cl_{2(g)} \rightarrow 2Cl_{(g)}$

Choose the correct answer from the options given below :

(1) A, C and D (2) C and D (3) A and C (4) A, B and D

Ans. **(1)**

Sol.

Process	**Entropy change**
(A) $A(\ell) \longrightarrow A(g)$ vapourization	Increases
(B) $A_{(S)} \longrightarrow A_{(S)}$	Decreases
T = 130 K 0 K	
(C) $2NaHCO_3(s) \rightarrow Na_2CO_3(s) + CO_2(g) + H_2O(g)$	Increases
(D) $Cl_2(g) \longrightarrow 2Cl(g)$	Increases

So answer is A, C, D which in options 1

79. On heating, some solid substances change from solid to vapour state without passing through liquid state. The technique used for the purification of such solid substances based on the above principle is known as

(1) Distillation (2) Chromatography

(3) Crystallization (4) Sublimation

Ans. **(4)**

Sol. solid $\xrightarrow{\text{Sublimation}}$ Vapour

80. Match List I with List II.

	List I (Complex)		**List II (Type of isomerism)**
A.	$[Co(NH_3)_5(NO_2)]Cl_2$	I.	Solvate isomerism
B.	$[Co(NH_3)_5(SO_4)]Br$	II.	Linkage isomerism
C.	$[Co(NH_3)_6][Cr(CN)_6]$	III.	Ionization isomerism
D.	$[Co(H_2O)_6]Cl_3$	IV.	Coordination isomerism

Choose the correct answer from the options given below:

(1) A-I, B-IV, C-III, D-II (2) A-II, B-IV, C-III, D-I (3) A-II, B-III, C-IV, D-I (4) A-I, B-III, C-IV, D-II

Ans. **(3)**

Sol.

Complex	**Types of Isomerism**
(A) $[Co(NH_3)_5 (NO_2)] Cl_2$	(II) Linkage isomerism
(B) $[Co(NH_3)_5 (SO_4)] Br$	(III) Ionisation isomerism
(C) $[Co(NH_3)_6 (Cr(CN)_6]$	(IV) Co-ordination isomerism
(D) $[Co(H_2O)_6] Cl_2$	(I) solvate isomerism

A– II, B – III, C – IV, D – I

81. Given below are two statements :

Statement I : Aniline does not undergo Friedel-Crafts alkylation reaction.

Statement II : Aniline cannot be prepared through Gabriel synthesis.

In the light of the above statements, choose the correct answer from the options given below:

(1) Statement I is correct but Statement Ii is false.

(2) Statement I is incorrect but Statement Ii is true.

(3) Both Statement I and Statement II are true.

(4) Both Statement I and Statement II are false.

Ans. **(3)**

Sol. **Statement I :** Aniline does not undergo Friedel-Crafts alkylation reaction.

Solution : Aniline form complex compound with the catalyst of Anhy. $AlCl_3$ used in Fridal Crafts's Alkylation which is deactivates the benzene ring for further Electrophilic Substitution Reaction.

Statement II : Aniline cannot be prepared through Gabriel synthesis.

Solution: For the preparation of aniline using halo arene in which Carbon-Halogen bond partially double bonded. Which is not easily break.

82. Arrange the following elements in increasing order of first ionization enthalpy:

Li, Be, B, C, N

Choose the correct answer from the options given below:

(1) Li < Be < C < B < N (2) Li < Be < N < B < C

(3) Li < Be < B < C < N (4) Li < B < Be < C < N

Ans. **(4)**

Sol. Order of 1st ionisation energy $\Rightarrow$ Li < B < Be < C < N

83. The highest number of helium atoms is in

(1) 4 g of helium (2) 2.271098 L of helium at STP

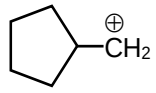
(3) 4 mol of helium (4) 4 u of helium

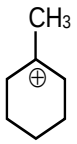
Ans. **(3)**

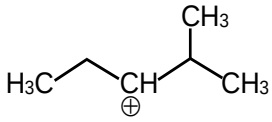
Sol.

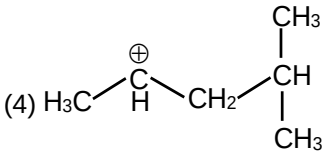
Amount	**No. of Helium atom**
(1) 4 g of Helium	$\frac{4}{4}$ = 1 mole = 1 N_A atom
(2) 2.271 L of Helium	$\frac{2.271}{22.4}$ = 0.101 mole = 0.101 N_A atom
(3) 4 mole of Helium	4 mole = 4 N_A atom
(4) 4 u of Helium	1 He atom

84. The most stable carbocation among the following is

(1) 

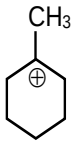
(2) 

(3) 

(4) 

Ans. **(2)**

Sol. Stability of carbocation is due to inductive effect and hyperconjugation.

 no. of α – H $\Rightarrow$ 7

85. The Henry's law constant (K_H) values of three gases (A, B, C) in water are 145, 2×10^{-5} and 35 kbar respectively. The solubility of these gases in water follow the order:

(1) A > C > B (2) A > B > C (3) B > A > C (4) B > C > A

Ans. **(4)**

Sol. Solubility of gas

$P = (K_H) X$

Higher the K_H lower is solubility.

So order of solubility $\Rightarrow$ B > C > A

86. A compound X contains 32% of A, 20% of B and remaining percentage of C. Then, the empirical formula of X is: (Given atomic masses of A = 64; B = 40; C = 32 u)

(1) AB_2C_2 (2) ABC_4 (3) A_2BC_2 (4) ABC_3

Ans. **(4)**

Sol.

Element	**%**	**Mole**	**Simple ratio**
A	32	$\frac{32}{64} = \frac{1}{2} = 0.5$	1
B	20	$\frac{20}{40} = \frac{1}{2} = 0.5$	1
C	48	$\frac{48}{32} = \frac{3}{2} = 1.5$	3

Empirical formula = ABC_3

87. The products A and B obtained in the following reactions, respectively, are

$3ROH + PCl_3 \rightarrow 3RCl + A$

$ROH + PCl_5 \rightarrow RCl + HCl + B$

(1) H_3PO_4 and $POCl_3$ (2) H_3PO_3 and $POCl_3$

(3) $POCl_3$ and H_3PO_3 (4) $POCl_3$ and H_3PO_4

Ans. **(2)**

Sol. $3ROH + PCl_3 \rightarrow 3RCl + \mathbf{H_3PO_3}$ (A)

$ROH + PCl_5 \rightarrow RCl + HCl + \mathbf{POCl_3}$ (B)

88. The plot of osmotic pressure (Π) vs concentration (mol L^{-1}) for a solution gives a straight line with slope 25.73 L bar mol^{-1}. The temperature at which the osmotic pressure measurement is done is:

(Use R = 0.083 L bar mol^{-1} K^{-1})

(1) 25.73°C (2) 12.05°C (3) 37°C (4) 310°C

Ans. **(3)**

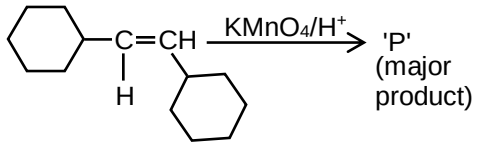
Sol. $\pi = CRT$

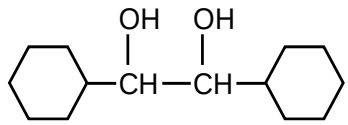
Slope = RT = 25.73

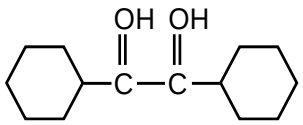
$T = \frac{25.73}{0.083} = 310$ K

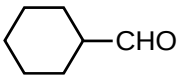
T = (310 – 273) = 37°C

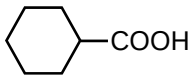
89. For the given reaction:



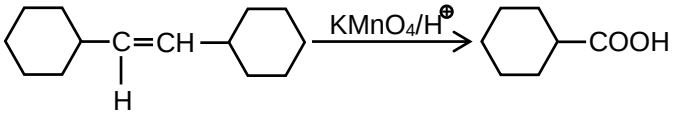
(1) 

(2) 

(3) 

(4) 

Ans. **(4)**

Sol. 

90. Given below are two statements:

Statement I: $\left[Co(NH_3)_6\right]^{3+}$ is a homoleptic complex whereas $\left[Co(NH_3)_4Cl_2\right]^{+}$ is a heteroleptic complex.

Statement II: Complex $\left[Co(NH_3)_6\right]^{3+}$ has only one kind of ligands but $\left[Co(NH_3)_4Cl_2\right]^{+}$ has more than one kind of ligands.

In the light of the above statements, choose the correct answer from the options given below:

(1) Statement I is true but Statement I is false. (2) Statement I is false but Statement II is true.

(3) Both Statement I and Statement II are true. (4) Both Statement I and Statement II are false.

Ans. **(3)**

Sol. $\left[Co(NH_3)_6\right]^{3+}$ is homoleptic as it contain one kind of ligand.

$\left[Co(NH_3)_4Cl_2\right]^{\oplus}$ is hetroleptic as it contain more than one kind of ligand.

91. During the preparation of Mohr's salt solution (Ferrous ammonium sulphate), which of the following acid is added to prevent hydrolysis of Fe^{2+} ion?

(1) dilute nitric acid (2) dilute sulphuric acid

(3) dilute hydrochloric acid (4) concentrated sulphuric acid

Ans. **(2)**

Sol. During preparation of mohr's salt dilute sulphuric acid is added to prevent hydrolysis of Fe^{2+} ion.

92. Identify the correct answer.

(1) Dipole moment of NF_3 is greater than that of NH_3.

(2) Three canocical forms can be drawn for CO_3^{2-} ion.

(3) Three resonance structures can be drawn for ozone.

(4) BF_3 has non-zero dipole moment.

Ans. **(2)**

Sol. (i) Dipole moment order = $NH_3 > NF_3$

(ii) Total canonical forms of $CO_3^{2-} \Rightarrow 3$

(iii) Resonance structure of ozone = 2

(iv) Dipole moment of $BF_3 = 0$

93. Given below are certain cations. Using inorganic qualitative analysis, arrange them in increasing group number from 0 to VI.

A. Al^{3+} B. Cu^{2+}

C. Ba^{2+} D. Co^{2+}

E. Mg^{2+}

Choose the correct answer from the options given below:

(1) E, C, D, B, A (2) E, A, B, C, D (3) B, A, D, C, E (4) B, C, A, D, E

Ans. **(3)**

Sol.

Sr. No.	A	B	C	D	E
Cation	Al^{3+}	Cu^{2+}	Ba^{2+}	Co^{2+}	Mg^{2+}
Group Number	III	II(A)	V	IV	VI

Increasing order of group number

$\Rightarrow$ B, A, D, C, E

94. Identify the major product C formed in the following reaction sequence:

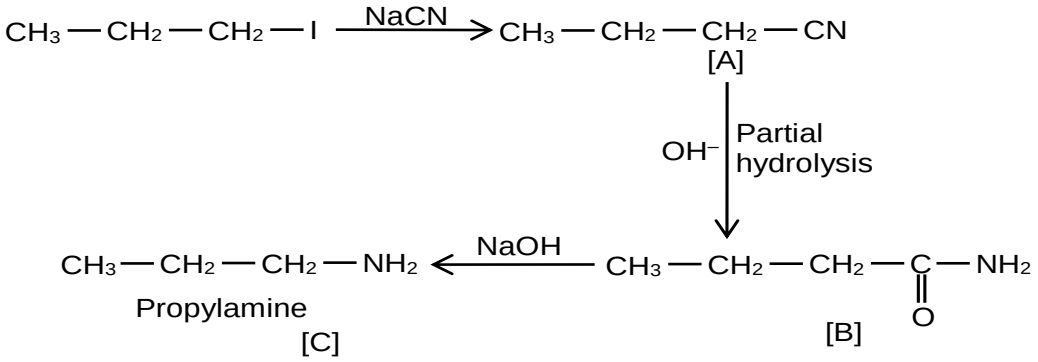
$$CH_3-CH_2-CH_2-I \xrightarrow{NaCN} A \xrightarrow[\text{Partial hydrolysis}]{OH^-} B \xrightarrow[Br_2]{NaOH} \underset{\text{(major)}}{C}$$

(1) butanamide (2) α–bromobutanoic acid

(3) propylamine (4) butylamine

Ans. **(3)**

Sol.



95. The rate of a reaction quadruples when temperature changes from 27°C to 57°C. Calculate the energy of activation.

Given R = 8.314 J K^{-1} mol^{-1}, log 4 = 0.6021

(1) 3.80 kJ/mol (2) 3804 kJ/mol (3) 38.04 kJ/mol (4) 380.4 kJ/mol

Ans. **(3)**

Sol. $\log\left(\frac{k_2}{k_1}\right) = \frac{Ea}{2.303R}\left[\frac{1}{T_1} - \frac{1}{T_2}\right]$

$\log(4) = \frac{Ea}{2.3\times 3\times 8.314}\left[\frac{1}{300} - \frac{1}{330}\right]$

$0.6020 = \frac{Ea}{2.303\times 8.314}\left[\frac{30}{300\times 330}\right]$

$Ea = \frac{0.6020\times 2.303\times 8.314\times 300\times 330}{30}$ = 38037.7 J = 38.04 kJ

96. Consider the following reaction is a sealed vessel at equilibrium with concentrations of

N_2 = 3.0 × 10^{-3} M, O_2 = 4.2 × 10^{-3} M and

NO = 2.8 × 10^{-3} M.

$2NO_{(g)} \rightleftharpoons N_{2(g)} + O_{2(g)}$

If 0.1 mol L^{-1} of $NO_{(g)}$ is taken in a closed vessel, what will be degree of dissociation (α) of $NO_{(g)}$ at equilibrium?

(1) 0.8889 (2) 0.717 (3) 0.00889 (4) 0.0889

Ans. **(2)**

Sol. Initially

	$2NO(g) \rightleftharpoons$	$N_2(g)$ +	$O_2(g)$
At Equilibrium	2.8×10^{-3}	3×10^{-3}	4.2×10^{-3}

$k_c = \frac{[N_2][O_2]}{[NO]^2} = \frac{3\times10^{-3}\times4.2\times10^{-3}}{(2.8\times10^{-3})^2} = 1.6$

Finally

	$2NO(g) \rightleftharpoons$	$N_2(g)$ +	$O_2(g)$
Initially conc.	0.1M	0	0
Finally	0.1(1-α)	0.1(α/2)	0.1(α/2)

$$k_c = \frac{\left\{\frac{\alpha}{2}\times\frac{\alpha}{2}\right\}\times 10^{-2}}{[0.1(1-\alpha)]^2} = 1.6 \qquad \Rightarrow \left[\frac{\alpha}{1-\alpha}\right]^2 = 1.6 \times 4$$

$$= \frac{\alpha}{1-\alpha} = 1.26\times 2$$

$\alpha = 0.717$

97. The work done during reversible isothermal expansion of one mole of hydrogen gas at 25°C from pressure of 20 atmosphere to 10 atmosphere to 10 atmosphere is :
(Given R = 2.0 cal K^{-1} mol^{-1})
(1) 413.14 calories (2) 100 calories (3) 0 calories (4) –413. 14 calories

Ans. **(4)**

Sol. Work done during reversible isothermal expansion

$$W = -2.303nRT\log\left(\frac{V_2}{V_1}\right) = -2.303\ nRT\log\left(\frac{P_1}{P_2}\right)$$

$$= -2.303 \times 1 \times 2 \times 298\log\left(\frac{20}{10}\right)$$

$= -2.303 \times 1 \times 2 \times 298 \log (2)$
$= -413.14$ calories.

98. Mass in grams of copper deposited by passing 9.6487 A current through a voltmeter containing copper sulphate solution for 100 seconds is : (**Given:** Molar mass of Cu : 63 g mol^{-1}, 1 F = 96487 C)
(1) 31.5 g (2) 0.0315 g (3) 3.15 g (4) 0.315 g

Ans. **(4)**

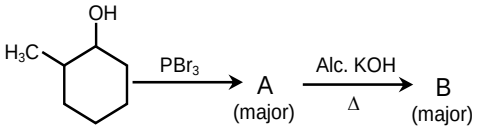
Sol. $Cu^{2+} + 2e^- \rightarrow Cu$

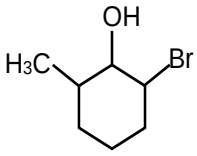
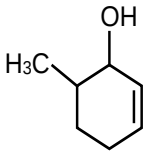
$$W = \left(\frac{E}{96487}\right)it$$

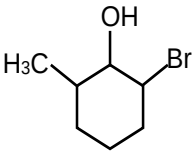
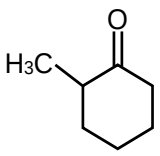
$$= \left(\frac{63}{2\times 96487}\right) \times 9.6487 \times 100$$

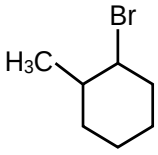
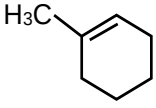
$$= \frac{63\times 96487\times 10^{-2}}{2\times 96487} = 31.5 \times 10^{-2} = 0.315 \text{ gram}$$

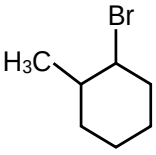
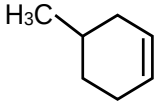
99. Major products A and B formed in the following reaction sequence, are



(1) A =  ; B = 

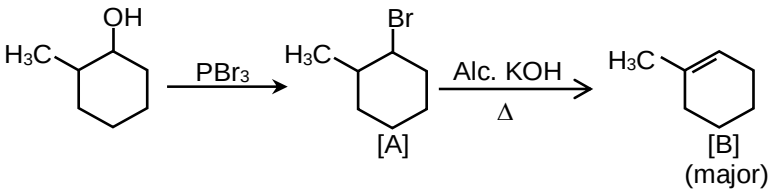
(2) A =  ; B = 

(3) A =  ; B = 

(4) A =  ; B = 

Ans. **(3)**

Sol.



100. The pair of Lanthanoid ions which are diamagnetic is

(1) Gd^{3+} and Eu^{3+} (2) Pm^{3+} and Sm^{3+} (3) Ce^{4+} and Yb^{2+} (4) Ce^{3+} and Eu^{2+}

Ans. **(3)**

Sol. The ion which have f^0 or d^{10}, f^{14} configuration are diamagnetic.

So, Ce^{4+} and Yb^{2+} are diamagnetic.

PART : BIOLOGY

Botany : Section –A (Q. No. 101 to 135)

101. Identify the set of correct statements:
A. The flowers of *Vallisneria* are colourful and produce nectar.
B. The flowers of waterlily are not pollinated by water.
C. In most of water-pollinated species, the pollen grains are protected from wetting.
D. Pollen grains of some hydrophytes are long and ribbon like.
E. In some hydrophytes, the pollen grains are carried passively inside water.
Choose the correct answer from the options given below:
(1) A, C, D and E only
(2) B, C, D and E only
(3) C, D and E only
(4) A, B, C and D only

Answer(2)

102. The type of conservation in which the threatened species are taken out from their natural habitat and placed in special setting where they can be protected and given special care is called;

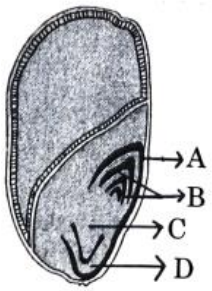
(1) Semi-conservative method
(2) Sustainable development
(3) In-situ conservation
(4) Biodiversity conservation

Answer (4)

103. Inhibition of Succinic dehydrogenase enzyme by malonate is a classical example of:
(1) Competitive inhibition
(2) Enzyme activation
(3) Cofactor inhibition
(4) Feedback inhibition

Answer(1)

104. Identify the part of the seed from the given figure which is destined to form root when the seed germinates.



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

Answer (1)

105. Bulliform cells are responsible for
(1) Increased photosynthesis in monocots.
(2) Providing large spaces for storage of sugars.
(3) Inward curling of leaves in monocots.
(4) Protecting the plant from salt stress.

Answer (3)

106. Which of the following are required for the dark reaction of photosynthesis?
A. Light
B. Chlorophyll
C. CO_2
D. ATP
E. NADPH
Choose the correct answer from the options given below:
(1) C, D and E only
(2) D and E only
(3) A, B and C only
(4) B, C and D only
Answer (1)

107. Formation of interfascicular cambium from fully developed parenchyma cells is an example for

(1) Dedifferentiation (2) Maturation
(3) Differentiation (4) Redifferentiation
Answer (1)

108. Hind II always cuts DNA molecules at a particular point called recognition sequence and it consists of:

(1) 4 bp (2) 10 bp (3) 8 bp (4) 6 bp
Answer (4)

109. Tropical regions show greatest level of species richness because
A. Tropical latitudes have remained relatively undisturbed for millions of years, hence more time was available for species diversification.
B. Tropical environments are more seasonal.
C. More solar energy is available in tropics.
D. Constant environments promote niche specialization.
E. Tropical environments are constant and predictable.
Choose the correct answer from the options given below:
(1) A, B and E only (2) A, B and D only
(3) A, C, D and E only (4) A and B only
Answer (3)

110. Which one of the following is not a criterion for classification of fungi?
(1) Mode of spore formation (2) Fruiting body
(3) Morphology of mycelium (4) Mode of nutrition
Answer (4)

111. How many molecules of ATP and NADPH are required for every molecule of CO_2 fixed in the Calvin cycle?
(1) 3 molecules of ATP and 3 molecules of NADPH
(2) 3 molecules of ATP and 2 molecules of NADPH
(3) 2 molecules of ATP and 3 molecules of NADPH
(4) 2 molecules of ATP and 2 molecules of NADPH
Answer (2)

112. These are regarded as major causes of biodiversity loss:
A. Over exploitation B. Co-extinction
C. Mutation D. Habitat loss and fragmentation Migration
Choose the correct option:
(1) A, B and E only (2) A, B and D only B (3) A, C and D only (4) A, B, C and D only
Answer (2)

113. The capacity to generate a whole plant from any cell of the plant is called:
(1) Differentiation (2) Somatic hybridization
(3) Totipotency (4) Micropropagation
Answer (3)

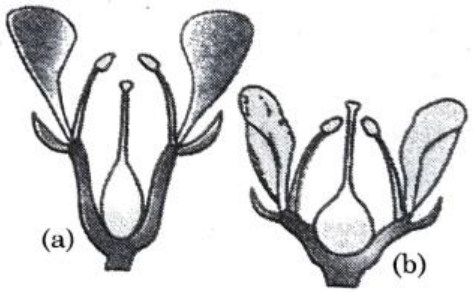
114. The equation of Verhulst-Pearl logistic growth is

$$\frac{dN}{dt} = rN\left[\frac{K-N}{K}\right]$$

From this equation, K indicates:
(1) Carrying capacity (2) Population density
(3) Intrinsic rate of natural increase (4) Biotic potential
Answer (1)

115. Spindle fibers attach to kinetochores of chromosomes during
(1) Anaphase (2) Telophase (3) Prophase (4) Metaphase
Answer (4)

116. Identify the type of flowers based on the position of calyx, corolla and androecium with respect to the ovary from the given figures (a) and (b)



(1) (a) Perigynous; (b) Epigynous (2) (a) Perigynous; (b) Perigynous
(3) (a) Epigynous; (b) Hypogynous (4) (a) Hypogynous; (b) Epigynous
Answer (2)

117. Match List I with List II

List I	**List II**
A. Rhizopus	I. Mush Mushroom
B. Ustilago	II. Smut fungus
C. Puccinia	III. Bread mould
D. Agaricus	IV. Rust fungus

Choose the correct answer from the options given below:
(1) A-III, B-II, C-I, D-IV (2) A-IV, B-III, C-II, D-I
(3) A-III, B-II, C-IV, D-I (4) A-I, B-III, C-II, D-IV
Answer (3)

118. In a plant, black seed colour (BB/Bb) is dominant over white seed colour (bb). In order to find out the genotype of the black seed plant, with which of the following genotype will you cross it?
(1) Bb (2) BB/Bb (3) BB (4) bb
Answer (4)

119. A pink flowered Snapdragon plant was crossed with a red flowered Snapdragon plant. What type RR of phenotype/s is/are expected in the progeny?

(1) Only pink flowered plants
(2) Red, Pink as well as white flowered plants
(3) Only red flowered plants
(4) Red flowered as well as pink flowered plants

Answer (4)

120. Match List I with List II

List I		List II	
A.	Two or more alternative forms of a gene	I.	Back cross
B.	Cross of F_1 progeny with homozygous recessive parent	II.	Ploidy
C.	Cross of F_1 progeny with any of the parents	III.	Allele
D.	Number of chromosome sets in plant	IV.	Test cross

Choose the correct answer from the options given below:

(1) A-III, B-IV, C-I, D-II
(2) A-IV, B-III, C-II, D-I
(3) A-I, B-II, C-III, D-IV
(4) A-II, B-I, C-III, D-IV

Answer (1)

121. Lecithin, a small molecular weight organic compound found in living tissues, is an example of:

(1) Glycerides (2) Carbohydrates (3) Amino acids (4) Phospholipids

Answer (4)

122. Match List I with List II

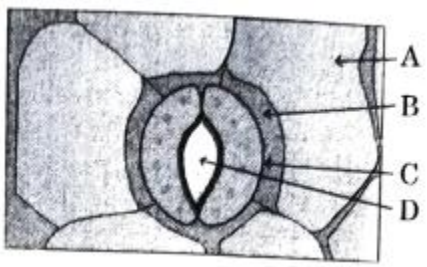
List I		List II	
A.	*Clostridium butylicum*	I.	Ethanol
B.	*Saccharomyces cerevisiae*	II.	Streptokinase
C.	*Trichoderma polysporum*	III.	Butyric acid
D.	*Streptococcus sp.*	IV.	Cyclosporin-A

Choose the correct answer from the options given below:

(1) A-III, B-I, C-IV, D-II
(2) A-IV, B-I, C-III, D-II
(3) A-III, B-I, C-II, D-IV
(4) A-II, B-IV, C-III, D-I

Answer (1)

123. In the given figure, which component has thin outer walls and highly thickened inner walls?



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

Answer (3)

124. Which of the following is an example of actinomorphic flower?
(1) *Pisum* (2) *Sesbania* (3) *Datura* (4) *Cassia*
Answer (3)

125. A transcription unit in DNA is defined primarily by the three regions in DNA and these are with respect to upstream and down stream end;
(1) Inducer, Repressor, Structural gene
(2) Promotor, Structural gene, Terminator
(3) Repressor, Operator gene, Structural gene
(4) Structural gene, Transposons, Operator gene
Answer (2)

126. What is the fate of a piece of DNA carrying only gene of interest which is transferred into an alien organism?
A. The piece of DNA would be able to multiply itself independently in the progeny cells of the organism.
B. It may get integrated into the genome of the recipient.
C. It may multiply and be inherited along with the host DNA.
D. The alien piece of DNA is not an integral part of chromosome.
E. It shows ability to replicate.
Choose the correct answer from the options given below:
(1) B and C only (2) A and E only (3) A and B only (4) D and E only
Answer (1)

127. Auxin is used by gardeners to prepare weed-free lawns. But no damage is caused to grass as auxin
(1) does not affect mature monocotyledonous plants.
(2) can help in cell division in grasses, to produce growth.
(3) promotes apical dominance.
(4) promotes abscission of mature leaves only.
Answer (1)

128. The factor of the enzyme carboxypeptidase
(1) Flavin (2) Haem (3) Zinc (4) Niacin
Answer (3)

129. The lactose present in the growth medium of bacteria is transported to the cell by the action of

(1) Permease (2) Polymerase (3) Beta-galactosidase (4) Acetylase
Answer (1)

130. Which one of the following can be explained on the basis of Mendel's Law of Dominance?

A. Out of one pair of factors one is dominant and the other is recessive.
B. Alleles do not show any expression and both the characters appear as such in F_2 generation.
C. Factors occur in pairs in normal diploid plants.
D. The discrete unit controlling a particular character is called factor.
E. The expression of only one of the parental characters is found in a monohybrid cross.
Choose the correct answer from the options given below:
(1) B, C and D only (2) A, B, C, D and E
(3) A, B and C only (4) A, C, D and E only
Answer (4)

131. Given below are two statements:
Statement I: Bt toxins are insect group specific and coded by a gene cry IAc.
Statement II: Bt toxin exists as inactive protoxin in B. thuringiensis. However, after ingestion by the insect the inactive protoxin gets converted into active form due to acidic pH of the insect gut.
In the light of the above statements,
choose the correct answer from the options given below:
(1) Statement I is true but Statement II is false
(2) Statement I is false but Statement II is true
(3) Both Statement I and Statement II are true
(4) Both Statement I and Statement II are false

Answer (1)

132. Given below are two statements:
Statement I: Parenchyma is living but collenchyma is dead tissue.
Statement II: Gymnosperms lack xylem vessels but presence of xylem vessels is the characteristic of angiosperms.
In the light of the above statements, choose the correct answer from the options given below:
(1) Statement I is true but Statement II is false
(2) Statement I is false but Statement II is true
(3) Both Statement I and Statement II are true
(4) Both Statement I and Statement II are false

Answer (2)

133. Given below are two statements:
Statement I: Chromosomes become gradually visible under light microscope during leptotene stage.
Statement II: The begining of diplotene stage is recognized by dissolution of synaptonemal complex.
In the light of the above statements, choose the correct answer from the options given below:
(1) Statement I is true but Statement II is false
(2) Statement I is false but Statement II is true
(3) Both Statement I and Statement II are true
(4) Both Statement I and Statement II are false

Answer (3)

134. Match List I with List II

List I	List II
A. Nucleolus	I. Site of formation of glycolipid
B. Centriole	II. Organization like the cartwheel
C. Leucoplast	III. Site for active ribosomal RNA
D. Golgi apparatus	IV. for storing nutrients

Choose the correct answer from the options given below:
(1) A-III, B-IV, C-II, D-I
(2) A-I, B-II, C-III, D-IV
(3) A-III, B-II, C-IV, D-I
(4) A-II, B-III, C-I, D-IV

Answer (3)

135. A List of endangered species was released by-
(1) FOAM (2) IUCN (3) GEAC (4) WWF

Answer (2)

Botany : Section –B (Q. No. 136 to 150)

136. The DNA present in chloroplast is:

(1) Linear, single stranded
(2) Circular, single stranded
(3) Linear, double stranded
(4) Circular, double stranded

Answer (4)

137. Which of the following are fused in somatic hybridization involving two varieties of plants?

(1) Protoplasts
(2) Pollens
(3) Callus
(4) Somatic embryos

Answer (1)

138. Identify the correct description about the given figure:

(1) Cleistogamous flowers showing autogamy.
(2) Compact inflorescence showing complete autogamy.
(3) Wind pollinated plant inflorescence showing flowers with well exposed.stamens.
(4) Water pollinated flowers showing stamens with mucilaginous covering.

Answer (3)

139. Spraying sugarcane crop with which of the following plant growth regulators, increases the length of stem, thus, increasing the yield?

(1) Cytokinin
(2) Abscisic acid
(3) Auxin
(4) Gibberellin

Answer (4)

140. Match List I with List II

List I	**List II**
A. Frederick Griffith	I. Genetic code
B. Francois Jacob & Jacque	II. Semi-conservative mode of DNA replication
C. Har Gobind Khorana	III. Transformation
D. Meselson & Stahl	IV. Lac operon

Choose the correct answer from the option given below:

(1) A-II, B-III, C-IV, D-I
(2) A-IV, B-I, C-II, D-III
(3) A-III, B-IV, C-I, D-IV
(4) A-III, B-IV, C-I, D-II

Answer (4)

141. Match List I with List II

List I	List II
A. GLUT-4	I. Hormone
B. Insulin	II. Enzyme
C. Trypsin	III. Intercellular
D. Collagen	IV. Enables glucose transport into cell

Choose the correct answer from the options given below:

(1) A-II, B-III, C-IV, D-I (2) A-III, B-IV, C-I, D-II

(3) A-IV, B-I, C-II, D-III (4) A-I, B-II, C-III, D-IV

Answer (3)

142. Given below are two statements:

Statement I: In C_3 plants, some O_2 bino RuBisCO, hence CO_2 fixation is decreased.

Statement II: In C_4 plants, mesophyll cells show very little photorespiration while bundle show cells do not show photorespiration.

In the light of the above statements, choose correct answer from the options given below

(1) Statement I is true but statement II is false

(2) Statement I is false but statement II is true

(3) Both statement I and statement II are true

(4) Both statement I and statement II are false

Answer (1)

143. Identify the step in tricarboxylic acid cycle, which does not involve oxidation of substrate.

(1) Succinyl -CoA$\rightarrow$Succinic acid

(2) Isocitratrate $\rightarrow$ $\alpha-$ ketoglutaric acid

(3) Malic acid $\rightarrow$ Oxaloacetic acid

(4) Succinic acid $\rightarrow$ Malic acid

Answer (1)

144. Match List I with List II

List I	List II
A. Citric acid cycle	I. Cytoplasm
B. Glycolysis	II. Mitochondrial matrix
C. Electron transport system	III. Intermembrane space of mitrochndria
D. Proton gradient	IV. Inner mitochondrial membrane

Choose the correct answer from the option given below:

(1) A-III, B-IV, C-I, D-II

(2) A-IV, B-III, C-II, D-I

(3) A-I, B-II, C-III, D-IV

(4) A-II, B-I, C-IV, D-III

Answer (4)

145. Which of the following statement is correct regarding the process of replication in E.coli?

(1) The DNA dependent DNA polymerase catalyses polymerization in 5'$\rightarrow$3' as well as 3'$\rightarrow$5' direction.

(2) The DNA dependent DNA polymerase catalyses polymerization in 5'$\rightarrow$3' direction.

(3) The DNA dependent DNA polymerase catalyses polymerization in one direction that is 3'$\rightarrow$5'.

(4) The DNA dependent RNA polymerase catalyses polymerization in one direction, that is 5'$\rightarrow$3'.

Answer (2)

146. In an ecosystem if the Net Primary Productivity (NPP) of first trophic level is $100x(kcal\ m^{-2})yr^{-1}$ what would be the GPP (Gross Primary Productivity) of the third trophic level of the same ecosystem ?

(1) $10x(kcal\ m^{-2})yr^{-1}$ (2) $100x/3x(kcal\ m^{-2})yr^{-1}$

(3) $x/10(kcal\ m^{-2})yr^{-1}$ (4) $x(kcal\ m^{-2})yr^{-1}$

Answer (4)

147. Match List I with List II

List I	**List II**
A. Rose	I. Twisted aestivatio
B. Pen	II. perigynous flower
C. Cotton	III. Drupe
D. Mango	IV. Marginal placentation

Choose the correct answer from the option given below:

(1) A-IV, B-III, C-II, D-I (2) A-II, B-III, C-IV, D-I

(3) A-II, B-IV, C-I, D-III (4) A-I, B-II, C-III, D-IV

Answer (3)

148. Match List I with List II

List I	**List II**
A. Robert May	I. Species -Area relationship
B. Alexander von Humboldt	II. Long term ecosystem
C. Paul Ehrlich	III. Global species diversity at about 7 millon
D. David Tilman	IV. Rivet Popper hypothesis

Choose the correct answer from the option given below:

(1) A-I, B-III, C-II, D-IV (2) A-III, B-IV, C-II, D-I

(3) A-II, B-III, C-I, D-IV (4) A-III, B-I, C-IV, D-II

Answer (4)

149. Match List I with List II

List I (Types of Stamens)	**List II (Example)**
A. Monoadelphous	I. Citrus
B. Diadelphous	II. Pea
C. Polyadelphous	III. Lily
D. Epiphyllous	IV. China-rose

Choose the correct answer from the option given below:

(1) A-I, B-II, C-IV, D-III (2) A-III, B-I, C-IV, D-II

(3) A-IV, B-II, C-I, D-III (4) A-IV, B-I, C-II, D-III

Answer (3)

150. Read the following statements and choose the set of correct statements

In the members of phaeophyceae,

(A) Asexual reproduction occurs usually by biflagellate zoospores.

(B) Sexual reproduction is by oogamous method only.

(C) Stored food is in the form of carbohydrates which is either mannitol or laminarin.

(D) The major pigments found are chlorophyll a, c and carotenoids and xanthophyll.

(E) Vegetative cells have a cellulosic wall, usually covered on the outside by gelatinous coating of algin.

Choose the correct answer from the option given below:

(1) A,C,D and E only (2) A,B,C and E only

(3) A,B,C and D only (4) B,C,D and E only

Answer (1)

Zoology : Section –A (Q. No. 151 to 185)

151. Match List I with List II

List I	List II
A. Typhoid	I. Fungus
B. Leishmaniasis	II. Nematode
C.Ringworm	III. Protozoa
D. Filariasis	IV. Bacteria

Choose the correct answer from the option given below:

(1) A-III, B-I, C-IV, D-II (2) A-II, B-IV, C-III, D-I

(3) A-I, B-III, C-II, D-IV (4) A-IV, B-III, C-I, D-II

Answer (4)

152. Match List I with List II

List I	List II
A. Non-medicated IUD	I. Multiload 3
B. Copper releasing IUD	II. Progestoger
C. Hormone releasing IUD	III. Lippes loop
D. Implants	IV. LNG-20

Choose the correct answer from the option given below:

(1) A-IV, B-I, C-II, D-III (2) A-III, B-I, C-IV, D-II

(3) A-III, B-I, C-II, D-IV (4) A-I, B-III, C-IV, D-II

Answer (2)

153. Given below are two statements

Statement I: The presence or absence of hymen is not a reliable indicator of virginity

Statement II: The hymen is torn during the fill coitus only.

In the light of the above statements, choose correct answer from the options given below

(1) Statement I is true but Statement II is false

(2) Statement I is false but Statement II is true

(3) Both Statement I and Statement II are true

(4) Both Statement I and Statement II are false

Answer (1)

154. In both sexes of cockroach, a pair of jointed filamentous structures called anal cerci are present on

(1) 8^{th} and 9^{th} segment

(2) 11^{th} segment

(3) 5^{th} segment

(4) 10^{th} segment

Answer (4)

155. Match List I with List II

List I	List II
A. Pons	I. Provides additional space for Neurons, reggulates posture and balance.
B. Hypothalamus	II. Controls respiration and gastric secretions
C. Medulla	III. Connects different regions of the brain
D. Cerebellum	IV. Neuro secretory cells

Choose the correct answer from the option given below:

(1) A-I, B-III, C-II, D-IV (2) A-II, B-I, C-III, D-IV

(3) A-II, B-III, C-I, D-IV (4) A-III, B-IV, C-II, D-I

Answer (4)

156. Which of the following is not a steroid hormone?

(1) Progesterone (2) Glucagon

(3) Cortisol (4) Testosterone

Answer (2)

157. Which one is the correct product of DNA dependent RNA polymerase to the given template?

3'TACATGGCAAATATCCATTCA5'

(1) 5' AUGUACCGUUUAUAGGGAAGU3'

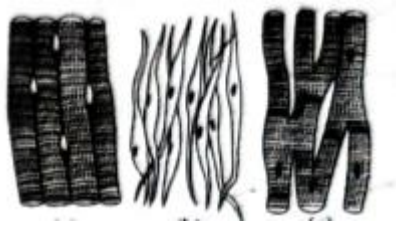
(2) 5' ATGTACCGTTTATAGGTAAGT3'

(3) 5' AUGUACCGUUAUAGGUAAGU3'

(4) 5' AUGUAAAGUUUAUAGGUAAGU3'

Answer (3)

158. Three types of muscles are given as a, b and c. Identity the correct matching pair along with their location in human body



(a) (b) (c)

Name of muscle/location

(1) (a) skeletal- Biceps
(b) Involuntary – Intestine
(c) Smooth- heart

(2) (a) Involuntary – Intestine
(b) Skeletal – Bone
(c) Cardiac- Heart.

(3) (a) Smooth – Toes
(b) Skeletal- legs
(c) Cardiac- Heart

(4) (a) Skeletal- Triceps
(b) Smooth – Stomach
(c) Cardiac- Heart

Answer (4)

159. Following are the stages of cell division

A. Gap2 phase
B. Cytokinesis
C. Synthesis phase
D. Karyokinesis
E. Gap 1 phase

Choose the correct sequence of stages from the option given below

(1) B-D-E-A-C
(2) E-C-A-D-B
(3) C-E-D-A-B
(4) E-B-D-A-C

Answer (2)

160. Which of the following are autoimmune disorders?

A. Myasthenia gravis
B. Rheumatoid arthritis
C. Gout
D. Muscular dystrophy
E. Systemic Lupus Erythematous (SLE)

Choose the most appropriate answer from the option given below

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

Answer (4)

161. Match List I with List II:

List I	List II
A. Lipase	I. Peptide bond
B. Nuclease	II. Ester bond
C. Protease	III. Glycosidic bond
D. Amylase	IV. Phosphodiester bond

Choose the correct answer from the options given below:

(1) A-II, B-IV, C-1, D-III
(2) A-IV, B-1, C-III, D-II
(3) A-IV, B-II, C-III, D-I
(4) A-III, B-II, C-I, D-IV

Answer (1)

162. The flippers of the Penguins and Dolphins are the example of the

(1) Convergent evolution
(2) Divergent evolution
(3) Adaptive radiation
(4) Natural selection

Answer (2)

163. Match List I with List II:

List I		**List II**	
A.	*Expiratory capacity*	I.	Expiratory reserve volume + Tidal volume Inspiratory reserve volume
B.	*Functional residual capacity*	II.	Tidal volume + Expiratory reserve volume
C.	*Vital capacity*	III.	Tidal volume + Inspiratory reserve volume
D.	*Inspiratory capacity*	IV.	Expiratory reserve volume + Residual volume

Choose the correct answer from the options given below:

(1) A-II, B-I, CIM, D-III
(2) A-I, B-III, CII, D-IV
(3) A-II, B-IV, C-I, D-III
(4) A-III, B-II, C-IV, D-I

Answer (3)

164. Which one of the following factors will not affect the Hardy-Weinberg equilibrium?

(1) Gene migration
(2 Constant gene pool
(3) Genetic recombination
(4) Genetic drift

Answer (2)

165. Given below are some stages of human evolution. Arrange them in correct sequence. (Past to Recent)
A. Homo habilis
B. Homo sapiens
C. Homo neanderthalensis
D. Homo erectus
Choose the correct sequence of human evolution from the options given below:
(1) C-B-D-A (2) A-D-C-B (3) D-A-C-B (4) B-A-D-C
Answer (2)

166. Following are the stages of pathway for conduction of an action potential through the heart:
A. AV bundle
B. Purkinje fibres
C. AV node
D. Bundle branches
E. SA node
Choose the correct sequence of pathway from the options given below:
(1) B-D-E-C-A
(2) E-A-D-B-C
(3) E-C-A-D-B
(4) A-E-C-B-D
Answer (3)

167. Which of the following factors are favourable for the formation of oxyhaemoglobin in alveoli?

(1) Low pCO_2 and High H^+ concentration
(2) Low pCO_2 and High temperature
(3) High pO_2 and High pCO_2
(4) High pO_2 and Lesser H^+ concentration
Answer (4)

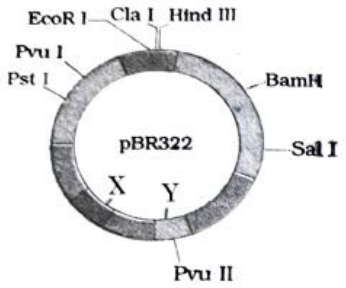
168. Match List I with List II:

List I	List II
A. α-1 antitrypsin	I. Cotton bollworm
B. Cry IAb	II. ADA deficiency
C. Cry IA	III. Emphysema
D. Enzyme replacement therapy	IV. Corn borer

Choose the correct answer from the options given below:
(1) A-III, B-IV, C-L, D-II
(2) A-II, B-IV, C-L D-III
(3) A-II, B-I, C-IV, D-III
(4) A-III, B-I, C-II, D-IV
Answer (1)

169. Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R:
Assertion A: FSH acts upon ovarian follicles in female and Leydig cells in male.
Reason R: Growing ovarian follicles secrete estrogen in female while interstitial cells secrete androgen in male human being.
In the light of the above statements, choose the correct answer from the options given below:
(1) A is true but R is false
(2) A is false but R is true
(3) Both A and R are true and R is the correct explanation of A.
(4) Both A and R are true but R is NOT the correct explanation of A.
Answer (2)

170. The following diagram showing restriction sites in E.coli cloning vector pBR322. Find the role of 'X' and 'Y' genes:



(1) The gene 'X' is for protein involved in replication of Plasmid and 'Y' for resistance to antibiotics.
(2) Gene 'X' is responsible for recognition sites and 'Y' is responsible for antibiotic resistance.
(3) The gene 'X' is responsible for resistance to antibiotics and 'Y' for protein involved in the replication of Plasmid.
(4) The gene 'X' is responsible for controlling the copy number of the linked DNA and 'Y' for protein involved in the replication of Plasmid.

Answer (4)

171. Match List-I with List-II

List-I	List-II
A. Cocaine	I. Effective sedative in surgery
B. Heroin	II. *Cannabis sativa*
C. Morphine	III. *Erythroxylum*
D. Marijuana	V. *Papaver somniferum*

Choose the correct answer from the options given below:
(1) A-II, B-I, C-III, D-IV (2) A-III, B-IV, C-I, D-II
(3) A-IV, B-III, C-I, D-II (4) A-I, B-III, C-II, D-IV

Answer (2)

172. Consider the following statements :
A. Annelids are true coelomates
B. Poriferans are pseudocoelomates
C. Aschelminthes are acoelomates
D. Platyhelminthes are pseudocoelomates
Choose the correct answer from the options given below:
(1) C only (2) D only (3) B only (4) A only

Answer (4)

173. Given below are two statements:
Statement I: In the nephron, the descending limb of loop of Henle is impermeable to water and permeable to electrolytes.
Statement II: The proximal convoluted tubule is lined by simple columnar brush border epithelium and increases the surface area for reabsorption.
In the light of the above statements, choose the 2 correct answer from the options given below :
(1) Statement I is true but Statement II is false
(2) Statement I is false but Statement II is true
(3) Both Statement and Statement II are true
(4) Both Statement I and Statement II are false

Answer (4)

174. Match List I with List II:

List-I	**List-II**
A. Fibrous joints	I. Adjacent vertebrae, limited movement
B. Cartilaginous joints	II. Humerus and Pectoral girdle, rotational movement
C. Hinge joints	III. Skull, don't allow any movement
D. Ball and socket joints	IV. Knee, help in locomotion

Choose the correct answer from the options given below:

(1) A-II, B-III, C-I, D-IV (B) A-III, B-1, C-IV, D-II

(3) A-IV, B-II, C-III, D-I (4) A-1, B-III, C-II, D-IV

Answer (2)

175. Which of the following is not a natural/traditional contraceptive method?

(1) Lactational amenorrhea (2) Vaults

(3) Interrupted intercourse (4) Periodic abstinence

Answer (2)

176. Match List I with List II:

List-I	List II
A. Pleurobrachia	I. Mollusca
B. Radula	II. Ctenophora
C. Stomochord	III. Osteichthyes
D. Air bladder	IV. Hemichordata

Choose the correct answer from the options given below:

(1) A-II, B-IV, C-I, D-III (2) A-IV, B-III, C-II, D-I

(3) A-IV, B-II, C-III, D-I (4) A-II, B-1, C-IV, D-III

Answer (4)

177. Match List I with List II:

List-I	**List-II**
A. Axoneme	I. Centriole
B. Cartwheel pattern	II. Cilia and flagella
C. Crista	III. Chromosome
D. Satellite	IV. Mitochondria

Choose the correct answer from the options given below:

(1) A-II, B-IV, C-I, D-III (2) A-II, B-I, C-IV, D-III

(3) A-IV, B-III, C-II, D-I (4) A-IV, B-II, C-III, D-I

Answer (2)

178. Which of the following statements is incorrect?

(1) Bio-reactors are used to produce small scale bacterial cultures.

(2) Bio-reactors have an agitator system, an oxygen delivery system and foam control system.

(3) A bio-reactor provides optimal growth conditions for achieving the desired product.

(4) Most commonly used bio-reactors are of stirring type.

Answer (1)

179. Match List I with List II:

List I **(Sub Phases of Prophase I)**	**List II** **(Specific characters)**
A. Diakinesis	I. Synaptonemal complex formation
B. Pachytene	II. Completion of terminalisation of chiasmata
C. Zygotene	III. Chromosomes look like thin threads
D. Leptotene	IV. Appearance of recombination nodules

Choose the correct answer from the options given below

(1) A-II, B-IV, C-I, D-III (2) A-IV, B-III, C-II, D-I

(3) A-IV, B-II, C-III, D-I (4) A-I, B-II, C-IV, D-III

Answer (1)

180. Match List I with List II:

List I	**List II**
A. Common cold	I. Plasmodium
B. Haemozoin	II. Typhoid
C. Widal test	III. Rhinoviruses
D. Allergy	IV. Dust mites

Choose the correct answer from the options given below

(1) A-III, B-I, C-II, D-IV (2) A-IV, B-II, C-III, D-I

(3) A-II, B-IV, C-III, D-I (4) A-I, B-III, C-II, D-IV

Answer (1)

181. Given below are two statements: one is labelled statements as Assertion A and the other is labelled as Reason R :

Assertion A: Breast-feeding during initial period of infant growth is recommended by doctors for bringing a healthy baby.

Reason R: Colostrum contains several antibodies absolutely essential to develop resistance for the new born baby.

In the light of the above statements, choose the most appropriate answer from the options given below:

(1) A is correct but R is not correct.

(2) A is not correct but R is correct.

(3) Both A and R are correct and R is the correct explanation of A.

(4) Both A and R are correct but R is NOT the correct explanation of A.

Answer (3)

182. Match List I with List-II :

List I	**List II**
A. Pterophyllum	I. Hag fish
B. Myxine	II. Saw fish
C. Pristis	III. Angel fish
D. Exocoetus	IV. Flying fish

Choose the correct answer from the options given below:

(1) A-IV, B-I, C-II, D-III (2) A-III, B-II, C-I, D-IV

(3) A-II, B-I, C-III, D-IV (4) A-III, B-I, C-II, D-IV

Answer (4)

183. The "Ti plasmid" of *Agrobacterium tumefaciens* stands for

(1) Tumor inducing plasmid.

(2) Temperature independent plasmid

(3) Tumour, inhibiting plasmid

(4) Tumor independent plasmid

Answer (1)

184. Which of the following is not a component of Fallopian tube?

(1) Infundibulum (2) Ampulla

(3) Uterine fundus (4) Isthmus

Answer (2)

185. A Match List I with List II:

List-I	**List-II**
A. Down's syndrome	I. 11^{th} chromosome
B. α-Thalassemia	II. 'X' chromosome
C. β-Thalassemia	III. 21^{st} chromosome
D. Klinefelter's syndrome	IV. 16^{th} chromosome

Choose the correct answer from the options given below:

(1) A-III, B-IV, C-I, D-II (2) A-IV, B-I, C-II, D-III

(3) A-I, B-II, C-III, D-IV (4) A-II, B-III, C-IV, D-I

Answer (1)

Zoology : Section –B (Q. No. 186 to 200)

186. The following are the statements about non- chordates:

A. Pharynx is perforated by gill slits.

B. Notochord is absent.

C. Central nervous system is dorsal.

D. Heart is dorsal if present.

E. Post anal tail is absent.

Choose the most appropriate answer from the options given below:

(1) B, D & E only (2) B, C & D only (3) A & C only (4) A, B & D only

Answer (1)

187. Match List I with List II:

List-I	**List-II**
A. Mesozoic Era	I. Lower invertebrates
B. Proterozoic Era	II. Fish & Amphibian
C. Cenozoic Era	II. Birds & Reptiles
D. Paleozoic Era	IV. Mammals

Choose the correct answer from the options given below:

(1) A-I, B-II, C-IV, D-III (2) A-III, B-I, C-IV, D-II

(3) A-II, B-I, C-III, D-IV (4) A-III, B-I, C-II, D-IV

Answer (2)

188. Given below are two statements:

Statement I: The cerebral hemispheres are connected by nerve tract known as corpus callosum.

Statement II: The brain stem consists of the medulla oblongata, pons and cerebrum.

In the light of the above statements, choose the most appropriate answer from the options given below:

(1) Statement I is correct but Statement II is incorrect.

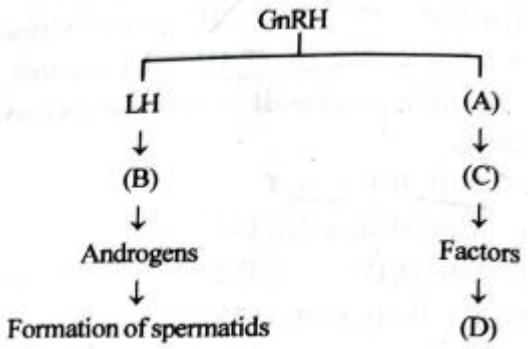
(2) Statement I is incorrect but Statement II is correct.

(3) Both Statement I and Statement II are correct.

(4) Both Statement I and Statement II are incorrect.

Answer (1)

189. Identify the correct option (A), (B), (C), (D) respect to spermatogenesis.



(1) FSH, Sertoli cells, Leydig cells, spermatogenesis,
(2) ICSH, Leydig cells, Sertoli cells, spermatogenesis.
(3) FSH, Leydig cells, Sertoli cells, spermiogenesis
(4) ICSH, Interstitial cells, Leydig cells, spermiogenesis.

Answer (3)

190. Match List 1 with List II:

List I	**List II**
A. RNA polymerase III	I. snRNPs
B. Termination of transcription	II. Promoter
C. Splicing of Exons	III. Rho factor
D. TATA box	IV. SnRNAs, tRNA

Choose the correct answer from the options given below:

(1) A-III, B-IV, C-I, D-II (2) A-IV, B-III, C-I, D-II
(3) A-II, B-IV, C-I, D-III (4) A-III, B-II, C-IV, D-I

Answer (2)

191. A Match List I with List II:

List I	**List II**
A. Exophthalmic goiter	I. Excess secretion of cortisol, moon face & hyperglycemia
B. Acromegaly	II. Hypo-secretion of thyroid hormone and stunted growth.
C. Cushing's syndrome	III. Hyper secretion of thyroid hormone & protruding eye balls.
D. Cretinism	IV. Excessive secretion of growth hormone.

Choose the correct answer from the options given below:

(1) A-III, B-IV, C-II, D-I (2) A-III, B-IV, C-I, D-II
(3) A-I, B-III, C-II, D-IV (4) A-IV, B-II, C-I, D-III

Answer (2)

192. Match List I with List II:

List-I	**List-II**
A. Unicellular glandular epithelium	I. Salivary glands
B. Compound epithelium	II. Pancreas
C. Multicellular glandular epithelium	III. Goblet cells of alimentary canal
D. Endocrine glandular epithelium	IV. Moist surface of buccal cavity

Choose the correct answer from the options given below:

(1) A-III, B-IV, C-I, D-II (2) A-II, B-I, C-IV, D-III
(3) A-II, B-I, C-III, D-IV (4) A-IV, B-III, C-I, D-II

Answer (1)

193. Given below are two statements:
Statement I: Bone marrow is the main lymphoid organ where all blood cells including lymphocytes are produced.
Statement II Both bone marrow and thymus provide micro environments for the development and maturation of T-lymphocytes.
In the light of the above statements, choose the most appropriate answer from the options given below:
(1) Statement I is correct but Statement II is incorrect.
(2) Statement I is incorrect but Statement II is correct.
(3) Both Statement I and Statement II are correct.
(4) Both Statement I and Statement II are incorrect.

Answer (3)

194. Match List I with List II related to digestive system of cockroach.

List-I	List II
A. The structures used for storing of food,	I. Gizzard
B. Ring of 6-8 blind tubules at junction of foregut and midgut	II. Gastric caeca
C. Ring of 100-150/yellow coloured thin filaments at junction of midgut and hindgat.	III. Malpighian tubules
D. The structures used for grinding the food.	IV. Crop

Choose the correct answer from the options given below:
(1) A-IV, B-III, C-II, D-I (2) A-III, B-II, C-IV, D-I
(3) A-IV, B-II, C-III, D-I (4) A-I, B-II, C-III, D-IV

Answer (3)

195. Choose the correct statement given below regarding juxta medullary nephron.
(1) Loop of Henle of adjacent medullary nephron runs deep into medulla.
(2) Juxta medullary nephrons outnumber the cortical nephrons.
(3) Juxta medullary nephrons are located in the columns of Bertini.
(4) Renal corpuscle of juxta medullary nephron lies in the outer portion of the renal medulla.

Answer (1)

196. Match List I with List II:

List I	List II
A. P wave	I. Heart muscles are electrically silent.
B. QRS complex	II. Depolarisation of ventricles.
C. T wave	III. Depolarisation of atria.
D. T-P gap	IV. Repolarisation of ventricles.

Choose the correct answer from the options given below:
(1) A-II, B-III, C-I, D-IV (2) A-IV, B-II, C-I, D-III
(3) A-I, B-III, C-IV, D-II (4) A-III, B-II, C-IV, D-I

Answer (4)

197. As per ABO blood grouping system, the blood group of father is B+, mother is A+ and child is O+. Their respective genotype can be

A. I^Bi /I^Ai / ii B. I^BI^B / I^AI^A / ii C. I^AI^B / iI^A / I^Bi D. I^Ai / I^Bi /I^Ai

E. iI^B / iIA /I^AI^B

Choose the most appropriate answer from the options given below:
(1) C & B only (2) D & E only (3) A only (4) B only

Answer (3)

198. Given below are two statements
Statement I: Gause's competitive exclusive principle states that two closely related species competing for different resources cannot exist indefinitely.
Statement II: According to Gause's principle during competition, the inferior will be eliminated. This may be true if resources are limiting.
In the light of the above statements, choose correct answer from the options given below :
(1) Statement I is true but Statement II is false
(2) Statement I is false but Statement II is true
(3) Both Statement I and Statement II are true
(4) Both Statement I and Statement II are false

Answer (2)

199. Regarding catalytic cycle of an enzyme action select the correct sequential steps:
A. Substrate enzyme complex formation.
B. Free enzyme ready to bind with another substrate.
C. Release of products.
D. Chemical bonds of the substrate broken.
E. Substrate binding to active site.
Choose the correct answer from the options give below:
(1) B, A, C, D, E
(2) E, D, C, B, A
(3) E, A, D, C, B
(4) A, E, B, D, C

Answer (3)

200. Given below are two statements:
Statement: Mitochondria and chloroplasts are both double membrane bound organelles.
Statement: Inner membrane of mitochondria is relatively less permeable, as compared to chloroplast.
In the light of the above statements, choose the most appropriate answer from the options given below:
(1) Statement-I is correct but Statement-ll incorrect.
(2) Statement-I is incorrect but Statement-ll is correct.
(3) Both Statement-I and Statement-II are correct.
(4) Both Statement I and Statement-II are incorrect.

Answer (1)