



Physics : Section-A (Q. No. 1 to 35)

1 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  $E = hv$  ✓
- B. The velocity of a photon is  $c$ . ✓
- C. The momentum of a photon,  $p = \frac{hv}{c}$ . ✓
- D. In a photon-electron collision, both total energy and total momentum are conserved. ✓
- E. Photon possesses positive charge. ✗

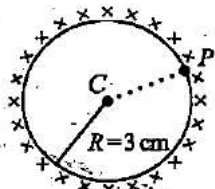
Choose the correct answer from the options given below :

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

$\frac{1}{A+B} = \frac{1}{A+B}$

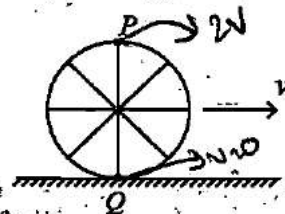
2 A thin spherical shell is charged by some source. The potential difference between the two points C and P (in V) shown in the figure is:

(Take  $\frac{1}{4\pi\epsilon_0} = 9 \times 10^9$  SI units)



- (1) zero
- (2)  $3 \times 10^5$
- (3)  $1 \times 10^5$
- (4)  $0.5 \times 10^5$

3 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)?

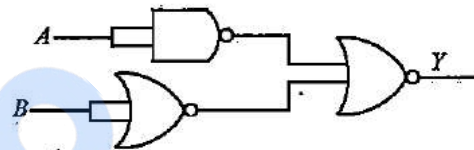


- (1) Point P has zero speed. ✗
- (2) Point P moves slower than point Q. ✗
- (3) Point P moves faster than point Q. ✓
- (4) Both the points P and Q move with equal speed. ✗

4 If the monochromatic source in Young's double slit experiment is replaced by white light, then

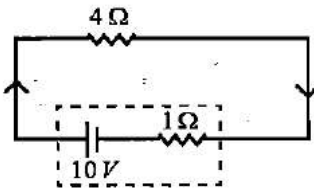
- (1) all bright fringes will be of equal width.
- (2) interference pattern will disappear.
- (3) there will be a central dark fringe surrounded by a few coloured fringes.
- (4) there will be a central bright white fringe surrounded by a few coloured fringes. ✓

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



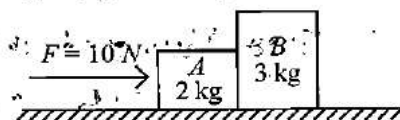
- (1) AND gate
- (2) NAND gate
- (3) NOR gate
- (4) OR gate ✓

6 The terminal voltage of the battery, whose emf is 10V and internal resistance  $1 \Omega$ , when connected through an external resistance of  $4 \Omega$  as shown in the figure is :



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

7 A horizontal force 10 N is applied to a block A as shown in figure. The mass of blocks 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) 10 N
- (2) zero
- (3) 4 N
- (4) 6 N ✓

$v_1 = 2 \frac{2+4}{2}$   
 $v_2 = 2$

- 8 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) 1:4 (2) 1:2  
(3) 2:1 (4) 4:1

- 9 A bob is whirled in a horizontal plane by means of a string with an initial speed of  $\omega$  rpm. The tension in the string is  $T$ . If speed becomes  $2\omega$  while keeping the same radius, the tension in the string becomes :
- (1)  $\sqrt{2}T$  (2)  $T$   
(3)  $4T$  (4)  $\frac{T}{4}$

- 10  ${}_{82}^{290}X \xrightarrow{\alpha} {}_{80}^{286}Y + {}_2^4He$   
 ${}_{82}^{290}X \xrightarrow{\beta^-} {}_{83}^{290}Z \xrightarrow{\beta^-} {}_{84}^{286}P \xrightarrow{\alpha} {}_{80}^{282}Q$
- In the nuclear emission stated above, the mass number and atomic number of the product Q respectively, are :
- (1) 286, 81 (2) 280, 81  
(3) 286, 80 (4) 288, 82

11 Match List-I with List-II.

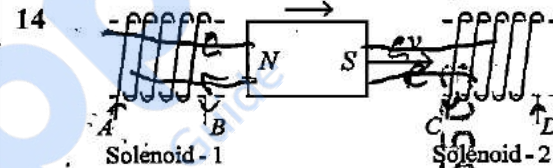
List-I (Material)	List-II (Susceptibility ( $\chi$ ))
A. Diamagnetic	I. $\chi = 0$
B. Ferromagnetic	II. $0 > \chi \geq -1$
C. Paramagnetic	III. $\chi \gg 1$
D. Non-magnetic	IV. $0 < \chi < \epsilon$ (a small positive number)

Choose the correct answer from the options given below:

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

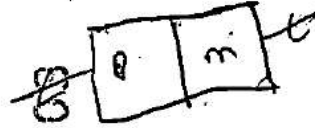
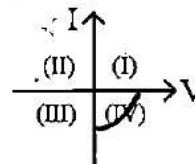
- 12 A particle moving with uniform speed in a circular path maintains :
- (1) varying velocity and varying acceleration.  
(2) constant velocity.  
(3) constant acceleration.  
(4) constant velocity but varying acceleration.

- 13 The moment of inertia of a thin rod about an axis passing through its mid point and perpendicular to the rod is  $2400 \text{ g cm}^2$ . The length of the 400 g rod is nearly :
- (1) 72.0 cm (2) 8.3 cm  
(3) 17.5 cm (4) 20.7 cm



- 14 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) BA and DC (2) AB and DC  
(3) BA and CD (4) AB and CD

- 15 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 p-n junction diode, the current measured in ( $\mu A$ ), is due to majority charge carriers.
- (1) Both A and B are incorrect.  
(2) A is correct but B is incorrect.  
(3) A is incorrect but B is correct.  
(4) Both A and B are correct.

16 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) 6  
(2) 10  
(3) 5  
(4) 7

17 Match List I with List II.

**List I**  
(Spectral Lines of Hydrogen for transitions from)

- A.  $n_2 = 3$  to  $n_1 = 2$   
B.  $n_2 = 4$  to  $n_1 = 2$   
C.  $n_2 = 5$  to  $n_1 = 2$   
D.  $n_2 = 6$  to  $n_1 = 2$
- List II**  
(Wavelengths (nm))
- I. 410.2  
II. 434.1  
III. 656.3  
IV. 486.1

Choose the correct answer from the options given below:

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

18 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,  $4 \times 10^{-6}$  C m, is  $\pm 9 \times 10^3$  V.

(Take  $\frac{1}{4\pi\epsilon_0} = 9 \times 10^9$  SI units)

**Reason R**:  $V = \pm \frac{2P}{4\pi\epsilon_0 r^2}$ , where  $r$  is the distance of any axial point, situated at 2 m 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 false but R is true.  
(2) Both A and R are true and R is the correct explanation of A.  
(3) Both A and R are true and R is NOT the correct explanation of A.  
(4) A is true but R is false.

19 A logic circuit provides the output  $Y$  as per the following 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)  $B$   
(2)  $A.B + \bar{A}$   
(3)  $A\bar{B} + \bar{A}$   
(4)  $\bar{B}$

20 A light ray enters through a right angled prism at point  $P$  with the angle of incidence  $30^\circ$  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)  $\frac{\sqrt{3}}{2}$   
(2)  $\frac{\sqrt{5}}{4}$   
(3)  $\frac{\sqrt{5}}{2}$   
(4)  $\frac{\sqrt{3}}{4}$



21 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)  $10(N + 1)$   
(2)  $\frac{1}{10N}$   
(3)  $\frac{1}{100(N + 1)}$   
(4)  $100N$

22 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  $4\pi \times 10^{-7}$  SI units):

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

23 A wire of length 'l' and resistance  $100 \Omega$  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:

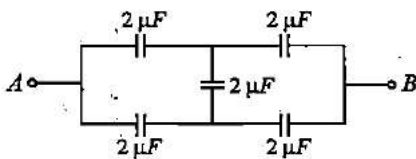
- (1)  $60 \Omega$                       (2)  $26 \Omega$   
~~(3)  $52 \Omega$~~                       (4)  $55 \Omega$

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

- (1) angular speed and stress  
~~(2) strain and angle~~  
 (3) stress and angle  
 (4) strain and arc

*ans is  $\frac{1}{10}$   
 $\frac{3 \times 97}{10}$*

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



- (1)  $4 \mu F$                       ~~(2)  $2 \mu F$~~   
 (3)  $1 \mu F$                       (4)  $0.5 \mu F$

*ans is  $\frac{1}{10}$   
 $\frac{3 \times 97}{10}$   
 $\frac{1}{10}$   
 $\frac{1}{10}$*

26 The maximum elongation of a steel wire of 1 m length if the elastic limit of steel and its Young's modulus, respectively, are  $8 \times 10^8 \text{ N m}^{-2}$  and  $2 \times 10^{11} \text{ N m}^{-2}$ , is :

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

27 An unpolarised light beam strikes a glass surface at Brewster's angle. Then

- ~~(1) the reflected light will be completely polarised but the refracted light will be partially polarised.~~  
 (2) the reflected light will be partially polarised.  
 (3) the refracted light will be completely polarised.  
 (4) both the reflected and refracted light will be completely polarised.

28 In an ideal transformer, the turns ratio is  $\frac{N_p}{N_s} = \frac{1}{2}$ .

The ratio  $V_s : V_p$  is equal to (the symbols carry their usual meaning):

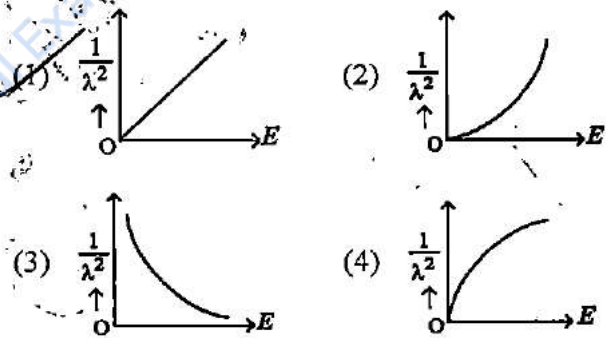
- (1) 1 : 4                      (2) 1 : 2  
~~(3) 2 : 1~~                      (4) 1 : 1

29 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 :

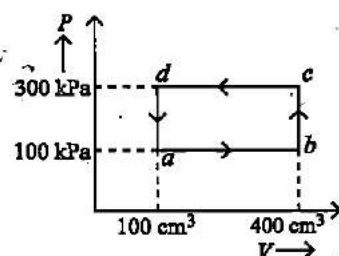
- (1)  $3.92 \text{ m s}^{-2}$                       (2)  $19.6 \text{ m s}^{-2}$   
 (3)  $9.8 \text{ m s}^{-2}$                       (4)  $4.9 \text{ m s}^{-2}$

*$a = \frac{g}{4} = \frac{9.8}{4} = 2.45 \text{ m/s}^2$*

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



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



- (1)  $-60 \text{ J}$                       ~~(2) zero~~  
 (3)  $30 \text{ J}$                       (4)  $-90 \text{ J}$

Physics : Section-B (Q. No. 36 to 50)

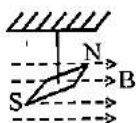
32 Given below are two statements :  
**Statement I** : Atoms are electrically neutral as they contain equal number of positive and negative charges.

**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 incorrect but Statement II is correct.
- (2) Both Statement I and Statement II are correct.
- (3) Both Statement I and Statement II are incorrect.
- (4) Statement I is correct but Statement II is incorrect.

33 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  $9.8 \times 10^{-6} \text{ kg m}^2$ . If the magnitude of magnetic moment of the needle is  $x \times 10^{-5} \text{ Am}^2$ , then the value of  $x$  is :



- (1)  $1280 \pi^2$
- (2)  $5 \pi^2$
- (3)  $128 \pi^2$
- (4)  $50 \pi^2$

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

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

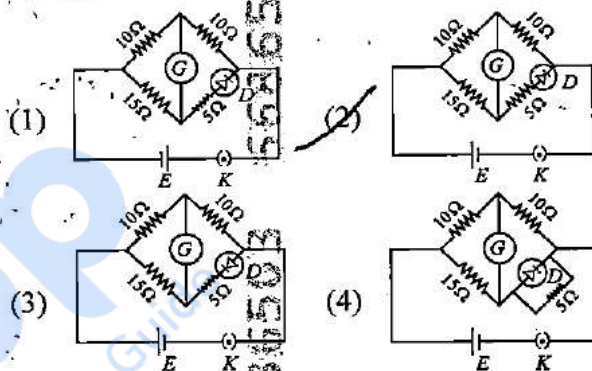
35 A thin flat circular disc of radius 4.5 cm is placed gently over the surface of water. If surface tension of water is  $0.07 \text{ Nm}^{-1}$ , then the excess force required to take it away from the surface is :

- (1) 99 N
- (2) 19.8 mN
- (3) 198 N
- (4) 1.98 mN

36 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  $60^\circ$  with each other. The magnetic moment of this new magnet is :

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

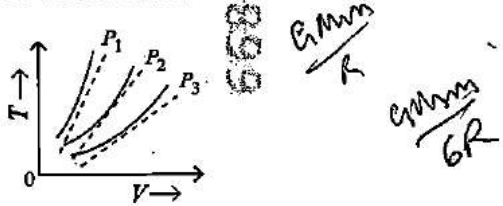
37 Choose the correct circuit which can achieve the bridge balance.



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

39 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 lines.



Then the correct relation is :

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

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

- (1) they originate from charges moving with uniform speed.
- (2) they are transverse in nature.
- (3) the energy density in electric field is equal to energy density in magnetic field.
- (4) they travel with a speed equal to  $\frac{1}{\sqrt{\mu_0 \epsilon_0}}$ .

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

- (1)  $2 \times 10^3 \text{ N}$                       (2)  $5 \times 10^3 \text{ N}$
- (3)  $50 \times 10^3 \text{ N}$                     (4)  $100 \times 10^3 \text{ N}$

42 Two heaters A and B have power rating of 1 kW and 2 kW, 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) 2 : 3                                  (2) 1 : 1
- (3) 2 : 9                                  (4) 1 : 2

43 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  $\alpha$  and  $\beta$  are constants, is:

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

44 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 greater than  $I$  flows but can be in any direction.
- (2) there is no current.
- (3) displacement current of magnitude equal to  $I$  flows in the same direction as  $I$ .
- (4) displacement current of magnitude equal to  $I$  flows in a direction opposite to that of  $I$ .

45 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) 32                                      (2) 34
- (3) 28                                      (4) 17

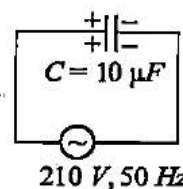
46 If the plates of a parallel plate capacitor connected to a battery are moved close to each other, then

- A. the charge stored in it, increases.  $\rightarrow C$
- B. the energy stored in it, decreases.  $\alpha$
- C. its capacitance increases.  $\checkmark$
- D. the ratio of charge to its potential remains the same.  $\checkmark$
- E. the product of charge and voltage increases.  $\checkmark$

Choose the most appropriate answer from the options given below:

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

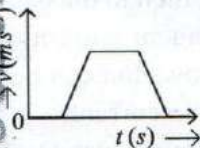
47 A  $10 \mu\text{F}$  capacitor is connected to a 210 V, 50 Hz source as shown in figure. The peak current in the circuit is nearly ( $\pi = 3.14$ ):



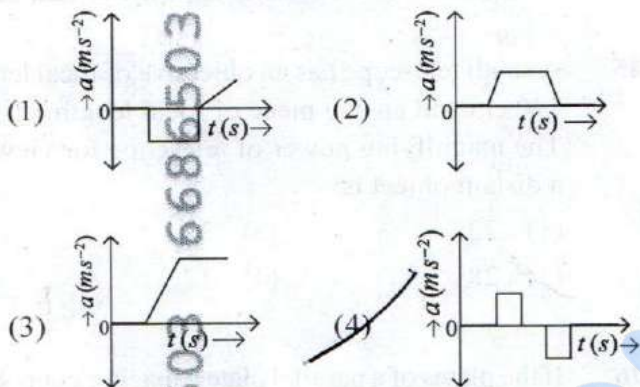
- (1) 0.35 A                                  (2) 0.58 A
- (3) 0.93 A                                  (4) 1.20 A

$100 \times 3.14 \times 10^{-6} \times 10^2 \times 210$   
 $\times \sqrt{2}$   
 $\frac{314}{21}$   
 $\frac{628}{21}$   
 $\frac{628}{21} \approx 29.9$

- 48 The velocity ( $v$ ) – time ( $t$ ) plot of the motion of a body is shown below :



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



- 49 A sheet is placed on a horizontal surface in front of a strong magnetic pole. A force is needed to :
- hold the sheet there if it is magnetic.
  - hold the sheet there if it is non-magnetic.
  - move the sheet away from the pole with uniform velocity if it is conducting.
  - 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:

- C only
- B and D only
- A and C only
- A, C and D only

Handwritten note:  $T \sim \sqrt{\frac{l}{g}}$

- 50 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:

- 4
- $\sqrt{3}$
- $\sqrt{2}$
- $2\sqrt{3}$

Chemistry : Section-A (Q. No. 51 to 85)

- 51 Match List I with List II.

List I	List II
Quantum Number	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:

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

- 52 Given below are two statements :

**Statement I :** Both  $[\text{Co}(\text{NH}_3)_6]^{3+}$  and  $[\text{CoF}_6]^{3-}$  complexes are octahedral but differ in their magnetic behaviour.

**Statement II :**  $[\text{Co}(\text{NH}_3)_6]^{3+}$  is diamagnetic whereas  $[\text{CoF}_6]^{3-}$  is paramagnetic.

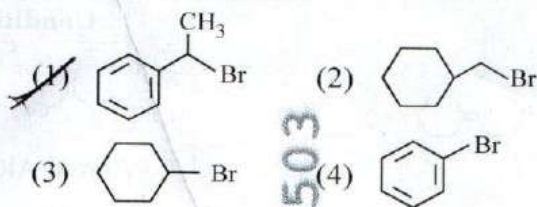
In the light of the above statements, choose the correct answer from the options given below:

- Statement I is false but Statement II is true.
- Both Statement I and Statement II are true.
- Both Statement I and Statement II are false.
- Statement I is true but Statement II is false.

- 53 The  $E^\circ$  value for the  $\text{Mn}^{3+}/\text{Mn}^{2+}$  couple is more positive than that of  $\text{Cr}^{3+}/\text{Cr}^{2+}$  or  $\text{Fe}^{3+}/\text{Fe}^{2+}$  due to change of

- $d^3$  to  $d^5$  configuration
- $d^5$  to  $d^4$  configuration
- $d^5$  to  $d^2$  configuration
- $d^4$  to  $d^5$  configuration

- 54 The compound that will undergo  $S_N1$  reaction with the fastest rate is



- 55 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 incorrect but Statement II is correct.
- (2) Both Statement I and Statement II are correct.
- (3) Both Statement I and Statement II are incorrect.
- (4) Statement I is correct but Statement II is incorrect.

- 56 Match List I with List II.

**List I**

(Process)

- A. Isothermal process
- B. Isochoric process
- C. Isobaric process
- D. Adiabatic process

**List II**

(Conditions)

- I. No heat exchange
- II. Carried out at constant temperature
- III. Carried out at constant volume
- IV. Carried out at constant pressure

Choose the correct answer from the options given below:

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

- 57 Activation energy of any chemical reaction can be calculated if one knows the value of

- (1) rate constant at two different temperatures.
- (2) rate constant at standard temperature.
- (3) probability of collision.
- (4) orientation of reactant molecules during collision.

- 58 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)  $Li < Be < N < B < C$
- (2)  $Li < Be < B < C < N$
- (3)  $Li < B < Be < C < N$
- (4)  $Li < Be < C < B < N$

- 59 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) Chromatography
- (2) Crystallization
- (3) Sublimation
- (4) Distillation

- 60 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) E and D
- (2) B and C
- (3) A and D
- (4) B and E

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

- A.  $Ti^{3+} - d^1$       B.  $Cr^{2+} - d^4$   
 C.  $Mn^{2+} - d^5$       D.  $Fe^{2+} - d^6$   
 E.  $Sc^{3+} - d^0$

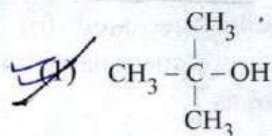
Choose the most appropriate answer from the options given below:

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

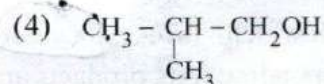
62 The Henry's law constant ( $K_H$ ) values of three gases (A, B, C) in water are 145,  $2 \times 10^{-5}$  and 35 kbar, respectively. The solubility of these gases in water follow the order:

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

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



- (2)  $CH_3 - CH_2 - CH_2 - CH_2OH$   
 (3)  $\begin{array}{c} CH_3 - CH_2 - CH - OH \\ | \\ CH_3 \end{array}$



64 Arrange the following elements in increasing order of electronegativity:

N, O, F, C, Si

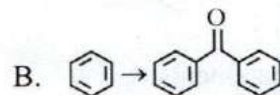
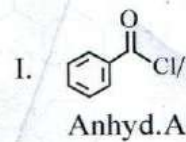
Choose the correct answer from the options given below:

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

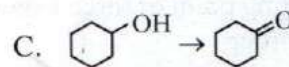
65 Match List I with List II.

List I (Reaction)

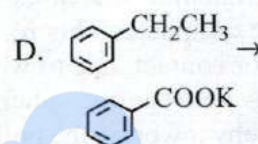
List II (Reagents/  
Condition)



II.  $CrO_3$



III.  $KMnO_4 /$   
 $KOH, \Delta$



IV. (i)  $O_3$

(ii)  $Zn-H_2O$

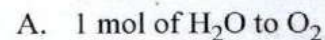
Choose the correct answer from the options given below:

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

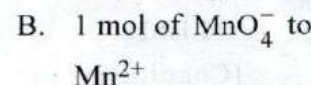
66 Match List I with List II.

List I  
(Conversion)

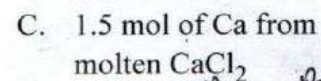
List II  
(Number of  
Faraday required)



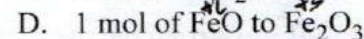
I. 3F



II. 2F



III. 1F



IV. 5F

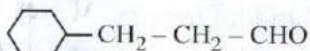
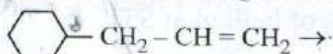
Choose the correct answer from the options given below:

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

67 Which reaction is NOT a redox reaction?

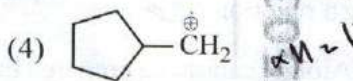
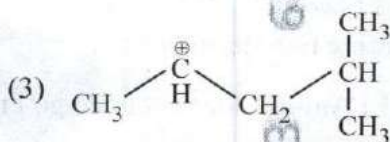
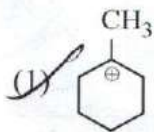
- (1)  $BaCl_2 + Na_2SO_4 \rightarrow BaSO_4 + 2 NaCl$   
 (2)  $Zn + CuSO_4 \rightarrow ZnSO_4 + Cu$   
 (3)  $2 KClO_3 + I_2 \rightarrow 2 KIO_3 + Cl_2$   
 (4)  $H_2 + Cl_2 \rightarrow 2 HCl$

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



- (1) (i)  $\text{H}_2\text{O}/\text{H}^+$   
 (ii) PCC  
 (2) (i)  $\text{H}_2\text{O}/\text{H}^+$   
 (ii)  $\text{CrO}_3$   
 (3) (i)  $\text{BH}_3$   
 (ii)  $\text{H}_2\text{O}_2/\text{OH}^-$   
 (iii) PCC  
 (4) (i)  $\text{BH}_3$   
 (ii)  $\text{H}_2\text{O}_2/\text{OH}^-$   
 (iii) alk.  $\text{KMnO}_4$   
 (iv)  $\text{H}_3\text{O}^+$

- 69 The most stable carbocation among the following is:



- 70 Among Group 16 elements, which one does NOT show -2 oxidation state?

- (1) Po (2) O  
 (3) Se (4) Te

- 71 The energy of an electron in the ground state ( $n = 1$ ) for  $\text{He}^+$  ion is  $-x$  J, then that for an electron in  $n = 2$  state for  $\text{Be}^{3+}$  ion in J is :

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

- 72 Match List I with List II.

List I (Molecule)	List II (Number and types of bond/s between two carbon atoms)
A. ethane	I. one $\sigma$ -bond and two $\pi$ -bonds
B. ethene	II. two $\pi$ -bonds
C. carbon molecule, $\text{C}_2$	III. one $\sigma$ -bond
D. ethyne	IV. one $\sigma$ -bond and one $\pi$ -bond

Choose the correct answer from the options given below:

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

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

Then, which of the following is correct?

- (1) Reaction has gone to completion in forward direction.  
 (2) Reaction is at equilibrium.  
 (3) Reaction has a tendency to go in forward direction.  
 (4) Reaction has a tendency to go in backward direction.

- 74 Given below are two statements:

**Statement I :** The boiling point of hydrides of Group 16 elements follow the order  $\text{H}_2\text{O} > \text{H}_2\text{Te} > \text{H}_2\text{Se} > \text{H}_2\text{S}$ .

**Statement II :** On the basis of molecular mass,  $\text{H}_2\text{O}$  is expected to have lower boiling point than the other members of the group but due to the presence of extensive H-bonding in  $\text{H}_2\text{O}$ , 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 false but Statement II is true.  
 (2) Both Statement I and Statement II are true.  
 (3) Both Statement I and Statement II are false.  
 (4) Statement I is true but Statement II is false.

$25 \times \frac{3}{4} \times \frac{40}{100}$   
750 mg

$\ln k = 2.303 \ln A - \frac{E_a}{RT}$

75 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

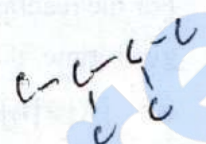
- (1) 200 mg                      (2) 750 mg  
~~(3) 250 mg~~                      (4) Zero mg

76 In which of the following equilibria,  $K_p$  and  $K_c$  are NOT equal?

- (1)  $2 \text{BrCl}_{(g)} \rightleftharpoons \text{Br}_{2(g)} + \text{Cl}_{2(g)}$  ✓  
~~(2)  $\text{PCl}_{5(g)} \rightleftharpoons \text{PCl}_{3(g)} + \text{Cl}_{2(g)}$~~  ✗  
(3)  $\text{H}_{2(g)} + \text{I}_{2(g)} \rightleftharpoons 2 \text{HI}_{(g)}$  ✓  
(4)  $\text{CO}_{(g)} + \text{H}_2\text{O}_{(g)} \rightleftharpoons \text{CO}_{2(g)} + \text{H}_{2(g)}$  ✓

77 A compound with a molecular formula of  $\text{C}_6\text{H}_{14}$  has two tertiary carbons. Its IUPAC name is:

- (1) 2,2-dimethylbutane  
(2) n-hexane  
(3) 2-methylpentane  
~~(4) 2,3-dimethylbutane~~



78 Fehling's solution 'A' is

- (1) aqueous sodium citrate  
~~(2) aqueous copper sulphate~~  
(3) alkaline copper sulphate  
~~(4) alkaline solution of sodium potassium tartrate (Rochelle's salt)~~ ✗

79 Match List I with List II.

List I (Compound)	List II (Shape/geometry)
A. $\text{NH}_3$	I. Trigonal Pyramidal
B. $\text{BrF}_5$	II. Square Planar
C. $\text{XeF}_4$	III. Octahedral
D. $\text{SF}_6$	IV. Square Pyramidal

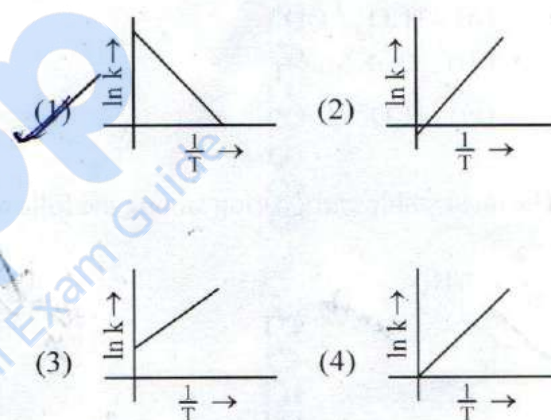
Choose the correct answer from the options given below:

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

80 The highest number of helium atoms is in

- (1) 2.271098 L of helium at STP ~~1 mol~~  
~~(2) 4 mol of helium~~ 4 mol  
(3) 4 u of helium 1 atom  
(4) 4 g of helium 1 mol

81 Which plot of  $\ln k$  vs  $\frac{1}{T}$  is consistent with Arrhenius equation?



82 Given below are two statements:

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

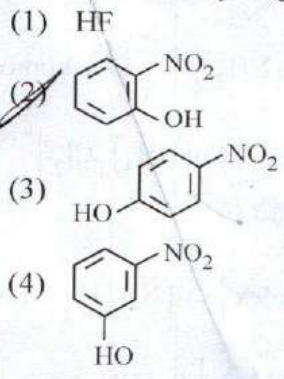
**Statement II :** Aniline cannot be prepared through Gabriel synthesis. ✓

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

- (1) Statement I is incorrect but Statement II is true.  
~~(2) Both Statement I and Statement II are true.~~  
(3) Both Statement I and Statement II are false.  
(4) Statement I is correct but Statement II is false.

Chemistry : Section B (Q. No. 86 to 100)

83 Intramolecular hydrogen bonding is present in



84 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.  $2 \text{NaHCO}_3(\text{s}) \rightarrow \text{Na}_2\text{CO}_3(\text{s}) + \text{CO}_2(\text{g}) + \text{H}_2\text{O}(\text{g})$  ✓
- D.  $\text{Cl}_2(\text{g}) \rightarrow 2 \text{Cl}(\text{g})$  ✓

Choose the correct answer from the options given below:

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

85 Match List I with List II.

List I (Complex)

List II (Type of isomerism)

- |   |                            |
|---|----------------------------|
| A. $[\text{Co}(\text{NH}_3)_5(\text{NO}_2)]\text{Cl}_2$ | I. Solvate isomerism       |
| B. $[\text{Co}(\text{NH}_3)_5(\text{SO}_4)]\text{Br}$   | II. Linkage isomerism      |
| C. $[\text{Co}(\text{NH}_3)_6][\text{Cr}(\text{CN})_6]$ | III. Ionization isomerism  |
| D. $[\text{Co}(\text{H}_2\text{O})_6]\text{Cl}_3$       | IV. Coordination isomerism |

Choose the correct answer from the options given below:

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

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)  $\text{ABC}_4$
- (2)  $\text{A}_2\text{BC}_2$
- (3)  $\text{ABC}_3$  ✓
- (4)  $\text{AB}_2\text{C}_2$

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

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

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

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

- 3. A.  $\text{Al}^{3+}$  - III
- 2. B.  $\text{Cu}^{2+}$  - II
- 5. C.  $\text{Ba}^{2+}$  - IV
- 4. D.  $\text{Co}^{2+}$  - V
- 6. E.  $\text{Mg}^{2+}$  - VI

Choose the correct answer from the options given below:

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

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

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

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

90 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  $\text{mol}^{-1}$ ,  $1F = 96487 \text{ C}$ )

- (1) 0.0315 g
- (2) 3.15 g ✓
- (3) 0.315 g
- (4) 31.5 g

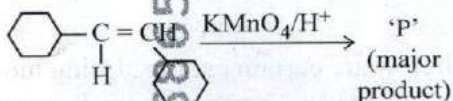
91 Consider the following reaction in a sealed vessel at equilibrium with concentrations of  $N_2 = 3.0 \times 10^{-3} M$ ,  $O_2 = 4.2 \times 10^{-3} M$  and  $NO = 2.8 \times 10^{-3} M$ .



If 0.1 mol  $NO(g)$  is taken in a closed vessel, what will be degree of dissociation ( $\alpha$ ) of  $NO(g)$  at equilibrium?

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

92 For the given reaction:



'P' is

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

93 The pair of lanthanoid ions which are diamagnetic is

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

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



- (1)  $H_3PO_3$  and  $POCl_3$   
(2)  $POCl_3$  and  $H_3PO_3$   
(3)  $POCl_3$  and  $H_3PO_4$   
(4)  $H_3PO_4$  and  $POCl_3$

Handwritten notes:  $3 \times 10^{-3} \times 3$ ,  $2.8 \times 2.8 \times 2$ ,  $4.2 \times 2$ ,  $2.8$

Handwritten note:  $\frac{9}{2}$  Sol

95 Given below are two statements :

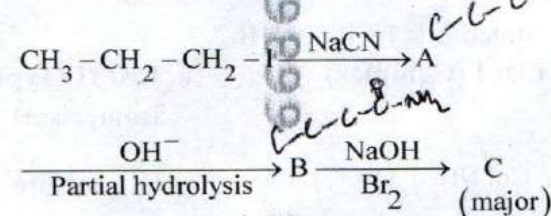
Statement I :  $[Co(NH_3)_6]^{3+}$  is a homoleptic complex whereas  $[Co(NH_3)_4Cl_2]^+$  is a heteroleptic complex.

Statement II : Complex  $[Co(NH_3)_6]^{3+}$  has only one kind of ligands but  $[Co(NH_3)_4Cl_2]^+$  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 false but Statement II is true.  
(2) Both Statement I and Statement II are true.  
(3) Both Statement I and Statement II are false.  
(4) Statement I is true but Statement II is false.

96 Identify the major product C formed in the following reaction sequence:



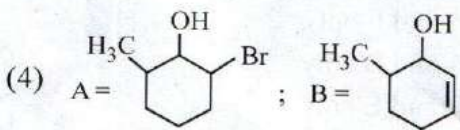
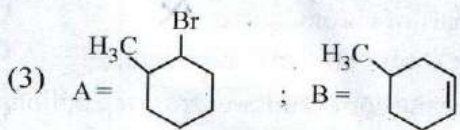
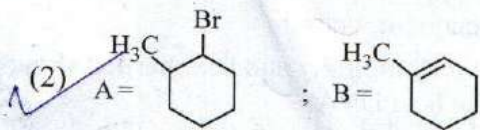
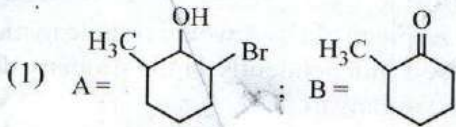
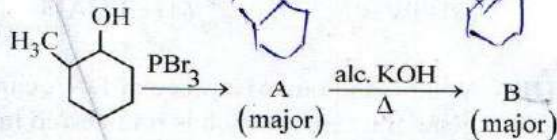
- (1)  $\alpha$ -bromobutanoic acid  
(2) propylamine  
(3) butylamine  
(4) butanamide

97 Identify the correct answer.

- (1) Three canonical forms can be drawn for  $CO_3^{2-}$  ion.  
(2) Three resonance structures can be drawn for ozone.  
(3)  $BF_3$  has non-zero dipole moment.  
(4) Dipole moment of  $NF_3$  is greater than that of  $NH_3$ .

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

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



99 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 sulphuric acid
- (2) dilute hydrochloric acid
- (3) concentrated sulphuric acid
- (4) dilute nitric acid

100 The work done during reversible isothermal expansion of one mole of hydrogen gas at  $25^\circ C$  from pressure of 20 atmosphere to 10 atmosphere is:

(Given  $R = 2.0 \text{ cal K}^{-1} \text{ mol}^{-1}$ )

- (1) 100 calories
- (2) 0 calorie
- (3) -413.14 calories
- (4) 413.14 calories

$W = -2.303 \times 2.0 \times 298 \times \log \frac{20}{10}$

101 Spindle fibers attach to kinetochores of chromosomes during

- (1) Telophase
- (2) Prophase
- (3) Metaphase
- (4) Anaphase

102 The capacity to generate a whole plant from any cell of the plant is called:

- (1) Somatic hybridization
- (2) Totipotency
- (3) Micropropagation
- (4) Differentiation

103 Bulliform cells are responsible for

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

104 Given below are two statements:

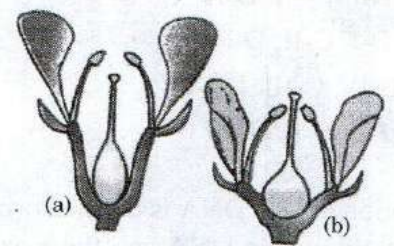
**Statement I :** Parenchyma is living but collenchyma is dead tissue.

**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 false but Statement II is true
- (2) Both Statement I and Statement II are true
- (3) Both Statement I and Statement II are false
- (4) Statement I is true but Statement II is false

105 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) Perigynous
- (2) (a) Epigynous; (b) Hypogynous
- (3) (a) Hypogynous; (b) Epigynous
- (4) (a) Perigynous; (b) Epigynous

106 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. Leucoplasts	III. Site for active ribosomal RNA synthesis
D. Golgi apparatus	IV. For storing nutrients

Choose the correct answer from the options given below:

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

107 Match List I with List II

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

Choose the correct answer from the options given below:

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

108 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) Promotor, Structural gene, Terminator  $\alpha$   
 (2) Repressor, Operator gene, Structural gene  
 (3) Structural gene, Transposons, Operator gene  
 (4) Inducer, Repressor, Structural gene

109 List of endangered species was released by-

- (1) IUCN (2) GEAC  
 (3) WWF (4) FOAM

110 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.  $\alpha$   
 B. It may get integrated into the genome of the recipient.  $\checkmark$   
 C. It may multiply and be inherited along with the host DNA.  $\checkmark$   
 D. The alien piece of DNA is not an integral part of chromosome.  $\alpha$   
 E. It shows ability to replicate.

Choose the correct answer from the options given below:

- (1) A and E only  
 (2) A and B only  
 (3) D and E only  
 (4) B and C only  $\alpha$

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

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

112 Match List I with List II

List I	List II
A. <i>Rhizopus</i>	I. Mushroom
B. <i>Ustilago</i>	II. Smut fungus
C. <i>Puccinia</i>	III. Bread mould
D. <i>Agaricus</i>	IV. Rust fungus

Choose the correct answer from the options given below:

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

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

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

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

115 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) Sustainable development  
 (2) *in-situ* conservation  
 (3) Biodiversity conservation  
 (4) Semi-conservative method

116 Auxin is used by gardeners to prepare weed-free lawns. But no damage is caused to grass as auxin

- (1) can help in cell division in grasses, to produce growth.  
 (2) promotes apical dominance.  
 (3) promotes abscission of mature leaves only.  
 (4) does not affect mature monocotyledonous plants.

117 Which of the following is an example of actinomorphic flower?

- (1) *Sesbania* (2) *Datura*  
 (3) *Cassia* (4) *Pisum*

118 The cofactor of the enzyme carboxypeptidase is:

- (1) Haem (2) Zinc  
 (3) Niacin (4) Flavin

119 The equation of Verhulst-Pearl logistic growth is

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

From this equation,  $K$  indicates:

- (1) Population density  
 (2) Intrinsic rate of natural increase  
 (3) Biotic potential  
 (4) Carrying capacity

120 Inhibition of Succinic dehydrogenase enzyme by malonate is a classical example of:

- (1) Enzyme activation  
 (2) Cofactor inhibition  
 (3) Feedback inhibition  
 (4) Competitive inhibition

121 Given below are two statements:

**Statement I :** Chromosomes become gradually visible under light microscope during leptotene stage.

**Statement II :** The beginning 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 false but Statement II is true  
 (2) Both Statement I and Statement II are true  
 (3) Both Statement I and Statement II are false  
 (4) Statement I is true but Statement II is false

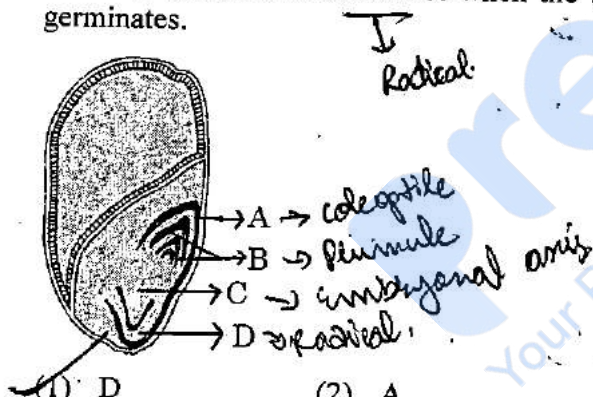
122 Tropical regions show greatest level of species richness because

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

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



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

124 These are regarded as major causes of biodiversity loss:

- A. Over exploitation ✓
- B. Co-extinction ✓
- C. Mutation
- D. Habitat loss and fragmentation ✓
- E. Migration

Choose the correct option:

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

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

126 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 false but Statement II is true
- (2) Both Statement I and Statement II are true
- (3) Both Statement I and Statement II are false
- (4) Statement I is true but Statement II is false

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

128 In a plant, black seed color (BB/Bb) is dominant over white seed color (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/Bb (2) BB  
~~(3) bb~~ (4) Bb

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

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

130 How many molecules of ATP and NADPH are required for every molecule of  $\text{CO}_2$  fixed in the Calvin cycle?

- ~~(1) 3 molecules of ATP and 2 molecules of NADPH~~  
 (2) 2 molecules of ATP and 3 molecules of NADPH  
 (3) 2 molecules of ATP and 2 molecules of NADPH  
 (4) 3 molecules of ATP and 3 molecules of NADPH

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

- (1) Maturation  
 (2) Differentiation  
 (3) Redifferentiation  
~~(4) Dedifferentiation~~

132 Which one of the following is not a criterion for classification of fungi?

- (1) Fruiting body  
 (2) Morphology of mycelium  
~~(3) Mode of nutrition~~  
 (4) Mode of spore formation

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



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

134 The lactose present in the growth medium of bacteria is transported to the cell by the action of:

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

135 Which of the following are required for the dark reaction of photosynthesis?

- A. Light  
 B. Chlorophyll  
 C.  $\text{CO}_2$  ✓  
 D. ATP ✓  
 E. NADPH ✓

Choose the correct answer from the options given below:

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

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

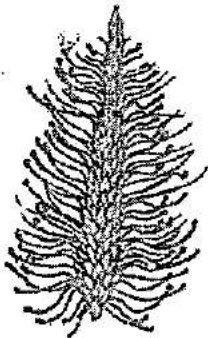
136 Match List I with List II

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

Choose the correct answer from the options given below:

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

137 Identify the correct description about the given figure:



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

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

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

139 In an ecosystem if the Net Primary Productivity (NPP) of first trophic level is

$100x \text{ (kcal m}^{-2}\text{) yr}^{-1}$ , what would be the GPP (Gross Primary Productivity) of the third trophic level of the same ecosystem?

- (1)  $\frac{100x}{3x} \text{ (kcal m}^{-2}\text{) yr}^{-1}$   
 (2)  $\frac{x}{10} \text{ (kcal m}^{-2}\text{) yr}^{-1}$   
 (3)  $x \text{ (kcal m}^{-2}\text{) yr}^{-1}$   
 (4)  $10x \text{ (kcal m}^{-2}\text{) yr}^{-1}$

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

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

141 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 options given below:

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

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

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