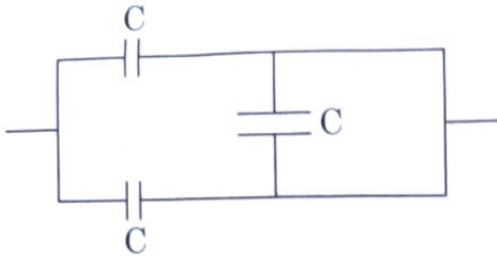


The equivalent capacitance of the combination shown in the figure is :



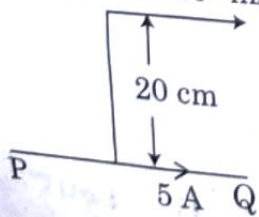
- (1) $3C$
- (2) $2C$
- (3) $C/2$
- (4) $3C/2$

Polar molecules are the molecules :

- (1) having zero dipole moment.
- (2) acquire a dipole moment only in the presence of electric field due to displacement of charges.
- (3) acquire a dipole moment only when magnetic field is absent.
- (4) having a permanent electric dipole moment.

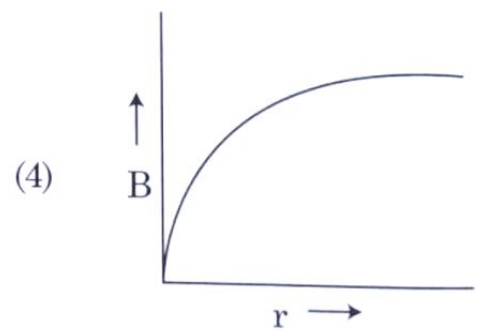
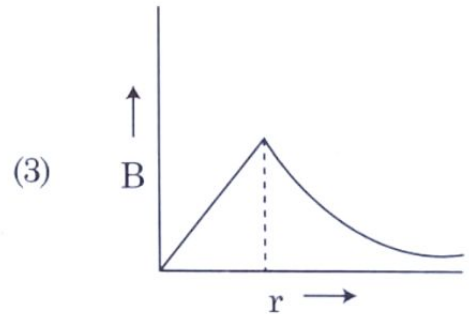
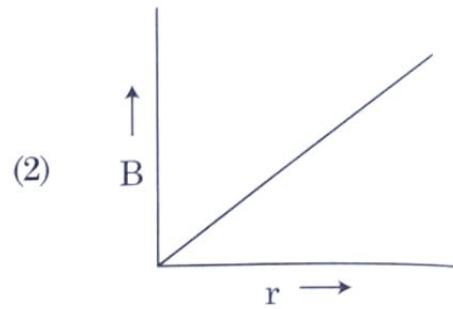
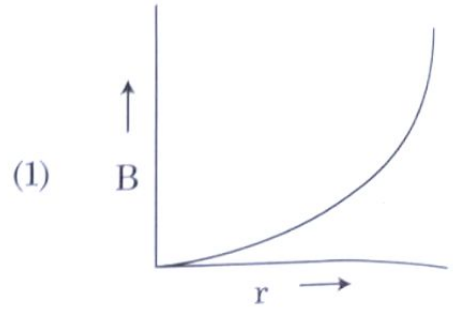
An infinitely long straight conductor carries a current of 5 A as shown. An electron is moving with a speed of 10^5 m/s parallel to the conductor. The perpendicular distance between the electron and the conductor is 20 cm at an instant. Calculate the magnitude of the force experienced by the electron at that instant.

Electron $v = 10^5$ m/s



- (1) 4×10^{-20} N
- (2) $8\pi \times 10^{-20}$ N
- (3) $4\pi \times 10^{-20}$ N
- (4) $8\pi \times 10^{-20}$ N

The variation of magnetic field across the cross-section of the cable is represented by :



5. In a potentiometer circuit a cell of EMF balance point at 36 cm length of wire cell of EMF 2.5 V replaces the first what length of the wire, the balance

- (1) 60 cm
- (2) 21.6 cm

...n, which one of the following combinations is correct possible directions for electric and magnetic field (B) respectively?

(A) $-\hat{k}, \hat{j} + \hat{k}$

(B) $\hat{i} + \hat{k}, -\hat{j} - \hat{k}$

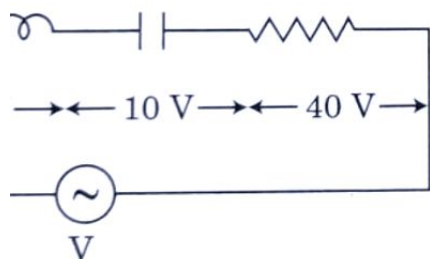
(C) $-\hat{k}, -\hat{j} - \hat{k}$

(D) $\hat{i} + \hat{k}, -\hat{j} + \hat{k}$

A series combination of inductor of inductance L, a capacitor of capacitance C and a resistor of resistance 'R' are connected in series to an ac source of potential difference 'V' volts as shown in figure.

The potential difference across L, C and R is 40 V, 40 V, respectively. The amplitude of current flowing through LCR series circuit is

The impedance of the circuit is :



(A) $\sqrt{2} \Omega$

(B) $\sqrt{2} \Omega$

The number of photons per second on an average emitted by the source of monochromatic light of wavelength 600 nm, when it delivers the power of 3 watt will be : ($h = 6.6 \times 10^{-34} \text{ Js}$)

(A) 3

(B) 7

work function. The wavelength of light emitted from the surface has de-Broglie wavelength λ_d , then :

(1) $\lambda = \left(\frac{2m}{hc}\right) \lambda_d^2$

(2) $\lambda_d = \left(\frac{2mc}{h}\right) \lambda^2$

(3) $\lambda = \left(\frac{2mc}{h}\right) \lambda_d^2$

(4) $\lambda = \left(\frac{2h}{mc}\right) \lambda_d^2$

10. Column - I gives certain physical terms associated with flow of current through a metallic conductor. Column - II gives some mathematical relations involving electrical quantities. Match Column - I and Column - II with appropriate relations.

Column - I	Column - II
(A) Drift Velocity	(P) $\frac{m}{ne^2 \rho}$
(B) Electrical Resistivity	(Q) nev_d
(C) Relaxation Period	(R) $\frac{eE}{m} \tau$
(D) Current Density	(S) $\frac{E}{J}$
(1) (A)-(R), (B)-(S), (C)-(P), (D)-(Q)	
(2) (A)-(R), (B)-(S), (C)-(Q), (D)-(P)	
(3) (A)-(R), (B)-(P), (C)-(S), (D)-(Q)	
(4) (A)-(R), (B)-(Q), (C)-(S), (D)-(P)	

11. The escape velocity from the Earth's surface is v . The escape velocity from the surface of another planet having a radius, four times that of Earth and same mass density is :

(1) v

(2) $2v$

M6

12. The velocity of a small ball of mass M and density d , when dropped in a container filled with glycerine becomes constant after some time. If the density of glycerine is $\frac{d}{2}$, then the viscous force acting on the ball will be :

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

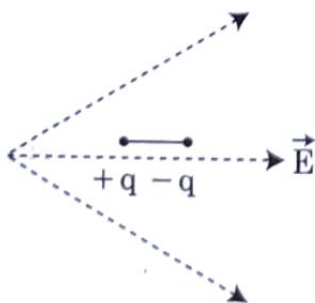
13. A body is executing simple harmonic motion with frequency 'n', the frequency of its potential energy is :

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

14. Water falls from a height of 60 m at the rate of 15 kg/s to operate a turbine. The losses due to frictional force are 10% of the input energy. How much power is generated by the turbine ?
($g = 10 \text{ m/s}^2$)

- (1) 10.2 kW
- (2) 8.1 kW
- (3) 12.3 kW
- (4) 7.0 kW

15. A dipole is placed in an electric field as shown. In which direction will it move ?



- (1) towards the left as its potential energy will increase.
- (2) towards the right as its potential energy will decrease.
- (3) towards the left as its potential energy will decrease.

16. A capacitor is connected to an ac source of voltage V , given by

$$V = V_0 \sin \omega t$$

The displacement current between the capacitor, would then be given by

- (1) $I_d = V_0 \omega C \cos \omega t$
- (2) $I_d = \frac{V_0}{\omega C} \cos \omega t$
- (3) $I_d = \frac{V_0}{\omega C} \sin \omega t$
- (4) $I_d = V_0 \omega C \sin \omega t$

17. A cup of coffee cools from 90°C to 80°C when the room temperature is 20°C . The time taken by a similar cup of coffee to cool from 80°C to 60°C at a room temperature same as above is

- (1) $\frac{13}{10}t$
- (2) $\frac{13}{5}t$
- (3) $\frac{10}{13}t$
- (4) $\frac{5}{13}t$

18. The effective resistance of a parallel combination of four wires of equal length, equal cross-section and same material is R . The effective resistance will be $R/4$ if they are connected in series ?

- (1) 0.25Ω
- (2) 0.5Ω

Match Column - I and Column - II and choose correct match from the given choices.

Column - I	Column - II
Root mean square speed of gas molecules	(P) $\frac{1}{3}nm\bar{v}^2$
Pressure exerted by ideal gas	(Q) $\sqrt{\frac{3RT}{M}}$
Average kinetic energy of a molecule	(R) $\frac{5}{2}RT$
Total internal energy of 1 mole of a diatomic gas	(S) $\frac{3}{2}k_B T$

- (A) - (R), (B) - (P), (C) - (S), (D) - (Q)
 (A) - (Q), (B) - (R), (C) - (S), (D) - (P)
 (A) - (Q), (B) - (P), (C) - (S), (D) - (R)
 (A) - (R), (B) - (Q), (C) - (P), (D) - (S)

A block slides down on a smooth inclined plane, starting from rest at time $t = 0$. Let S_n be the distance travelled by the block in the interval $(n-1)$ to $t = n$. Then, the ratio $\frac{S_n}{S_{n+1}}$ is :

$$\frac{2n-1}{2n}$$

$$\frac{2n-1}{2n+1}$$

$$\frac{2n+1}{2n-1}$$

$$\frac{2n}{2n-1}$$

An active nucleus ${}^A_Z X$ undergoes spontaneous decay in the sequence

$Z_{-1}B \rightarrow Z_{-3}C \rightarrow Z_{-2}D$, where Z is the atomic number of element X . The possible decay modes in the sequence are :

- α, β^-, β^+
 α, β^+, β^-

22. A screw gauge is used to measure the diameter of a wire. Main scale reading : 0 mm
 Circular scale reading : 52 divisions
 Given that 1 mm on main scale corresponds to 100 divisions on the circular scale. The diameter of the wire from the above data is :

- (1) 0.52 cm
 (2) 0.026 cm
 (3) 0.26 cm
 (4) 0.052 cm

23. A parallel plate capacitor has a uniform electric field ' E ' in the space between the plates. If the distance between the plates is ' d ' and the area of each plate is ' A ', the energy stored in the capacitor is : (ϵ_0 = permittivity of free space)

- (1) $\frac{1}{2}\epsilon_0 E^2$
 (2) $\epsilon_0 E A d$
 (3) $\frac{1}{2}\epsilon_0 E^2 A d$
 (4) $\frac{E^2 A d}{\epsilon_0}$

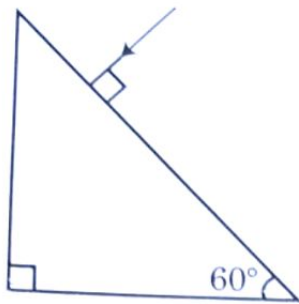
24. The electron concentration in an n-type semiconductor is the same as hole concentration in a p-type semiconductor. An external electric field is applied across each of them. Compare the currents in them.

- (1) current in n-type = current in p-type.
 (2) current in p-type > current in n-type.
 (3) current in n-type > current in p-type.
 (4) No current will flow in p-type, current will only flow in n-type.

25. A convex lens 'A' of focal length 20 cm and a concave lens 'B' of focal length 5 cm are kept along the same axis with a distance ' d ' between them. A parallel beam of light falling on 'A' leaves 'B' as a parallel beam, then the distance ' d ' in cm will be

- (1) 25
 (2) 15

prism. Refractive index of the glass is $\sqrt{3}$.



- (1) 60°
- (2) 30°
- (3) 45°
- (4) 90°

Consider the following **statements (A) and (B)** and identify the **correct** answer.

- (A) A zener diode is connected in reverse bias, when used as a voltage regulator.
- (B) The potential barrier of p-n junction lies between 0.1 V to 0.3 V.
- (1) (A) and (B) both are correct.
 - (2) (A) and (B) both are incorrect.
 - (3) (A) is correct and (B) is incorrect.
 - (4) (A) is incorrect but (B) is correct.

Two charged spherical conductors of radius R_1 and R_2 are connected by a wire. Then the ratio of surface charge densities of the spheres (σ_1/σ_2) is :

- (1) $\frac{R_1}{R_2}$
- (2) $\frac{R_2}{R_1}$
- (3) $\sqrt{\left(\frac{R_1}{R_2}\right)}$
- (4) $\frac{R_1^2}{R_2^2}$

If force [F], acceleration [A] and time [T] are chosen as the fundamental physical quantities. Find the dimensions of energy.

- (1) [F][A][T]
- (2) [F][A][T²]
- (3)

of :

- (1) $[M^2][L^{-1}][T^0]$
- (2) $[M][L^{-1}][T^{-1}]$
- (3) $[M][L^0][T^0]$
- (4) $[M^2][L^{-2}][T^{-1}]$

31. A lens of large focal length and large diameter is best suited as an objective of an astronomical telescope since :

- (1) a large aperture contributes to the resolution and visibility of the images.
- (2) a large area of the objective increases the light gathering power.
- (3) a large aperture provides a better resolution.
- (4) all of the above.

32. A nucleus with mass number 240 breaks into two fragments each of mass number 120. The binding energy per nucleon of the unfragmented nucleus is 7.6 MeV while that of fragments is 8.0 MeV. The total gain in the Binding Energy in the process is :

- (1) 0.9 MeV
- (2) 9.4 MeV
- (3) 804 MeV
- (4) 216 MeV

33. A particle is released from height S from the surface of the Earth. At a certain height s , its kinetic energy is three times its potential energy. The height s from the surface of earth and the speed of the particle at that instant are respectively :

- (1) $\frac{S}{4}, \frac{3gS}{2}$
- (2) $\frac{S}{4}, \frac{\sqrt{3gS}}{2}$
- (3) $\frac{S}{2}, \frac{\sqrt{3gS}}{2}$

Half-life of a radioactive nuclide is 100 hours. The fraction of original activity that will remain after 150 hours would be :

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

A spring is stretched by 5 cm by a force 10 N. The period of the oscillations when a mass of 2 kg is suspended by it is :

- (1) 0.0628 s
- (2) 6.28 s
- (3) 3.14 s
- (4) 0.628 s

Section - B (Physics)

An LCR circuit containing 5.0 H inductor, capacitor and 40Ω resistor is connected to a variable frequency ac source. The angular frequencies of the source at which power transferred to the circuit is half the power at the resonant angular frequency are likely to be :

- (1) 25 rad/s and 75 rad/s
- (2) 50 rad/s and 25 rad/s
- (3) 16 rad/s and 54 rad/s
- (4) 12 rad/s and 58 rad/s

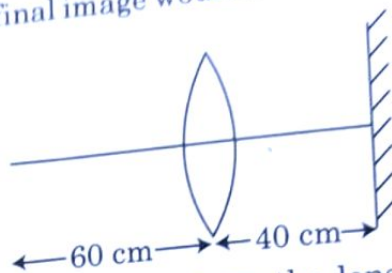
Two conducting circular loops of radii R_1 and R_2 are placed in the same plane with their centres coinciding. If $R_1 \gg R_2$, the mutual inductance M between them will be directly proportional to :

- (1) $\frac{R_1}{R_2}$
- (2) $\frac{R_2}{R_1}$
- (3) $\frac{R_2}{R_1}$
- (4) $\frac{R_1}{R_2}$

38. A ball is dropped from a height of 10 m. The magnitude of the velocity of the ball just before it hits the ground is ($g = 10 \text{ m/s}^2$) nearly :

- (1) 0 kg m/s
- (2) 4.2 kg m/s
- (3) 2.1 kg m/s
- (4) 1.4 kg m/s

39. A point object is placed at a distance of 60 cm from a convex lens of focal length 30 cm. If a plane mirror were put perpendicular to the principal axis of the lens and at a distance of 40 cm from it, the final image would be formed at a distance of :



- (1) 20 cm from the lens, it would be a real image.
- (2) 30 cm from the lens, it would be a real image.
- (3) 30 cm from the plane mirror, it would be a virtual image.
- (4) 20 cm from the plane mirror, it would be a virtual image.

40. A uniform conducting wire of length $12a$ and resistance 'R' is wound up as a current carrying coil in the shape of,

- (i) an equilateral triangle of side 'a'.
- (ii) a square of side 'a'.

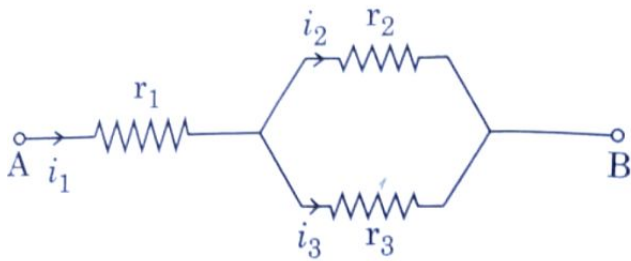
The magnetic dipole moments of the coil in each case respectively are :

- (1) $\sqrt{3} Ia^2$ and $3 Ia^2$
- (2) $3 Ia^2$ and Ia^2
- (3) $3 Ia^2$ and $4 Ia^2$
- (4) $4 Ia^2$ and $3 Ia^2$

41. A car starts from rest and accelerates at 5 m/s^2 . At $t = 4 \text{ s}$, a ball is dropped out of a window by a person sitting in the car. What is the velocity and acceleration of the ball at $t = 6 \text{ s}$? (Take $g = 10 \text{ m/s}^2$)

- (1) 20 m/s, 5 m/s^2
- (2) 20 m/s, 0
- (3) $20\sqrt{2} \text{ m/s}$, 0
- (4) $20\sqrt{2} \text{ m/s}$, 10 m/s^2

Three resistors having resistances r_1 , r_2 and r_3 are connected as shown in the given circuit. The ratio $\frac{i_3}{i_1}$ of currents in terms of resistances used in the circuit is :



- 1) $\frac{r_1}{r_2 + r_3}$
- 2) $\frac{r_2}{r_2 + r_3}$
- 3) $\frac{r_1}{r_1 + r_2}$
- 4) $\frac{r_2}{r_1 + r_3}$

A particle of mass 'm' is projected with a velocity $= kV_e$ ($k < 1$) from the surface of the earth.

(V_e = escape velocity)

The maximum height above the surface reached by the particle is :

$$R \left(\frac{k}{1-k} \right)^2$$

$$R \left(\frac{k}{1+k} \right)^2$$

$$\frac{R^2 k}{1+k}$$

$$\frac{Rk^2}{1-k^2}$$

A step down transformer connected to an ac mains supply of 220 V is made to operate at 11 V, 44 W. Ignoring power losses in the transformer, what is the current in the primary circuit ?

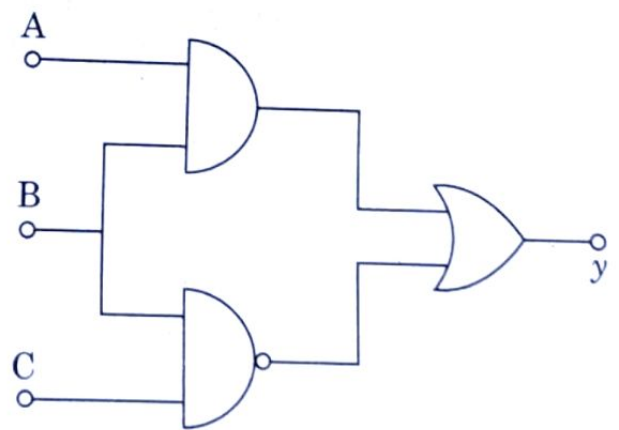
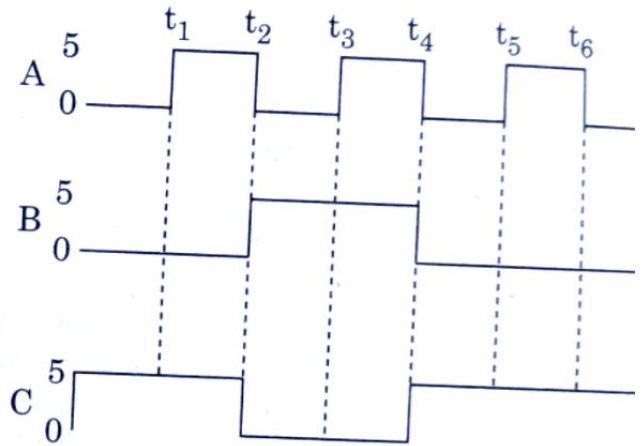
- 1) 0.2 A
- 2) 0.4 A
- 3) 2 A

45. Twenty seven drops of same size are charged with 220 V each. They combine to form a bigger drop. Calculate the potential of the bigger drop.

- (1) 660 V
- (2) 1320 V
- (3) 1520 V
- (4) 1980 V

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46. For the given circuit, the input digital signals applied at the terminals A, B and C. What will be the output at the terminal y?



- (1)
- (2)

A particle moving in a circle of radius R with a uniform speed takes a time T to complete one revolution.

If this particle were projected with the same speed at an angle ' θ ' to the horizontal, the maximum height attained by it equals $4R$. The angle of projection, θ , is then given by :

$$(1) \quad \theta = \cos^{-1} \left(\frac{gT^2}{\pi^2 R} \right)^{1/2}$$

$$(2) \quad \theta = \cos^{-1} \left(\frac{\pi^2 R}{gT^2} \right)^{1/2}$$

$$(3) \quad \theta = \sin^{-1} \left(\frac{\pi^2 R}{gT^2} \right)^{1/2}$$

$$(4) \quad \theta = \sin^{-1} \left(\frac{2gT^2}{\pi^2 R} \right)^{1/2}$$

From a circular ring of mass ' M ' and radius ' R ' an arc corresponding to a 90° sector is removed. The moment of inertia of the remaining part of the ring about an axis passing through the centre of the ring and perpendicular to the plane of the ring is KMR^2 . Then the value of ' K ' is :

$$\frac{3}{4}$$

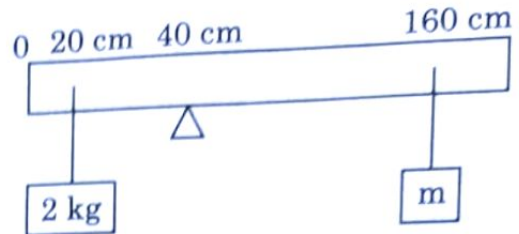
$$\frac{7}{8}$$

$$\frac{1}{4}$$

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49.

A uniform rod of length 200 cm and mass 2 kg is balanced on a wedge placed at 40 cm mark and another unknown mass ' m ' is suspended from the rod at 160 cm mark as shown in the figure. Find the value of ' m ' such that the rod is in equilibrium. ($g = 10 \text{ m/s}^2$)



$$(1) \quad \frac{1}{2} \text{ kg}$$

$$(2) \quad \frac{1}{3} \text{ kg}$$

$$(3) \quad \frac{1}{6} \text{ kg}$$

$$(4) \quad \frac{1}{12} \text{ kg}$$

50. In the product

$$\begin{aligned} \vec{F} &= q \left(\vec{v} \times \vec{B} \right) \\ &= q \vec{v} \times \left(B_0 \hat{i} + B_1 \hat{j} + B_2 \hat{k} \right) \end{aligned}$$

For $q = 1$ and $\vec{v} = 2\hat{i} + 4\hat{j} + 6\hat{k}$ and

$$\vec{F} = 4\hat{i} - 20\hat{j} + 12\hat{k}$$

What will be the complete expression for \vec{B} ?

$$(1) \quad -8\hat{i} - 8\hat{j} - 6\hat{k}$$

$$(2) \quad -6\hat{i} - 6\hat{j} - 8\hat{k}$$

$$(3) \quad 8\hat{i} + 8\hat{j} - 6\hat{k}$$

Section - A (Chemistry)

The correct sequence of bond enthalpy of 'C-X' bond is :

- (1) $\text{CH}_3-\text{F} < \text{CH}_3-\text{Cl} < \text{CH}_3-\text{Br} < \text{CH}_3-\text{I}$
 (2) $\text{CH}_3-\text{F} > \text{CH}_3-\text{Cl} > \text{CH}_3-\text{Br} > \text{CH}_3-\text{I}$
 (3) $\text{CH}_3-\text{F} < \text{CH}_3-\text{Cl} > \text{CH}_3-\text{Br} > \text{CH}_3-\text{I}$
 (4) $\text{CH}_3-\text{Cl} > \text{CH}_3-\text{F} > \text{CH}_3-\text{Br} > \text{CH}_3-\text{I}$

Which one of the following methods can be used to obtain highly pure metal which is liquid at room temperature?

- (1) Electrolysis
 (2) Chromatography
 (3) Distillation
 (4) Zone refining

The correct option for the number of body centred unit cells in all 14 types of Bravais lattice unit cells is :

- (1) 7
 (2) 5
 (3) 2
 (4) 3

Among the following alkaline earth metal halides, one which is covalent and soluble in organic solvents is :

- (1) Calcium chloride
 (2) Strontium chloride
 (3) Magnesium chloride
 (4) Beryllium chloride

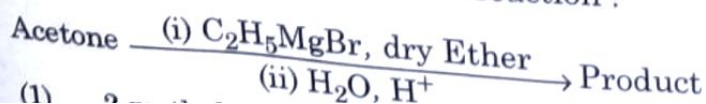
Zr ($Z = 40$) and Hf ($Z = 72$) have similar atomic and ionic radii because of :

- (1) belonging to same group
 (2) diagonal relationship
 (3) lanthanoid contraction
 (4) having similar chemical properties

The maximum temperature that can be achieved in blast furnace is :

- (1) upto 1200 K
 (2) upto 2200 K
 (3) upto 1900 K
 (4) upto 5000 K

57. What is the IUPAC name of the organic compound formed in the following chemical reaction?



(1)

58.

Which one is not formed by addition polymerisation :

- (1) Teflon
 (2) Nylon-66
 (3) Novolac
 (4) Dacron

59.

Right option for the number of tetrahedral and octahedral voids in hexagonal primitive unit cell are :

- (1) 8, 4
 (2) 6, 12
 (3) 2, 1
 (4) 12, 6

60. **Statement I :**

Acid strength increases in the order $\text{HF} \ll \text{HCl} \ll \text{HBr} \ll \text{HI}$.

Statement II :

As the size of the elements F, Cl, Br, I, down the group, the bond strength of HBr and HI decreases and so the boiling point increases.

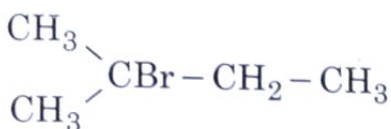
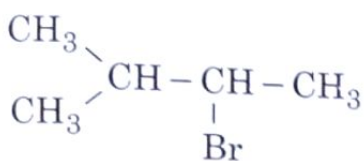
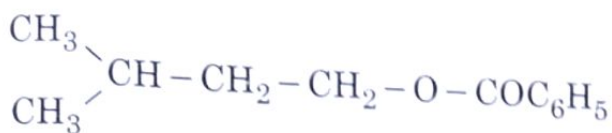
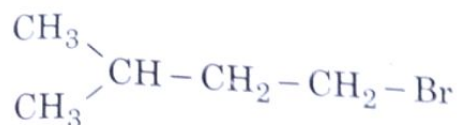
In the light of the above statements, the **correct** answer from the options is :

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

61. The **incorrect** statement among the following is :

- (1) Actinoid contraction is greater than Lanthanoid contraction.
 (2) Most of the trivalent Lanthanoid ions are colorless in the solid state.

Major product of the following chemical reaction is :



Structures of beryllium chloride in solid state and vapour phase, are :

Chain and dimer, respectively

Linear in both

Dimer and Linear, respectively

Chain in both

Below are two statements :

Statement I :

Aspirin and Paracetamol belong to the class of narcotic analgesics.

Statement II :

Morphine and Heroin are non-narcotic analgesics.

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

Both **Statement I** and **Statement II** are true.

Both **Statement I** and **Statement II** are false.

Statement I is true and Statement II is false.

Statement I is false and Statement II is true.

65. An organic compound contains 78% (by wt.) carbon and remaining percentage of hydrogen. The right option for the empirical formula of this compound is : [Atomic wt. of C is 12, H is 1]

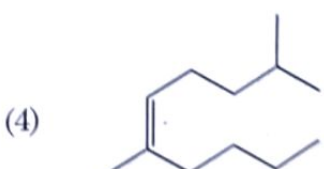
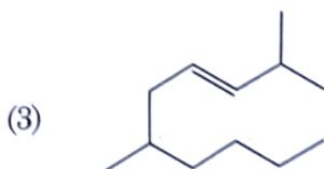
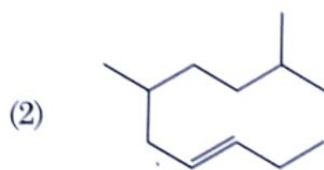
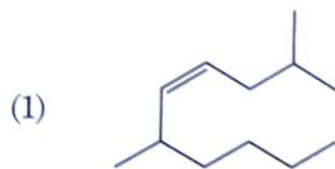
(1) CH

(2) CH₂

(3) CH₃

(4) CH₄

66. The correct structure of 2,6-Dimethyl-dec-4-ene is :

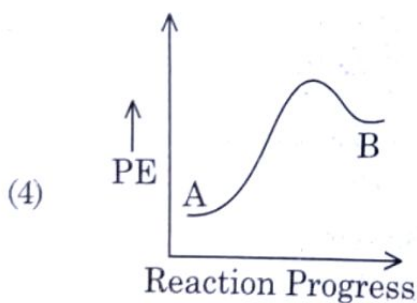
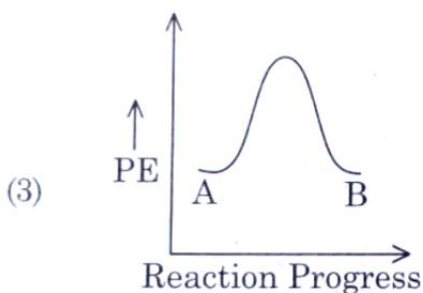
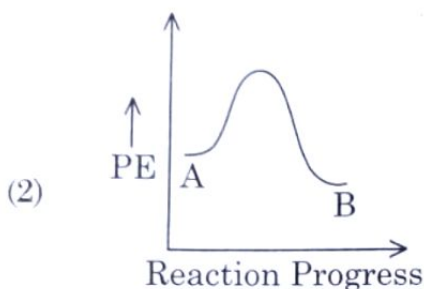
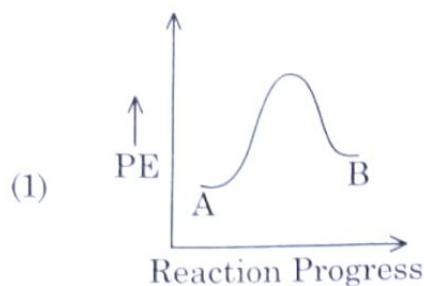


67. The major product formed in dehydrohalogenation reaction of 2-Bromopentane is Pent-2-ene. This product formation is based on ?

(1) Saytzeff's Rule

(2) Hund's Rule

For a reaction $A \rightarrow B$, enthalpy of reaction is -4.2 kJ mol^{-1} and enthalpy of activation is 9.6 kJ mol^{-1} . The correct potential energy profile for the reaction is shown in option.



Ethylene diaminetetraacetate (EDTA) ion is :

- (1) Hexadentate ligand with four "O" and two "N" donor atoms
- (2) Unidentate ligand
- (3) Bidentate ligand with two "N" donor atoms
- (4) Tridentate ligand with three "N" donor atoms

Noble gases are named because of their inertness towards reactivity. Identify an **incorrect** statement about them.

- (1) Noble gases are sparingly soluble in water.
- (2) Noble gases are chemically inert.

71. Which of the following is a displacement reaction? Choose the correct option.

- (1) $2\text{KClO}_3 \xrightarrow{\Delta} 2\text{KCl} + 3\text{O}_2$
- (2) $\text{Cr}_2\text{O}_3 + 2\text{Al} \xrightarrow{\Delta} \text{Al}_2\text{O}_3 + 2\text{Cr}$
- (3) $\text{Fe} + 2\text{HCl} \rightarrow \text{FeCl}_2 + \text{H}_2 \uparrow$
- (4) $2\text{Pb}(\text{NO}_3)_2 \rightarrow 2\text{PbO} + 4\text{NO}_2$

72. The compound which shows metallic character is:

- (1) C_5H_{12}
- (2) $\text{C}_3\text{H}_8\text{O}$
- (3) $\text{C}_3\text{H}_6\text{O}$
- (4) $\text{C}_4\text{H}_{10}\text{O}$

73. The RBC deficiency is deficiency of:

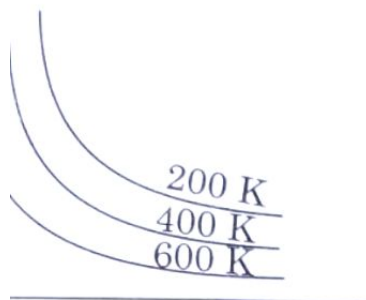
- (1) Vitamin B_{12}
- (2) Vitamin B_6
- (3) Vitamin B_1
- (4) Vitamin B_2

74. Dihedral angle of least stable conformation is:

- (1) 120°
- (2) 180°
- (3) 60°
- (4) 0°

75. Tritium, a radioactive isotope of hydrogen, is formed by which of the following particles?

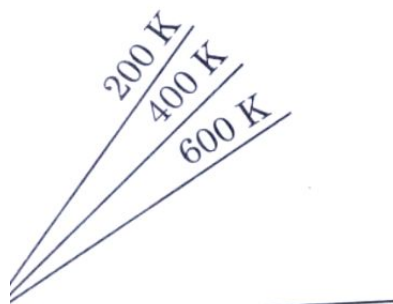
volume of a gas at different



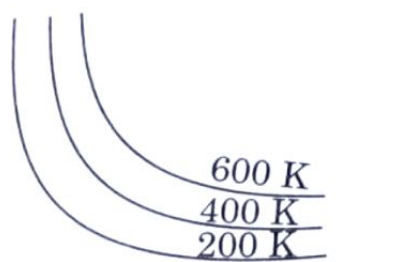
Volume (V) →
(dm³)

200 K, 400 K, 600 K

Volume (V) →
(dm³)



Volume (V) →
(dm³)



Volume (V) →
(dm³)

conductance of NaCl, HCl and CH₃COOH at infinite dilution are 126.45, 426.16 and 8 S cm² mol⁻¹ respectively. The molar conductance of CH₃COOH at infinite dilution is.

- (1) 3 S cm² mol⁻¹
- (2) 1 S cm² mol⁻¹
- (3) 8 S cm² mol⁻¹
- (4) 8 S cm² mol⁻¹

of dimethylamine and pK_a of acetic acid are 4.77 respectively at T (K).

LIST - I

- (a) PCl₅
- (b) SF₆
- (c) BrF₅
- (d) BF₃

List - II

- (i) Square pyramidal
- (ii) Trigonal planar
- (iii) Octahedral
- (iv) Trigonal bipyramidal

Choose the **correct** answer from the options given below.

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

80. Identify the compound that will react with Hinsberg's reagent to give a solid which dissolves in alkali.

- (1) CC(C)N(=O)=O
- (2) CC(C)N(C)C
- (3) CC(C)N
- (4) CC(C)N(C)C(C)C

81. The right option for the statement "Tyndall effect is exhibited by", is :

- (1) NaCl solution
- (2) Glucose solution
- (3) Starch solution
- (4) Urea solution

82. BF₃ is planar and electron deficient compound. Hybridization and number of electrons around the central atom, respectively are :

- (1) sp³ and 4
- (2) sp³ and 6
- (3) sp² and 6
- (4) sp² and 8

83. A particular station of All India Radio, New Delhi, broadcasts on a frequency of 1,368 kHz (kilohertz). The wavelength of the electromagnetic radiation emitted by the transmitter is : [speed of light, c = 3.0 × 10⁸ ms⁻¹]

- (1) 219.3 m

Which one among the following is the correct option for right relationship between C_P and C_V for one mole of ideal gas ?

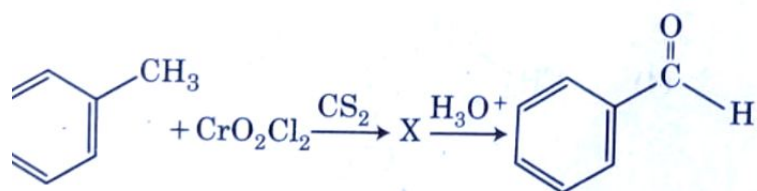
- (1) $C_P + C_V = R$
- (2) $C_P - C_V = R$
- (3) $C_P = RC_V$
- (4) $C_V = RC_P$

The following solutions were prepared by dissolving 10 g of glucose ($C_6H_{12}O_6$) in 250 ml of water (P_1), 10 g of urea (CH_4N_2O) in 250 ml of water (P_2) and 10 g of sucrose ($C_{12}H_{22}O_{11}$) in 250 ml of water (P_3). The right option for the decreasing order of osmotic pressure of these solutions is :

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

Section - B (Chemistry)

The intermediate compound 'X' in the following chemical reaction is :



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

For irreversible expansion of an ideal gas under isothermal conditions

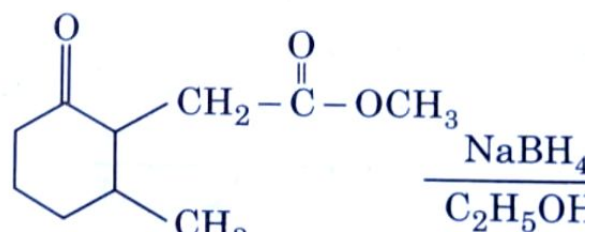
88. Choose the correct option for the value of ΔG (in atm.) in a mixture of 4 g O_2 and 2 g H_2 in a total volume of one litre at 0°C [Given $R = 0.082 \text{ L atm mol}^{-1}\text{K}^{-1}$]
- (1) 2.518
 - (2) 2.602
 - (3) 25.18
 - (4) 26.02

89. The correct option for the value of vapour pressure of a solution at 45°C with benzene and octane in molar ratio 3 : 2 is :

[At 45°C vapour pressure of benzene is 280 mm Hg and that of octane is 100 mm Hg. Assume Ideal gas]

- (1) 160 mm of Hg
- (2) 168 mm of Hg
- (3) 336 mm of Hg
- (4) 350 mm of Hg

90. The product formed in the following reaction is :



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

l₃
)
 5

Following pairs of ions which one is not ionic pair ?

- F⁻
- , Mg²⁺
- , Fe³⁺
- , Mn²⁺

conductivity of 0.007 M acetic acid is mol⁻¹. What is the dissociation acetic acid ? Choose the correct option.

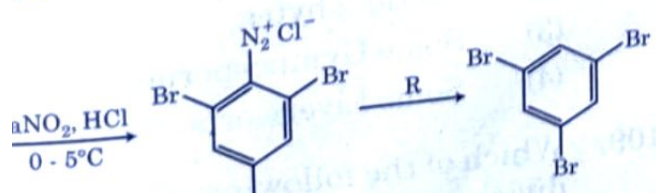
$$\left[\begin{array}{l} 0 \text{ S cm}^2 \text{ mol}^{-1} \\ = 50 \text{ S cm}^2 \text{ mol}^{-1} \end{array} \right]$$

- × 10⁻⁴ mol L⁻¹
- × 10⁻⁴ mol L⁻¹
- × 10⁻⁵ mol L⁻¹
- × 10⁻⁵ mol L⁻¹

of Arrhenius Plot $\left(\ln k \text{ v/s } \frac{1}{T} \right)$ of first reaction is $-5 \times 10^3 \text{ K}$. The value of E_a of reaction is. Choose the correct option for your

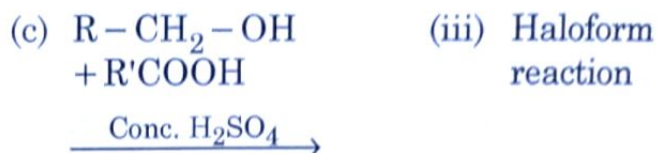
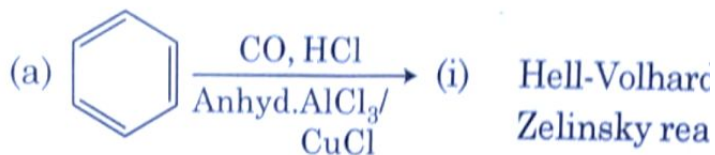
- 8.314 JK⁻¹mol⁻¹
- 5 kJ mol⁻¹
- 10 kJ mol⁻¹
- 3 kJ mol⁻¹

Identify 'R' in the given sequence of chemical reactions :



LIST - I

LIST - II



Choose the **correct** answer from the options given below.

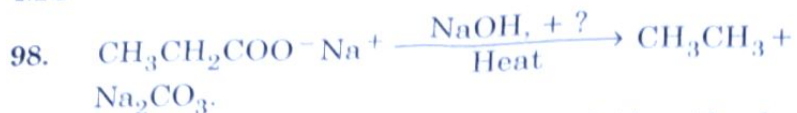
- (1) (a)-(iv), (b)-(i), (c)-(ii), (d)-(iii)
- (2) (a)-(iii), (b)-(ii), (c)-(i), (d)-(iv)
- (3) (a)-(i), (b)-(iv), (c)-(iii), (d)-(ii)
- (4) (a)-(ii), (b)-(iii), (c)-(iv), (d)-(i)

97. Match List - I with List - II.

- | List - I | List - II |
|--|-----------------------------|
| (a) $2\text{SO}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{SO}_3(\text{g})$ | (i) Acid rain |
| (b) $\text{HOCl}(\text{g}) \xrightarrow{h\nu} \dot{\text{O}}\text{H} + \dot{\text{C}}\text{l}$ | (ii) Smog |
| (c) $\text{CaCO}_3 + \text{H}_2\text{SO}_4 \rightarrow \text{CaSO}_4 + \text{H}_2\text{O} + \text{CO}_2$ | (iii) Ozone depletion |
| (d) $\text{NO}_2(\text{g}) \xrightarrow{h\nu} \text{NO}(\text{g}) + \text{O}(\text{g})$ | (iv) Tropospheric pollution |

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)



Consider the above reaction and identify the missing reagent/chemical.

- (1) B_2H_6
- (2) Red Phosphorus
- (3) CaO
- (4) DIBAL-H

99. Match List - I with List - II.

List - I	List - II
(a) $[\text{Fe}(\text{CN})_6]^{3-}$	(i) 5.92 BM
(b) $[\text{Fe}(\text{H}_2\text{O})_6]^{3+}$	(ii) 0 BM
(c) $[\text{Fe}(\text{CN})_6]^{4-}$	(iii) 4.90 BM
(d) $[\text{Fe}(\text{H}_2\text{O})_6]^{2+}$	(iv) 1.73 BM

Choose the correct answer from the options given below.

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

In which one of the following arrangements the given sequence is not strictly according to the properties indicated against it?

- (1) $\text{HF} < \text{HCl} < \text{HBr} < \text{HI}$: Increasing acidic strength
- (2) $\text{H}_2\text{O} < \text{H}_2\text{S} < \text{H}_2\text{Se} < \text{H}_2\text{Te}$: Increasing pK_a values
- (3) $\text{NH}_3 < \text{PH}_3 < \text{AsH}_3 < \text{SbH}_3$: Increasing acidic character
- (4) $\text{CO}_2 < \text{SiO}_2 < \text{SnO}_2 < \text{PbO}_2$: Increasing oxidizing power

Section - A (Biology : Botany)

Match List - I with List - II.

List - I		List - II	
(a)	Protoplast fusion	(i)	Totipotency
(b)	Plant tissue culture	(ii)	Pomato
(c)	Meristem culture	(iii)	Somaclones
(d)	Micropropagation	(iv)	Virus free plants

Choose the correct answer from the options given below.

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

102. R represents :

- (1) Radiant energy
- (2) Retardation factor
- (3) Environment factor
- (4) Respiration losses

103. Which of the following are not metabolites in plants?

- (1) Morphine, codeine
- (2) Amino acids, glucose
- (3) Vinblastin, curcumin
- (4) Rubber, gums

104. The factor that leads to Founder population is :

- (1) Natural selection
- (2) Genetic recombination
- (3) Mutation
- (4) Genetic drift

105. Amensalism can be represented as

- (1) Species A (-) ; Species B (0)
- (2) Species A (+) ; Species B (+)
- (3) Species A (-) ; Species B (-)
- (4) Species A (+) ; Species B (0)

106. A typical angiosperm embryo sac

- (1) 8-nucleate and 7-celled
- (2) 7-nucleate and 8-celled
- (3) 7-nucleate and 7-celled
- (4) 8-nucleate and 8-celled

107. During the purification process for DNA technology, addition of which precipitates out :

- (1) RNA
- (2) DNA
- (3) Histones
- (4) Polysaccharides

108. Gemmae are present in :

- (1) Mosses
- (2) Pteridophytes
- (3) Some Gymnosperms
- (4) Some Liverworts

109. Which of the following stages of

Match List - I with List - II.

List - I		List - II	
(a)	Lenticels	(i)	Phellogen
(b)	Cork cambium	(ii)	Suberin deposition
(c)	Secondary cortex	(iii)	Exchange of gases
(d)	Cork	(iv)	Phelloderm

Choose the **correct** answer from the options given below.

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

Plants follow different pathways in response to environment or phases of life to form different kinds of structures. This ability is called :

- (a) Elasticity
- (b) Flexibility
- (c) Plasticity
- (d) Maturity

The term used for transfer of pollen grains from anthers of one plant to stigma of a different plant which, during pollination, brings genetically different types of pollen grains to stigma, is :

- (a) Xenogamy
- (b) Geitonogamy
- (c) Chasmogamy
- (d) Cleistogamy

Which of the following plants is monoecious ?

- (a) *Carica papaya*
- (b) *Chara*
- (c) *Marchantia polymorpha*
- (d) *Cycas circinalis*

Complete the flow chart on central dogma.

DNA $\xrightarrow{(b)}$ mRNA $\xrightarrow{(c)}$ (d)

- (a) - Replication; (b) - Transcription; (c) - Transduction; (d) - Protein
- (b) - Translation; (b) - Replication; (c) - Transcription; (d) - Transduction
- (a) - Replication; (b) - Transcription;

115. Match List - I with List - II.

List - I		List - II	
(a)	Cristae	(i)	Primary constriction of chromosome
(b)	Thylakoids	(ii)	Disc-shaped sacs in Golgi apparatus
(c)	Centromere	(iii)	Infoldings in mitochondria
(d)	Cisternae	(iv)	Flattened membrane sacs in stroma of plastids

Choose the **correct** answer from the options given below.

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

116. Mutations in plant cells can be induced by :

- (1) Kinetin
- (2) Infrared rays
- (3) Gamma rays
- (4) Zeatin

117. Which of the following statements is **not** correct?

- (1) Pyramid of biomass in sea is generally inverted.
- (2) Pyramid of biomass in sea is generally upright.
- (3) Pyramid of energy is always upright.
- (4) Pyramid of numbers in a grassland ecosystem is upright.

118. In spite of interspecific competition in nature, a mechanism the competing species might have evolved for their survival ?

- (1) Resource partitioning
- (2) Competitive release
- (3) Mutualism
- (4) Predation

119. Match List - I with List - II.

List - I		List - II	
(a)	Cohesion	(i)	More attraction between water molecules in liquid phase
(b)	Adhesion	(ii)	Mutual attraction among water molecules
(c)	Surface tension	(iii)	Water loss in liquid phase
(d)	Guttation	(iv)	Attraction towards polar surfaces

Choose the **correct** answer from the options given below.

- | | | | |
|-----|-----|-----|-----|
| (a) | (b) | (c) | (d) |
|-----|-----|-----|-----|

arrow bands

bright orange bands

dark red bands

right blue bands

of the following is an **incorrect** answer?

Mature sieve tube elements possess a conspicuous nucleus and usual cytoplasmic organelles.

Mitochondria are present both in plant and animal cells.

The perinuclear space forms a barrier between the materials present inside the nucleus and that of the cytoplasm.

Nuclear pores act as passages for proteins and RNA molecules in both directions between nucleus and cytoplasm.

Gene targeting involving gene amplification is adopted in an individual's tissue to treat cancer. It is known as :

Gene therapy

Gene therapy

Molecular diagnosis

Gene therapy

Match List - I with List - II.

List - I	List - II	
Cells with active cell division capacity	(i)	Vascular tissues
Tissue having all cells similar in structure and function	(ii)	Meristematic tissue
Tissue having different types of cells	(iii)	Sclereids
Cells with highly thickened walls and narrow lumen	(iv)	Simple tissue

Choose the **correct** answer from the options given below.

- (a) (b) (c) (d)
 (i) (iv) (i) (iii)
 (ii) (iii) (ii) (i)
 (iii) (ii) (iii) (iv)
 (iv) (i) (iv) (i)

Which of the following is a product of a PCR?

(4) Blue-green algae

126. Which of the following is **not** an application of Polymerase Chain Reaction?

- (1) Molecular diagnosis
 (2) Gene amplification
 (3) Purification of isolated protein
 (4) Detection of gene mutation

127. Genera like *Selaginella* and *Salvinia* produce two kinds of spores. Such plants are known as:

- (1) Homosorus
 (2) Heterosorus
 (3) Homosporous
 (4) Heterosporous

128. Diadelphous stamens are found in:

- (1) China rose
 (2) Citrus
 (3) Pea
 (4) China rose and citrus

129. When the centromere is situated in the middle of two equal arms of chromosomes, the chromosome is referred to as:

- (1) Metacentric
 (2) Telocentric
 (3) Sub-metacentric
 (4) Acrocentric

130. Which of the following algae contain reserve food material?

- (1) *Ectocarpus*
 (2) *Gracilaria*
 (3) *Volvox*
 (4) *Ulothrix*

131. The amount of nutrients, such as carbon, nitrogen, phosphorus and calcium present in a community at a given time, is referred to as:

- (1) Climax
 (2) Climax community
 (3) Standing state
 (4) Standing crop

132. The first stable product of CO₂ fixation in C₃ plants is:

- (1) Pyruvic acid
 (2) Oxaloacetic acid
 (3) Succinic acid

AA
 3AA
 4-D
 3A

production of gametes by the parents, formation of zygotes, the F₁ and F₂ plants, can be read from a diagram called :

- allet square
- nch square
- unnett square
- st square

Question - B (Biology : Botany)

Exponential growth equation
 'e' represents :

- (a) base of number logarithms
- (b) base of exponential logarithms
- (c) base of natural logarithms
- (d) base of geometric logarithms

Match Column - I with Column - II.

Column - I	Column - II
<i>Cococcus</i>	(i) Denitrification
<i>Thiobacillum</i>	(ii) Conversion of ammonia to nitrite
<i>Bacillus</i>	(iii) Conversion of nitrite to nitrate
<i>Rhodospirillum rubrum</i>	(iv) Conversion of atmospheric nitrogen to ammonia

Select the correct answer from options given

- | | | |
|-------|-------|-------|
| (b) | (c) | (d) |
| (iv) | (i) | (iii) |
| (ii) | (iii) | (iv) |
| (i) | (iv) | (ii) |
| (iii) | (ii) | (i) |

Match Column - I with List - II.

Column - I	List - II
Protein synthesis	(i) Proteins are synthesized
Quiescent stage	(ii) Inactive phase
Prophase	(iii) Interval between mitosis and initiation of DNA replication
S phase	(iv) DNA replication

Select the correct answer from the options given

- (2) terminate the process in bacteria.
- (3) The coding strand in a transcription is copied to an mRNA.
- (4) Split gene arrangement is characteristic of prokaryotes.

140. Plasmid pBR322 has PstI restriction enzyme site within gene *amp^R* that confers ampicillin resistance. If this enzyme is used for insertion of a gene for β-galactoside production and a recombinant plasmid is inserted in an *E. coli* cell,

- (1) it will not be able to confer ampicillin resistance to the host cell.
- (2) the transformed cells will have the ability to resist ampicillin as well as produce β-galactoside.
- (3) it will lead to lysis of host cell.
- (4) it will be able to produce a novel protein with dual ability.

141. DNA fingerprinting involves identifying differences in some specific regions in DNA sequence, known as :

- (1) Satellite DNA
- (2) Repetitive DNA
- (3) Single nucleotides
- (4) Polymorphic DNA

142. Which of the following statements is correct?

- (1) Fusion of two cells is called Karyogamy.
- (2) Fusion of protoplasts between two cells on non-motile gametes is called plasmogamy.
- (3) Organisms that depend on living plants for nutrition are called saprophytes.
- (4) Some of the organisms can fix atmospheric nitrogen in specialized cells called heterocyst cells.

143. Match Column - I with Column - II.

Column - I	Column - II
(a) $\% \frac{\text{♂}}{\text{♀}} K_{(5)} C_{1+2+(2)} A_{(9)+1} G_1$	(i) Brassicaceae
(b) $\frac{\text{♂}}{\text{♀}} K_{(5)} \overline{C_{(5)}} A_5 G_2$	(ii) Liliaceae
(c) $\frac{\text{♂}}{\text{♀}} P_{(3+3)} \overline{A_{3+3}} G_{(3)}$	(iii) Fabaceae
(d) $\frac{\text{♂}}{\text{♀}} K_{2+2} C_4 A_{2-4} G_{(2)}$	(iv) Solanaceae

Select the correct answer from the options given below.

to hybridise its complimentary DNA in a clone of cells, followed by its detection using autoradiography because :

- (1) mutated gene partially appears on a photographic film.
- (2) mutated gene completely and clearly appears on a photographic film.
- (3) mutated gene does not appear on a photographic film as the probe has no complementarity with it.
- (4) mutated gene does not appear on photographic film as the probe has complementarity with it.

Which of the following statements is **incorrect** ?

- (1) Both ATP and NADPH + H⁺ are synthesized during non-cyclic photophosphorylation.
- (2) Stroma lamellae have PS I only and lack NADP reductase.
- (3) Grana lamellae have both PS I and PS II.
- (4) Cyclic photophosphorylation involves both PS I and PS II.

Which of the following statements is **incorrect** ?

- 1) During aerobic respiration, role of oxygen is limited to the terminal stage.
- 2) In ETC (Electron Transport Chain), one molecule of NADH + H⁺ gives rise to 2 ATP molecules, and one FADH₂ gives rise to 3 ATP molecules.
- 3) ATP is synthesized through complex V.
- 4) Oxidation-reduction reactions produce proton gradient in respiration.

Match List - I with List - II.

List - I	List - II
Protein	(i) C = C double bonds
Unsaturated fatty acid	(ii) Phosphodiester bonds
Nucleic acid	(iii) Glycosidic bonds
Polysaccharide	(iv) Peptide bonds

Choose the **correct** answer from the options given below.

- | | | | |
|------|-------|-------|-------|
| (a) | (b) | (c) | (d) |
| (iv) | (i) | (ii) | (iii) |
| (i) | (iv) | (iii) | (ii) |
| (ii) | (i) | (iv) | (iii) |
| (iv) | (iii) | (i) | (ii) |

What is the role of RNA polymerase III in the process of transcription in eukaryotes ?

- Transcribes rRNAs (28S, 18S and 5.8S)
- Transcribes tRNA, 5S rRNA
- Transcribes mRNA

- (1) Large colorless empty cells in the epidermis of grass leaves - *Succisa*
- (2) In dicot leaves, vascular bundles are surrounded by large thick-walled cells - *Cotyledon*
- (3) Cells of medullary rays that form part of cambial ring - *Intercambium*
- (4) Loose parenchyma cells rupturing the epidermis and forming a lens-shaped opening in bark - *Sporoparenchyma*

150. In some members of which of the following families, pollen grains retain their viability for several months after release ?

- (1) Poaceae ; Rosaceae
- (2) Poaceae ; Leguminosae
- (3) Poaceae ; Solanaceae
- (4) Rosaceae ; Leguminosae

Section - A (Biology : Zoology)

151. Match List - I with List - II.

List - I	List - II
(a) Vaults	(i) Entry of sperm through Cervix is blocked
(b) IUDs	(ii) Removal of Vas deferens
(c) Vasectomy	(iii) Phagocytosis of sperm within the Uterus
(d) Tubectomy	(iv) Removal of fallopian tube

Choose the **correct** answer from the options given below.

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

152. Which of the following statements with respect to smooth muscle represents the nature of smooth muscle ?

- (1) These muscle have striations
- (2) These muscle have no striations
- (3) These muscle have striations and are voluntary
- (4) These muscle have striations and are involuntary

Endoplasmic reticulum, Mitochondria, Ribosomes and Lysosomes
 Endoplasmic reticulum, Golgi complex, Lysosomes and Vacuoles
 Golgi complex, Mitochondria, Ribosomes and Lysosomes
 Golgi complex, Endoplasmic reticulum, Mitochondria and Lysosomes

entericus is referred to as :
 pancreatic juice
 testinal juice
 astric juice
 yme

ne of the following is an example of a releasing IUD ?

- (1) M2
- (2) IUG 20
- (3) 7
- (4) Multiload 375

one of the following belongs to the family ?

- (1) house fly
- (2) househopper
- (3) cockroach
- (4) house fly

Adenine makes 30% of the DNA molecule, what is the percentage of Thymine, Guanine and Cytosine in it ?

- (1) A : 20 ; G : 30 ; C : 20
- (2) A : 20 ; G : 20 ; C : 30
- (3) A : 30 ; G : 20 ; C : 20
- (4) A : 30 ; G : 25 ; C : 25

Which of the following for sperm binding in mammals are present ?

- (1) zona radiata
- (2) cell membrane
- (3) vitelline space
- (4) pellucida

Which of the following is **not** an objective of genetic modification in crops ?

- (1) to increase protein content
- (2) to increase resistance to diseases
- (3) to increase vitamin content
- (4) to increase micronutrient and mineral content

Which of the following undergoes duplication during meiosis ?

- (1) Arthritis
- (2) Muscular dystrophy
- (3) Myasthenia gravis
- (4) Gout

162. Match List - I with List - II.

List - I		List - II	
(a)	Metamerism	(i)	Coelenterata
(b)	Canal system	(ii)	Ctenophora
(c)	Comb plates	(iii)	Annelida
(d)	Cnidoblasts	(iv)	Porifera

Choose the **correct** answer from the options given below.

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

163. During the process of gene amplification using PCR, if very high temperature is not maintained in the beginning, then which of the following steps of PCR will be affected first ?

- (1) Annealing
- (2) Extension
- (3) Denaturation
- (4) Ligation

164. Read the following statements.

- (a) Metagenesis is observed in Helminths.
- (b) Echinoderms are triploblastic and coelomate animals.
- (c) Round worms have organ-system level body organization.
- (d) Comb plates present in ctenophores help in digestion.
- (e) Water vascular system is characteristic of Echinoderms.

Choose the **correct** answer from the options given below.

- (1) (c), (d) and (e) are correct
- (2) (a), (b) and (c) are correct

Dobson units are used to measure thickness of:

- (1) CFCs
- (2) Stratosphere
- (3) Ozone
- (4) Troposphere

Which is the "Only enzyme" that has "Capability" to catalyse Initiation, Elongation and Termination in the process of transcription in prokaryotes?

- (1) DNA dependent DNA polymerase
- (2) DNA dependent RNA polymerase
- (3) DNA Ligase
- (4) DNase

A specific recognition sequence identified by endonucleases to make cuts at specific positions within the DNA is:

- (1) Degenerate primer sequence
- (2) Okazaki sequences
- (3) Palindromic Nucleotide sequences
- (4) Poly(A) tail sequences

The fruit fly has 8 chromosomes ($2n$) in each cell. During interphase of Mitosis if the number of chromosomes at G_1 phase is 8, what would be the number of chromosomes after S phase?

- (1) 8
- (2) 16
- (3) 4
- (4) 32

Sphincter of oddi is present at:

- (1) Ileo-caecal junction
- (2) Junction of hepato-pancreatic duct and duodenum
- (3) Gastro-oesophageal junction
- (4) Junction of jejunum and duodenum

Match List - I with List - II.

List - I		List - II	
(a)	<i>Aspergillus niger</i>	(i)	Acetic Acid
(b)	<i>Acetobacter aceti</i>	(ii)	Lactic Acid
(c)	<i>Clostridium butylicum</i>	(iii)	Citric Acid
(d)	<i>Lactobacillus</i>	(iv)	Butyric Acid

Choose the **correct** answer from the options given

171. Which one of the following organisms has pneumatic long bones?

- (1) *Neophron*
- (2) *Hemidactylus*
- (3) *Macropus*
- (4) *Ornithorhynchus*

172. In a cross between a male and female heterozygous for sickle cell anaemia, percentage of the progeny will be diseased

- (1) 50%
- (2) 75%
- (3) 25%
- (4) 100%

173. The partial pressures (in mm Hg) of oxygen and carbon dioxide (CO_2) at alveoli (during diffusion) are:

- (1) $pO_2 = 104$ and $pCO_2 = 40$
- (2) $pO_2 = 40$ and $pCO_2 = 45$
- (3) $pO_2 = 95$ and $pCO_2 = 40$
- (4) $pO_2 = 159$ and $pCO_2 = 0.3$

174. Venereal diseases can spread through:

- (a) Using sterile needles
- (b) Transfusion of blood from infected person
- (c) Infected mother to foetus
- (d) Kissing
- (e) Inheritance

Choose the **correct** answer from the options given below.

- (1) (a), (b) and (c) only
- (2) (b), (c) and (d) only
- (3) (b) and (c) only
- (4) (a) and (c) only

175. Which of the following...

Select the favourable conditions required for the formation of oxyhaemoglobin at the alveoli.

- (1) High pO_2 , low pCO_2 , less H^+ , lower temperature
- (2) Low pO_2 , high pCO_2 , more H^+ , higher temperature
- (3) High pO_2 , high pCO_2 , less H^+ , higher temperature
- (4) Low pO_2 , low pCO_2 , more H^+ , higher temperature

Match the following :

List - I		List - II	
(a)	<i>Physalia</i>	(i)	Pearl oyster
(b)	<i>Limulus</i>	(ii)	Portuguese Man of War
(c)	<i>Ancylostoma</i>	(iii)	Living fossil
(d)	<i>Pinctada</i>	(iv)	Hookworm

Choose the **correct** answer from the options given below.

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

Which enzyme is responsible for the conversion of inactive fibrinogens to fibrins ?

- (1) Thrombin
- (2) Renin
- (3) Epinephrine
- (4) Thrombokinase

For effective treatment of the disease, early diagnosis and understanding its pathophysiology is very important. Which of the following molecular diagnostic techniques is very useful for early detection ?

- (1) Western Blotting Technique
- (2) Southern Blotting Technique
- (3) ELISA Technique
- (4) Hybridization Technique

Identify the **incorrect** pair.

- (1) Alkaloids - Codeine
- (2) - Abrin

181. Which stage of meiotic prophase shows terminalisation of chiasmata as its distinctive feature ?

- (1) Leptotene
- (2) Zygotene
- (3) Diakinesis
- (4) Pachytene

182. With regard to insulin choose correct options.

- (a) C-peptide is not present in mature insulin.
- (b) The insulin produced by rDNA technology has C-peptide.
- (c) The pro-insulin has C-peptide.
- (d) A-peptide and B-peptide of insulin are interconnected by disulphide bridges.

Choose the **correct** answer from the options given below.

- (1) (b) and (d) only
- (2) (b) and (c) only
- (3) (a), (c) and (d) only
- (4) (a) and (d) only

183. Persons with 'AB' blood group are called as "Universal recipients". This is due to :

- (1) Absence of antigens A and B on the surface of RBCs
- (2) Absence of antigens A and B in plasma
- (3) Presence of antibodies, anti-A and anti-B, on RBCs
- (4) Absence of antibodies, anti-A and anti-B, in plasma

184. Erythropoietin hormone which stimulates R.B.C formation is produced by :

- (1) Alpha cells of pancreas
- (2) The cells of rostral adenohypophysis
- (3) The cells of bone marrow
- (4) Juxtaglomerular cells of the kidney

185. Which of the following characteristics is **incorrect** with respect to cockroach ?

- (1) A ring of gastric caeca is present at the junction of midgut and hind gut.
- (2) Hypopharynx lies within the cavity enclosed by the mouth parts.
- (3) In females, 7th-9th sterna together form genital pouch.
- (4) 10th abdominal segment in both sexes, bears a pair of anal cerci.

- ... deficiency results into:
- (1) Dysfunction of Immune system
 - (2) Parkinson's disease
 - (3) Digestive disorder
 - (4) Addison's disease

7. Which of the following is **not** a step in Multiple Ovulation Embryo Transfer Technology (MOET)?

- (1) Cow is administered hormone having LH like activity for super ovulation ✓
- (2) Cow yields about 6-8 eggs at a time
- (3) Cow is fertilized by artificial insemination
- (4) Fertilized eggs are transferred to surrogate mothers at 8-32 cell stage

3. Match List - I with List - II.

List - I		List - II	
(a)	Adaptive radiation	(i)	Selection of resistant varieties due to excessive use of herbicides and pesticides
(b)	Convergent evolution	(ii)	Bones of forelimbs in Man and Whale
(c)	Divergent evolution	(iii)	Wings of Butterfly and Bird
(d)	Evolution by anthropogenic action	(iv)	Darwin Finches

Choose the **correct** answer from the options given below.

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

Which one of the following statements about Histones is **wrong**?

- (1) Histones are organized to form a unit of 8 molecules.
- (2) The pH of histones is slightly acidic.
- (3) Histones are rich in amino acids - Lysine and Arginine.
- (4) Histones carry positive charge in the side chain.

Which of the following secretes the hormone, relaxin, during the later phase of pregnancy?

- (1) Graafian follicle
- (2) Corpus luteum
- (3) Foetus
- (4) Uterus

lipids.

- (a) Lipids having only single bonds are called saturated fatty acids.
- (b) Lecithin is a phospholipid.
- (c) Trihydroxy propane is glycerol.
- (d) Palmitic acid has 20 carbon atoms including carboxyl carbon.
- (e) Arachidonic acid has 16 carbon atoms.

Choose the **correct** answer from the options below.

- (1) (a) and (b) only
- (2) (c) and (d) only
- (3) (b) and (e) only
- (4) (b) and (e) only

192. Match List - I with List - II.

List - I		List - II	
(a)	Filariasis	(i)	<i>Haemophilus influenzae</i>
(b)	Amoebiasis	(ii)	<i>Trichophyton</i>
(c)	Pneumonia	(iii)	<i>Wuchereria bancrofti</i>
(d)	Ringworm	(iv)	<i>Entamoeba histolytica</i>

Choose the **correct** answer from the options given below.

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

193. Identify the types of cell junctions that help in the leakage of the substances across a cell membrane and facilitate communication with neighboring cells via rapid transfer of ions and molecules.

- (1) Gap junctions and Adhering junctions respectively.
- (2) Tight junctions and Gap junctions respectively.
- (3) Adhering junctions and Tight junctions respectively.
- (4) Adhering junctions and Gap junctions respectively.

ing events occur?
H⁺ zone disappears

A' band widens

I' band reduces in width

Myosine hydrolyzes ATP, releasing the ADP and Pi

Z-lines attached to actins are pulled inwards
the **correct** answer from the options given

a), (c), (d), (e) only

a), (b), (c), (d) only

b), (c), (d), (e) only

b), (d), (e), (a) only

ng are the statements about prostomium
worm.

t serves as a covering for mouth.

t helps to open cracks in the soil into which
t can crawl.

t is one of the sensory structures.

t is the first body segment.

the **correct** answer from the options given

a), (b) and (c) are correct

a), (b) and (d) are correct

a), (b), (c) and (d) are correct

b) and (c) are correct

ion (A) :

on goes to high altitude and experiences
'the sickness' with symptoms like breathing
difficulty and heart palpitations.

n (R) :

low atmospheric pressure at high altitude,
y does not get sufficient oxygen.

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

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

Both (A) and (R) are true but (R) is not the
correct explanation of (A)

(A) is true but (R) is false

(A) is false but (R) is true

of these is not an important component of
nutrition in humans?

(a)	Allen's Rule	(i)	Kangaroo rat
(b)	Physiological adaptation	(ii)	Desert lizard
(c)	Behavioural adaptation	(iii)	Marine fish at depth
(d)	Biochemical adaptation	(iv)	Polar seal

Choose the **correct** answer from the options
below.

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

(1) (iv) (ii) (iii) (i)

(2) (iv) (i) (iii) (ii)

✓ (3) (iv) (i) (ii) (iii)

(4) (iv) (iii) (ii) (i)

199. Match List - I with List - II.

List - I		List - II	
(a)	Scapula 4	(i)	Cartilaginous joint
(b)	Cranium 2	(ii)	Flat bone
(c)	Sternum 2	(iii)	Fibrous joints
(d)	Vertebral column 1	(iv)	Triangular flat bone

Choose the **correct** answer from the options
below.

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

(1) (i) (iii) (ii) (iv)

(2) (ii) (iii) (iv) (i)

(3) (iv) (ii) (iii) (i)

(4) (iv) (iii) (ii) (i)

200. **Statement I :**

The codon 'AUG' codes for methionine
phenylalanine.

Statement II :

'AAA' and 'AAG' both codons code for the
acid lysine.

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

(1) Both **Statement I** and **Statement II**
true

(2) Both **Statement I** and **Statement II**
false

(3) **Statement I** is correct but **Statement II**
is false

(4) **Statement I** is incorrect
Statement II is true