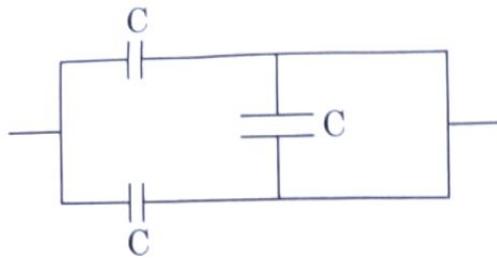


The equivalent capacitance of the combination shown in the figure is :



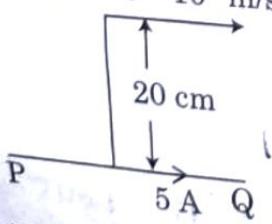
- (1) $3C$
- (2) $2C$
- (3) $C/2$
- (4) $3C/2$

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.

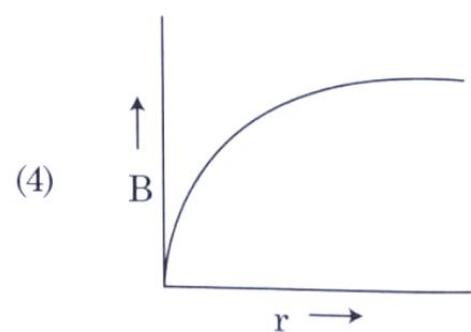
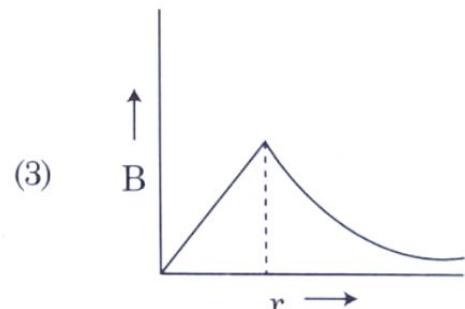
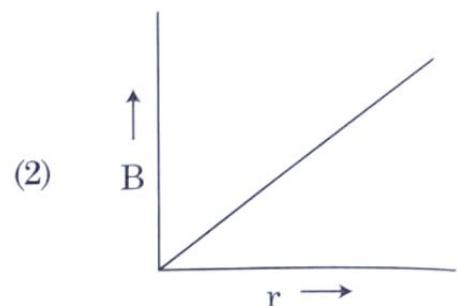
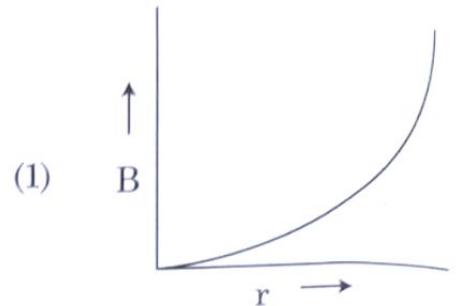
An infinitely long straight conductor carries a current of 5 A as shown. An electron is moving with a speed of 10^5 m/s parallel to the conductor. The perpendicular distance between the electron and the conductor is 20 cm at an instant. Calculate the magnitude of the force experienced by the electron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

Electron $v = 10^5 \text{ m/s}$



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

cross-section. The variation of magnetic field due to the cable with the distance 'r' from 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 point shifts to 24 cm ?
- (1) 60 cm
 - (2) 21.6 cm

In which one of the following combinations of the correct possible directions for electric field (E) and magnetic field (B) respectively?

$$-\hat{k}, \hat{i} + \hat{j}$$

$$\hat{i} + \hat{k}, -\hat{j} - \hat{k}$$

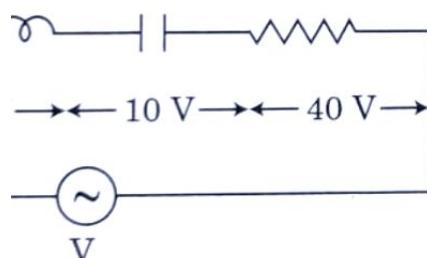
$$-\hat{k}, -\hat{i} - \hat{j}$$

$$\hat{i} + \hat{k}, -\hat{j} + \hat{k}$$

Circuit 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.

If the potential difference across L, C and R is 40 V, 10 V and 40 V, respectively. The amplitude of current flowing through LCR series circuit is

The impedance of the circuit is :



$$\frac{1}{2} \Omega$$

$$\sqrt{2} \Omega$$

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 : ($\text{h} = 6.6 \times 10^{-34} \text{ Js}$)

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

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

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

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

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

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

$$(A) \quad \text{Drift Velocity} \quad (P) \quad \frac{m}{ne^2 \rho}$$

$$(B) \quad \text{Electrical Resistivity} \quad (Q) \quad nev_d$$

$$(C) \quad \text{Relaxation Period} \quad (R) \quad \frac{eE}{m} \tau$$

$$(D) \quad \text{Current Density} \quad (S) \quad \frac{E}{J}$$

$$(1) \quad (A)-(R), (B)-(S), (C)-(P), (D)-(Q)$$

$$(2) \quad (A)-(R), (B)-(S), (C)-(Q), (D)-(P)$$

$$(3) \quad (A)-(R), (B)-(P), (C)-(S), (D)-(Q)$$

$$(4) \quad (A)-(R), (B)-(Q), (C)-(S), (D)-(P)$$

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 :

$$(1) \quad v$$

$$(2) \quad 2v$$

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 ?
($g = 10 \text{ m/s}^2$)

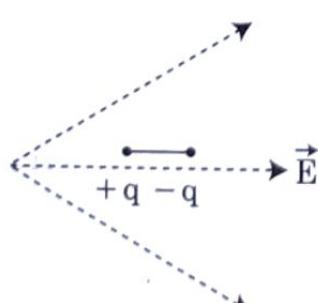
(1) 10.2 kW

(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 of capacity C 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 22°C . When the coffee is taken by a similar cup of coffee to a room temperature 22°C at a room temperature 22°C

(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 circuit consists of four wires of equal length and same cross-section and same material is R . What will be the effective resistance if the wires are joined 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) $\frac{1}{3} \text{ nm} \bar{v}^2$

Pressure exerted by ideal gas (Q) $\sqrt{\frac{3 RT}{M}}$

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)

All block slides down on a smooth inclined plane, starting from rest at time $t=0$. Let S_n be distance travelled by the block in the interval

from $t=1$ 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 number of element X. The possible decays in the sequence are :

α , β^- , β^+

α , β^+ , β^-

22.

used to measure the

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.

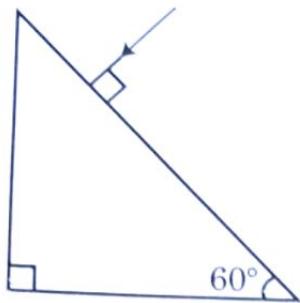
- (1) current in n-type = current in p-type.
- (2) current in p-type > current in n-type.
- (3) current in n-type > current in p-type.
- (4) No current will flow in p-type, current will only flow in n-type.

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



- (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) $[F][A][T^2]$
- (3) $[F][A][T^3]$

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 is best suited as an objective of a telescope since :

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

32. A nucleus with mass number 240 breaks up into two fragments each of mass number 120. The energy per nucleon of unfragmented nucleus is 7.6 MeV while that of fragments is 8.8 MeV. The total gain in the Binding Energy in the fragmentation process is

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

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

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

The fraction of original activity that will remain after 150 hours would be :
 $\frac{1}{2}$

$$\frac{1}{2\sqrt{2}}$$

$$\frac{2}{3}$$

$$\frac{2}{3\sqrt{2}}$$

A ring 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, 10 μF capacitor and 40 Ω resistor is connected to a variable frequency ac source. The angular frequencies of the source at which power delivered to the circuit is half the power at the natural angular frequency are likely to be :

- (1) 25 rad/s and 75 rad/s
- (2) 50 rad/s and 25 rad/s
- (3) 46 rad/s and 54 rad/s
- (4) 42 rad/s and 58 rad/s

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

$$\frac{R_1}{R_2}$$

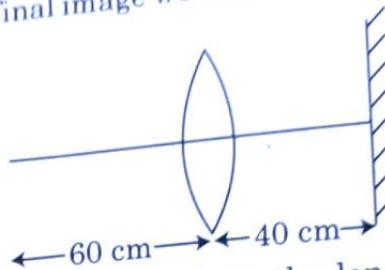
$$\frac{R_2}{R_1}$$

$$\frac{R_1^2}{R_2^2}$$

$$\frac{R_2^2}{R_1^2}$$

38. A ball is projected vertically upwards with a velocity of 10 m/s from a height. The magnitude of the acceleration of the ball 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 :

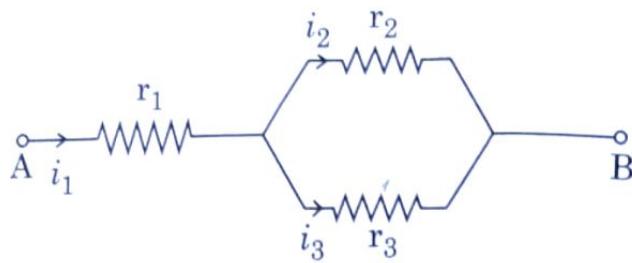
- (1) $\sqrt{3} Ia^2$ and $3 Ia^2$
- (2) $3 Ia^2$ and Ia^2
- (3) $3 Ia^2$ and $4 Ia^2$
- (4) $4 Ia^2$ and $3 Ia^2$

41. A car starts from rest and accelerates at 5 m/s². At $t = 4$ 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 $t = 6$ s ?

(Take $g = 10 \text{ m/s}^2$)

- (1) 20 m/s, 5 m/s²
- (2) 20 m/s, 0
- (3) $20\sqrt{2}$ m/s, 0
- (4) $20\sqrt{2}$ m/s, 10 m/s²

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 :



$$1) \frac{r_1}{r_2 + r_3}$$

$$2) \frac{r_2}{r_2 + r_3}$$

$$3) \frac{r_1}{r_1 + r_2}$$

$$4) \frac{r_2}{r_1 + r_3}$$

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 :

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

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

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

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

Step down transformer connected to an ac mains supply of 220 V is made to operate at 11 V, 44 W resp. 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 220 V each. They combine to form a bigger drop. Calculate the potential of the bigger drop.

$$(1) 660 \text{ V}$$

$$(2) 1320 \text{ V}$$

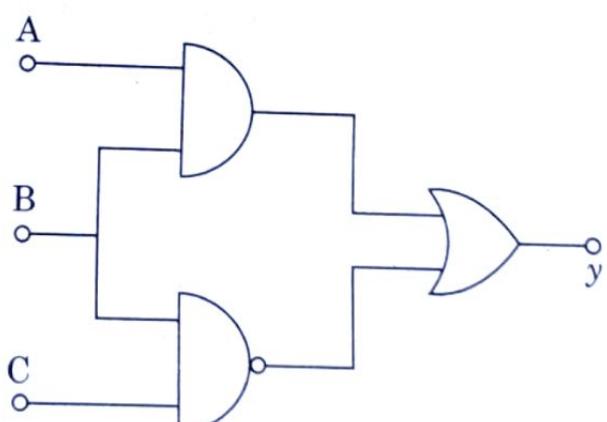
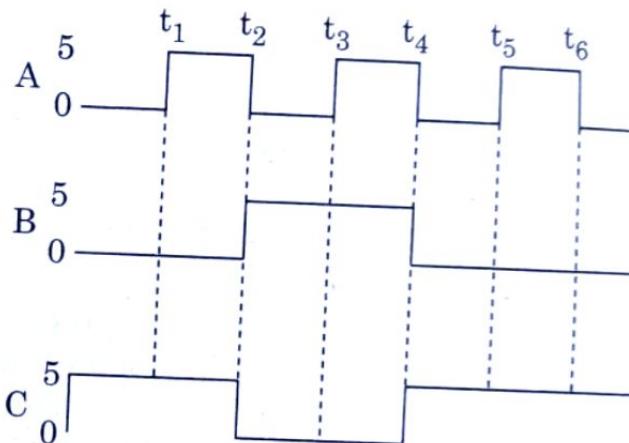
$$(3) 1520 \text{ V}$$

$$(4) 1980 \text{ V}$$

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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?



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 :

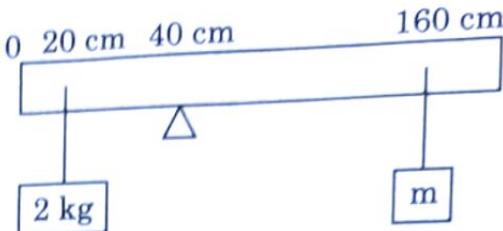
$$\frac{3}{4}$$

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

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

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49. A uniform rod of length 200 cm and mass m balanced on a wedge placed at 40 cm mark. A mass of 2 kg is suspended from the rod at 20 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

$$\vec{F} = q \left(\vec{v} \times \vec{B} \right) \\ = q \vec{v} \times \left(B \hat{i} + B \hat{j} + B_0 \hat{k} \right)$$

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 : $\text{CH}_3-\text{F} < \text{CH}_3-\text{Cl} < \text{CH}_3-\text{Br} < \text{CH}_3-\text{I}$
- $\text{CH}_3-\text{F} < \text{CH}_3-\text{Cl} < \text{CH}_3-\text{Br} < \text{CH}_3-\text{I}$
 - $\text{CH}_3-\text{F} > \text{CH}_3-\text{Cl} > \text{CH}_3-\text{Br} > \text{CH}_3-\text{I}$
 - $\text{CH}_3-\text{F} < \text{CH}_3-\text{Cl} > \text{CH}_3-\text{Br} > \text{CH}_3-\text{I}$
 - $\text{CH}_3-\text{Cl} > \text{CH}_3-\text{F} > \text{CH}_3-\text{Br} > \text{CH}_3-\text{I}$
- Which one of the following methods can be used to obtain highly pure metal which is liquid at room temperature ?
- Electrolysis
 - Chromatography
 - Distillation
 - Zone refining
- The correct option for the number of body centred unit cells in all 14 types of Bravais lattice unit cells is :
- 7
 - 5
 - 2
 - 3
- Among the following alkaline earth metal halides, one which is covalent and soluble in organic solvents is :
- Calcium chloride
 - Strontium chloride
 - Magnesium chloride
 - Beryllium chloride
- Zr ($Z=40$) and Hf ($Z=72$) have similar atomic and ionic radii because of :
- belonging to same group
 - diagonal relationship
 - lanthanoid contraction
 - having similar chemical properties
- The maximum temperature that can be achieved in blast furnace is :
- upto 1200 K
 - upto 2200 K
 - upto 1900 K
 - upto 5000 K
- What is the IUPAC name of the organic compound formed in the following chemical reaction ?
- Acetone $\xrightarrow{\text{(i) } \text{C}_2\text{H}_5\text{MgBr, dry Ether}}$ Product
- (1) $\text{H}_2\text{O}, \text{H}^+$ $\xrightarrow{\text{(ii) }} \text{Product}$

58. Which one is formed by addition polymerisation :

- Teflon
- Nylon-66
- Novolac
- Dacron

59. Right option for the number of tetrahedral voids in hexagonal prism are :

- 8, 4
- 6, 12
- 2, 1
- 12, 6

60. Statement I :

Acid strength increases in the sequence HF << HCl << HBr << HI.

Statement II :

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

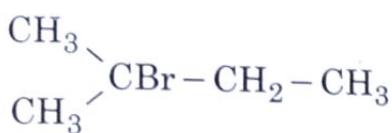
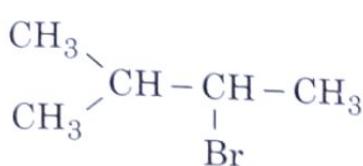
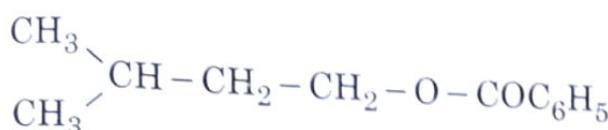
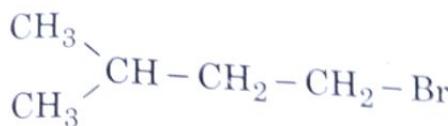
In the light of the above statements, choose the correct answer from the options

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

61. The incorrect statement among the following is

- Actinoid contraction is greater than lanthanoid contraction
- Most of the trivalent Lanthanides are colourless in the solid state

What is the following chemical ion is :



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

Chain and dimer, respectively

Linear in both

Dimer and Linear, respectively

Chain in both

below are two statements :

ment I :

Ibuprofen and Paracetamol belong to the class of non-narcotic analgesics.

ment II :

Aspirin and Heroin are non-narcotic analgesics. In the 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.

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

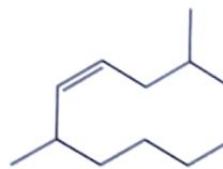
(3) CH₃

(4) CH₄

66.

The correct structure of 2,6-Dimethyl-dec-4-en is :

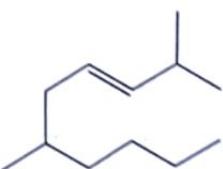
(1)



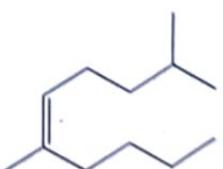
(2)



(3)



(4)



67.

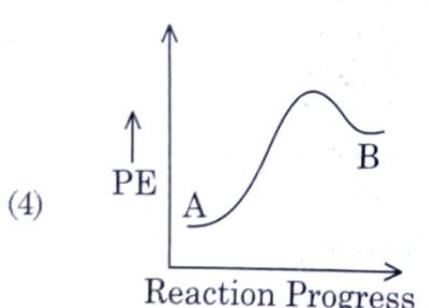
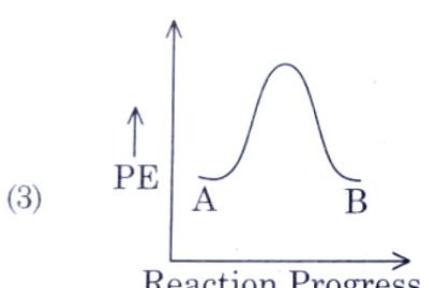
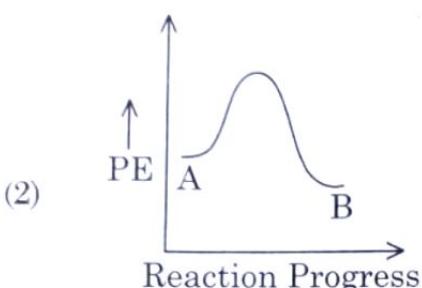
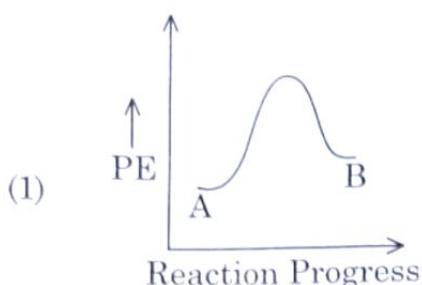
The major product formed in dehydrohalogenation reaction of 2-Bromo pentane is Pent-2-ene. This product formation is based on ?

(1) Saytzeff's Rule

(2) Hund's Rule

6

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 :

- Hexadentate ligand with four "O" and two "N" donor atoms
- Unidentate ligand
- Bidentate ligand with two "N" donor atoms
- Tridentate ligand with three "N" donor atoms

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

- Noble gases are sparingly soluble in water.
- Noble gases are inert.

71.

Which of the following reaction is displacement reaction? Choose one

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

72.

The compound which shows meta:

- C_5H_{12}
- $\text{C}_3\text{H}_8\text{O}$
- $\text{C}_3\text{H}_6\text{O}$
- $\text{C}_4\text{H}_{10}\text{O}$

73.

The RBC deficiency is deficiency d

- Vitamin B_{12}
- Vitamin B_6
- Vitamin B_1
- Vitamin B_2

74.

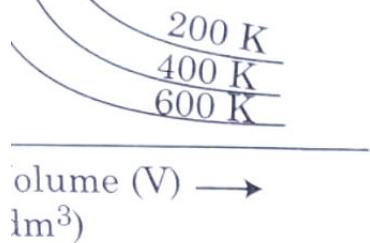
Dihedral angle of least stable conformation is :

- 120°
- 180°
- 60°
- 0°

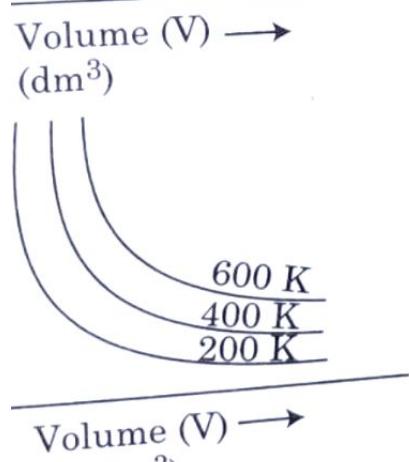
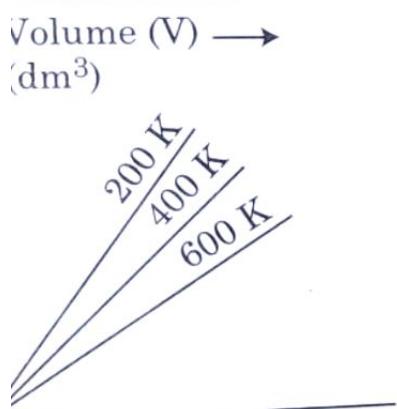
75.

Tritium, a radioactive isotope of hydrogen, which of the following particles?

volume of a gas at different



00 K, 400 K, 600 K



conductance of NaCl, HCl and at infinite dilution are 126.45, 426.16 m² mol⁻¹ respectively. The molar of CH₃COOH at infinite dilution is.

3 S cm² mol⁻¹

1 S cm² mol⁻¹

8 S cm² mol⁻¹

8 S cm² mol⁻¹ f dimethylamine and pK_a of acetic acid are 77 respectively at T (K).

List - I

- (a) PCl₅ (i) Square pyramidal
(b) SF₆ (ii) Trigonal planar
(c) BrF₅ (iii) Octahedral
(d) BF₃ (iv) Trigonal bipyramidal

List - II

Square pyramidal

Trigonal planar

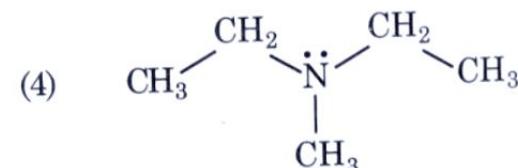
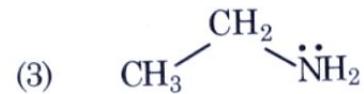
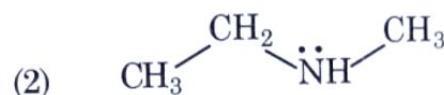
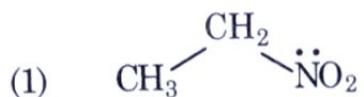
Octahedral

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.



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?

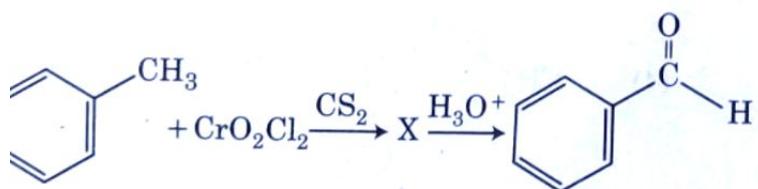
- (1) $C_P + C_V = R$
- (2) $C_P - C_V = R$
- (3) $C_P = R C_V$
- (4) $C_V = R C_P$

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) $\text{C}_6\text{H}_5\text{CH}_2\text{CH}(\text{OCrOHCl}_2)_2$
- (2) $\text{C}_6\text{H}_5\text{CH}_2\text{CH}(\text{OCOCH}_3)_2$
- (3) $\text{C}_6\text{H}_5\text{CH}(\text{Cl})_2$
- (4) $\text{C}_6\text{H}_5\text{CH}(\text{Cl})\text{H}$

For irreversible expansion of an ideal gas, $\frac{P}{T} = \frac{n}{V}$

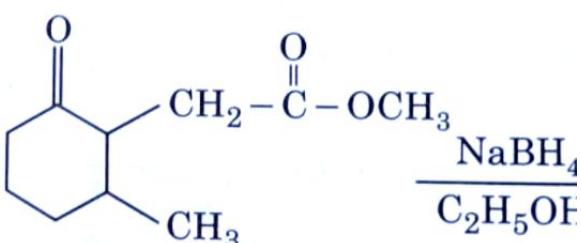
88. Choose the correct option for the value of V (in atm.) in a mixture of 4 g O_2 and 2 g N_2 in a total volume of one litre at 0°C [Given $R = 0.082 \text{ L atm mol}^{-1}\text{K}^{-1}$]
- (1) 2.518
 - (2) 2.602
 - (3) 25.18
 - (4) 26.02

89. The correct option for the value of V (in atm.) 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 160 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) $\text{C}_6\text{H}_{11}\text{CH}_2\text{CH}(\text{OH})-\text{C}(\text{H})(\text{OH})\text{OCH}_3$

- (2) $\text{C}_6\text{H}_{11}\text{CH}_2\text{CH}_2\text{OH}$

- (3) $\text{C}_6\text{H}_{11}\text{CH}_2\text{CH}(\text{OH})-\text{C}(\text{H})(\text{OH})\text{CH}_3$

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.

$$0 \text{ S cm}^2 \text{ mol}^{-1}$$

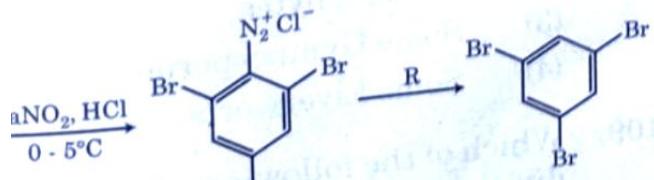
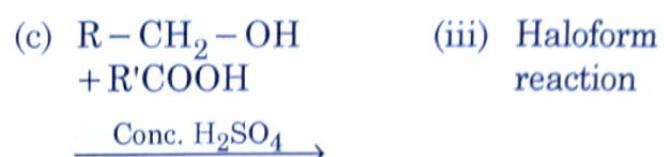
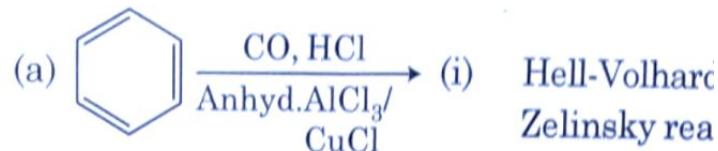
$$= 50 \text{ S cm}^2 \text{ mol}^{-1}$$

- $\times 10^{-4} \text{ mol L}^{-1}$
- $\times 10^{-4} \text{ mol L}^{-1}$
- $\times 10^{-5} \text{ mol L}^{-1}$
- $\times 10^{-5} \text{ mol L}^{-1}$

of Arrhenius Plot ($\ln k$ v/s $\frac{1}{T}$) of first reaction is $-5 \times 10^3 \text{ K}$. The value of E_a of reaction is $8.314 \text{ JK}^{-1} \text{ mol}^{-1}$. Choose the correct option for your answer is.

- 5 kJ mol⁻¹
- 10 kJ mol⁻¹
- 15 kJ mol⁻¹
- 3 kJ mol⁻¹

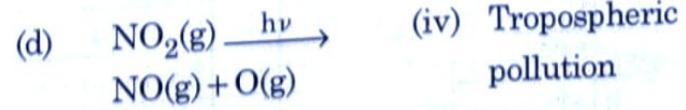
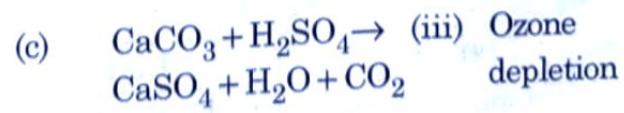
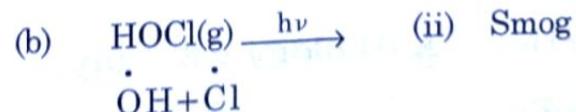
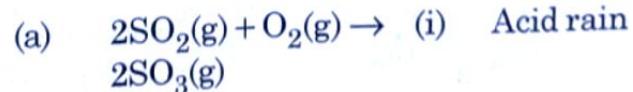
What 'R' in the given sequence of chemical reactions:

**List - I****List - II**

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

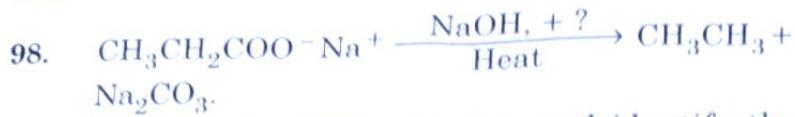
- (1) (a)-(iv), (b)-(i), (c)-(ii), (d)-(iii)
- (2) (a)-(iii), (b)-(ii), (c)-(i), (d)-(iv)
- (3) (a)-(i), (b)-(iv), (c)-(iii), (d)-(ii)
- (4) (a)-(ii), (b)-(iii), (c)-(iv), (d)-(i)

97. Match **List - I** with **List - II**.

List - I**List - II**

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

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



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

- B_2H_6
- Red Phosphorus
- CaO
- DIBAL-H

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.

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

- $\text{HF} < \text{HCl} < \text{HBr} < \text{HI}$: Increasing acidic strength
- $\text{H}_2\text{O} < \text{H}_2\text{S} < \text{H}_2\text{Se} < \text{H}_2\text{Te}$: Increasing pK_a values
- $\text{NH}_3 < \text{PH}_3 < \text{AsH}_3 < \text{SbH}_3$: Increasing acidic character
- $\text{CO}_2 < \text{SiO}_2 < \text{SnO}_2 < \text{PbO}_2$: 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) Microppropagation	(iv) Virus free plants

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

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

102. R represents:

- Radiant energy
- Retardation factor
- Environment factor
- Respiration losses

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

- Morphine, codeine
- Amino acids, glucose
- Vinblastin, curcumin
- Rubber, gums

104. The factor that leads to Found population is:

- Natural selection
- Genetic recombination
- Mutation
- Genetic drift

105. Amensalism can be represented as

- Species A (-); Species B (0)
- Species A (+); Species B (+)
- Species A (-); Species B (-)
- Species A (+); Species B (0)

106. A typical angiosperm embryo sac

- 8-nucleate and 7-celled
- 7-nucleate and 8-celled
- 7-nucleate and 7-celled
- 8-nucleate and 8-celled

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

- RNA
- DNA
- Histones
- Polysaccharides

108. Gemmae are present in :

- Mosses
- Pteridophytes
- Some Gymnosperms
- Some Liverworts

109. Which of the following stages of n

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)	Phelloiderm

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 :

- Elasticity
- Flexibility
- Plasticity
- Maturity

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

- Xenogamy
- Geitonogamy
- Chasmogamy
- Cleistogamy

Which of the following plants is monoecious ?

Carica papaya

Chara

Marchantia polymorpha

Cycas circinalis

Complete the flow chart on central dogma.



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

115. Match List - I with List - II.

List - I		(i)	Primary construction
(a)	Cristae	(i)	chromosome
(b)	Thylakoids	(ii)	Disc-shaped sacs in
(c)	Centromere	(iii)	Golgi apparatus
(d)	Cisternae	(iv)	Infoldings in mitochondria
			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. Inspite of interspecific competition in nature, what 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 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) |
|--|-----|-----|-----|-----|
|--|-----|-----|-----|-----|

know values

bright orange bands

dark red bands

bright blue bands

of the following is an incorrect
nt?

ature sieve tube elements possess a
nspicuous nucleus and usual cytoplasmic
ganelles.

icrobodies are present both in plant and
imal cells.

he perinuclear space forms a barrier
between the materials present inside the
ucleus and that of the cytoplasm.

uclear pores act as passages for proteins
nd RNA molecules in both directions
tween nucleus and cytoplasm.

ne targetting involving gene amplification
opted in an individual's tissue to treat
it is known as :

opiracy

ene therapy

olecular diagnosis

fety testing

ist - I with List - II.

List - I	List - II
s with active cell ision capacity	(i) Vascular tissues
sue having all cells ilar in structure function	(ii) Meristematic tissue
sue having erent types of cells	(iii) Sclereids
nd cells with highly kened walls and row lumen	(iv) Simple tissue

the correct answer from the options given

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

of the following is a

(4) Blue-green algae

126. Which of the following is **not** an applica
(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*
kinds of spores. Such plants are kno

- (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
two equal arms of chromosomes, the
is referred as :

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

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

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

131. The amount of nutrients, such as carl
phosphorus and calcium present in t
given time, is referred as :

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

132. The first stable product of CO₂ fixatio
is :

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

AA
JAA
A-D
3A

production of gametes by the parents, in of zygotes, the F_1 and F_2 plants, can be deduced from a diagram called:

allel square
inch square
innert square
st square

on - B (Biology : Botany)

ponential growth equation

t , e represents :

- e base of number logarithms
- e base of exponential logarithms
- e base of natural logarithms
- e base of geometric logarithms

olumn - I with Column - II.

Column - I	Column - II
<i>coccus</i>	(i) Denitrification
<i>bium</i>	(ii) Conversion of ammonia to nitrite
<i>acillus</i>	(iii) Conversion of nitrite to nitrate
<i>bacter</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)

- I with List - II.

Column - I	Column - II
re	(i) Proteins are synthesized
se	(ii) Inactive phase
ent stage	(iii) Interval between mitosis and initiation of DNA replication
se	(iv) DNA replication

Select the correct answer from the options given

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

140. Plasmid pBR322 has PstI restriction enzyme within gene amp^R that confers ampicillin resistance. If this enzyme is used for insertion of a gene for β -galactoside production a recombinant plasmid is inserted in an *E.coli*.
(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 protoplasms between two non-motile gametes is called plasmogamy.
(3) Organisms that depend on living plants called saprophytes.
(4) Some of the organisms can fix atmospheric nitrogen in specialized cells called symbiotic cells.

143. Match Column - I with Column - II.
- | Column - I | Column - II |
|--|------------------|
| (a) $\text{K}_{(5)}\text{C}_{1+2+}(2)\text{A}_{(9)+1}\text{G}_1$ | (i) Brassicaceae |
| (b) $\text{K}_{(5)}\text{C}_{(5)}\text{A}_5\text{G}_2$ | (ii) Liliaceae |
| (c) $\text{P}_{(3+3)}\text{A}_{3+3}\text{G}_{(3)}$ | (iii) Fabaceae |
| (d) $\text{K}_{2+2}\text{C}_4\text{A}_{2-4}\text{G}_{(2)}$ | (iv) Solanaceae |

Select the correct answer from the options 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 5S)
- Transcribes tRNA, 5S and 5.8S
- Transcribes mRNA

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

150. In some members of which of the following families, pollen grains retain their 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 tubes

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

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

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

- (1) These muscle have
- (2)

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

Intercus is referred to as:
Incretic juice
Testinal juice
Astric juice
Iyme

None of the following is an example of releasing IUD?

T

JG 20

7

Utiload 375

None of the following belongs to the family?

Housefly

Locust

Croach

Housefly

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

20 ; G : 30 ; C : 20

20 ; G : 20 ; C : 30

20 ; G : 20 ; C : 20

20 ; G : 25 ; C : 25

Proteins involved in sperm binding in mammals are:

Zona radiata

Acrosome membrane

Midpiece

Pellucida

The following is not an objective of selection in crops?

bove protein content

bove resistance to diseases

bove vitamin content

bove micronutrient and mineral content

DNA undergoes duplication during:

- (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 of 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 (d) are correct

- Dobson units are used to measure thickness of:
- Ozone
 - Stratosphere
 - Ozone
 - Troposphere

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

- DNA dependent DNA polymerase
- DNA dependent RNA polymerase
- DNA Ligase
- DNase

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

- Degenerate primer sequence
- Okazaki sequences
- Palindromic Nucleotide sequences
- 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?

- 8
- 16
- 4
- 32

Sphincter of oddi is present at :

- Ileo-caecal junction
- Junction of hepato-pancreatic duct and duodenum
- Gastro-oesophageal junction
- 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?

- Neophrorn*
- Hemidactylus*
- Macropus*
- Ornithorhynchus*

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

- 50%
- 75%
- 25%
- 100%

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

- $pO_2 = 104$ and $pCO_2 = 40$
- $pO_2 = 40$ and $pCO_2 = 45$
- $pO_2 = 95$ and $pCO_2 = 40$
- $pO_2 = 159$ and $pCO_2 = 0.3$

174. Venereal diseases can spread through:

- Using sterile needles
- Transfusion of blood from infected person
- Infected mother to foetus
- Kissing
- Inheritance

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

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

175. Which of the following is true?

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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 |
| | 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 sternum together form genital pouch.
- (4) 10th abdominal segment in both sexes, bears a pair of anal cerci.

- (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) |
| (2) | (iii) | (ii) | (i) |
| (3) | (ii) | (i) | (iv) |
| (4) | (i) | (iv) | (iii) |

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 unsaturated 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 given below.

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

193. Identify the types of cell junctions that help in the leakage of the substances across a tissue facilitation of communication with neighbouring 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.

g events occur?

H zone disappears

A band widens

C band reduces in width

Myosine hydrolyzes ATP, releasing the ADP and Pi

-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 of 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 'altitude sickness' with symptoms like breathing difficulty and heart palpitations.

n (R) :

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

In the light of the above statements, choose the **correct** 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	(i)	Cartilaginous joint
(b)	Cranium	(ii)	Flat bone
(c)	Sternum	(iii)	Fibrous joints
(d)	Vertebral column	(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 and phenylalanine.

Statement II :

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

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

- | | |
|-----|---|
| (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 incorrect but Statement II is true |