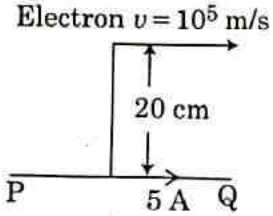
Section - A (Physics)

1. 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.



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

2. 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

3. A radioactive nucleus ${}^{A}_{Z}X$ undergoes spontaneous decay in the sequence

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

(1) α, β^-, β^+
(2) α, β^+, β^-
(3) β^+, α, β^-
(4) β^-, α, β^+

4. 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) $2v$
(3) $3v$
(4) $4v$

5. The 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) $\frac{2}{3\sqrt{2}}$

6. 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. If 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
(3) 50
(4) 30

7. A capacitor of capacitance 'C', is connected across an ac source of voltage V, given by

$V = V_0 \sin\omega t$

The displacement current between the plates of 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) $I_d = V_0 \omega C \sin\omega t$

8. A small 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 $t = n-1$ to $t = n$. Then, the ratio $\frac{S_n}{S_{n+1}}$ is :

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

9. A particle is released from height S from the surface of the Earth. At a certain height its kinetic energy is three times its potential energy. The height 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) $\frac{S}{2}, \frac{\sqrt{3gS}}{2}$

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

10. In a potentiometer circuit a cell of EMF 1.5 V gives balance point at 36 cm length of wire. If another cell of EMF 2.5 V replaces the first cell, then at what length of the wire, the balance point occurs ?

(1) 60 cm

(2) 21.6 cm

(3) 64 cm

(4) 62 cm

11. For a plane electromagnetic wave propagating in x-direction, which one of the following combination gives the correct possible directions for electric field (E) and magnetic field (B) respectively ?

(1) $\hat{j}+\hat{k}, \hat{j}+\hat{k}$

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

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

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

12. 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.

13. 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

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

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

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

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

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

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

15. 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 ? ($g = 10\ m/s^2$)

(1) 10.2 kW

(2) 8.1 kW

(3) 12.3 kW

(4) 7.0 kW

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

(1) a large aperture contributes to the quality and visibility of the images.

(2) a large area of the objective ensures better light gathering power.

(3) a large aperture provides a better resolution.

(4) all of the above.

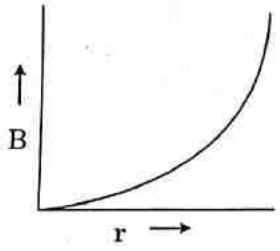
17. The electron concentration in an n-type semiconductor is the same as hole concentration in a p-type semiconductor. An external field (electric) is applied across each of them. Compare the currents in them.

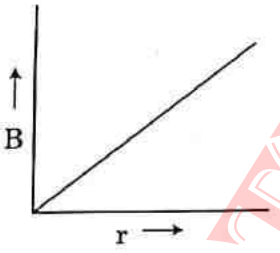
(1) current in n-type = current in p-type.
(2) current in p-type > current in n-type.
(3) current in n-type > current in p-type.
(4) No current will flow in p-type, current will only flow in n-type.

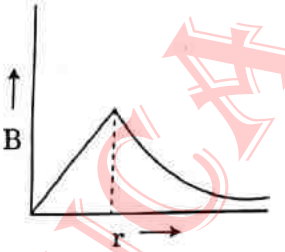
18. A nucleus with mass number 240 breaks into two fragments each of mass number 120, the binding energy per nucleon of unfragmented nuclei is 7.6 MeV while that of fragments is 8.5 MeV. The total gain in the Binding Energy in the process is :

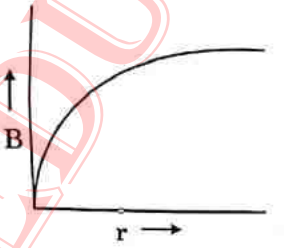
(1) 0.9 MeV
(2) 9.4 MeV
(3) 804 MeV
(4) 216 MeV

19. A thick current carrying cable of radius 'R' carries current 'I' uniformly distributed across its cross-section. The variation of magnetic field B(r) due to the cable with the distance 'r' from the axis of the cable is represented by :

(1) 

(2) 

(3) 

(4) 

20. 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) $\frac{R_1^2}{R_2^2}$

21. If E and G respectively denote energy and gravitational constant, then $\frac{E}{G}$ has the dimensions of :

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

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

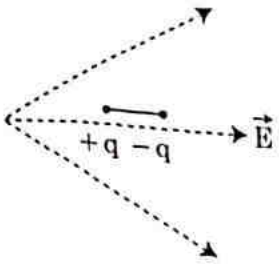
(1) 0.0628 s
(2) 6.28 s
(3) 3.14 s
(4) 0.628 s

23. **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)	$ne\upsilon_d$
(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)

24. 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.

(4) towards the right as its potential energy will increase.

25. 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.

26. A screw gauge gives the following readings when 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

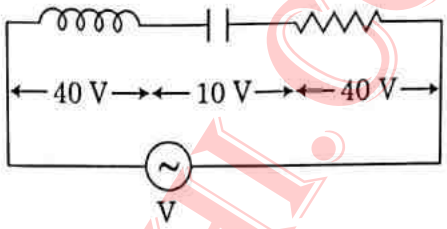
(2) 0.026 cm

(3) 0.26 cm

(4) 0.052 cm

27. An 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.

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 $10\sqrt{2}$ A. The impedance of the circuit is :



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

(2) $5/\sqrt{2}\ \Omega$

(3) $4\ \Omega$

(4) $5\ \Omega$

28. A parallel plate capacitor has a uniform electric field '$\vec{E}$' 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) $\frac{1}{2}\varepsilon_0 E^2$

(2) $\varepsilon_0 EAd$

(3) $\frac{1}{2}\varepsilon_0 E^2 Ad$

(4) $\frac{E^2 Ad}{\varepsilon_0}$

29. An electromagnetic wave of wavelength 'λ' is incident on a photosensitive surface of negligible work function. If 'm' mass is of photoelectron emitted from the surface has de-Broglie wavelength λ_d, then :

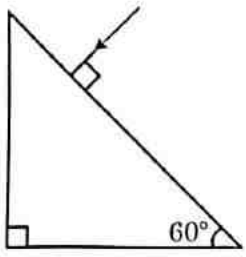
(1) $\lambda = \left(\frac{2m}{hc}\right)\lambda_d^{\,2}$

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

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

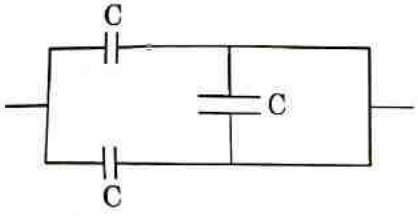
(4) $\lambda = \left(\frac{2h}{mc}\right)\lambda_d^{\,2}$

30. Find the value of the angle of emergence from the prism. Refractive index of the glass is $\sqrt{3}$.



(1) 60°
(2) 30°
(3) 45°
(4) 90°

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



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

32. 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^{-1}]
(4) [F] [A^{-1}] [T]

33. A cup of coffee cools from 90°C to 80°C in t minutes, 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 at 20°C is :

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

34. The effective resistance of a parallel connection that consists of four wires of equal length, equal area of cross-section and same material is 0.25 Ω. What will be the effective resistance if they are connected in series ?

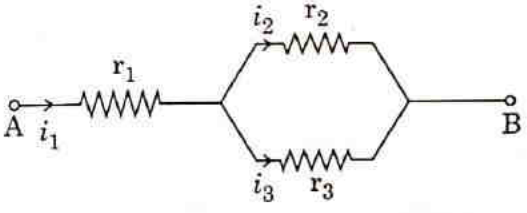
(1) 0.25 Ω
(2) 0.5 Ω
(3) 1 Ω
(4) 4 Ω

35. 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 3.3×10^{-3} watt will be : ($h = 6.6 \times 10^{-34}$ Js)

(1) 10^{18}
(2) 10^{17}
(3) 10^{16}
(4) 10^{15}

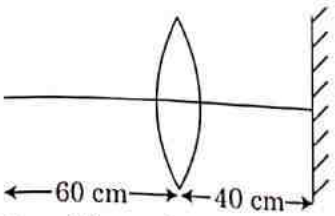
Section - B (Physics)

36. 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) $\frac{r_2}{r_1 + r_3}$

37. 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 :



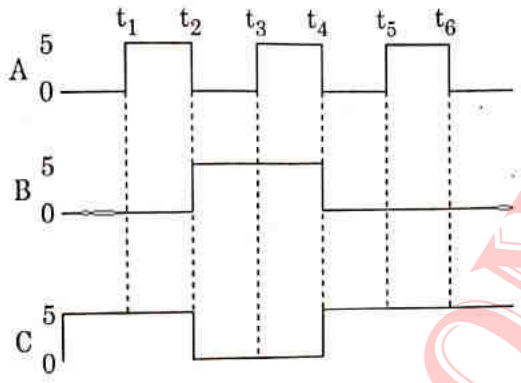
(1) 20 cm from the lens, it would be a real image.

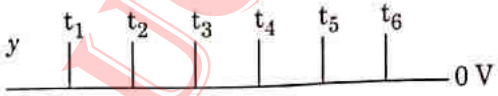
(2) 30 cm from the lens, it would be a real image.

(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.

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



(1) 

(2) 

(3) 

(4) 

39. A step down transformer connected to an ac mains supply of 220 V is made to operate at 11 V, 44 W lamp. 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

(4) 4 A

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. 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) $-8\hat{i} - 8\hat{j} - 6\hat{k}$

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

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

(4) $6\hat{i} + 6\hat{j} - 8\hat{k}$

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

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

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

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

43. A series LCR circuit containing 5.0 H inductor, 80 μF capacitor and 40 Ω resistor is connected to 230 V 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) 46 rad/s and 54 rad/s

(4) 42 rad/s and 58 rad/s

44. 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 'K' times 'MR^2'. Then the value of 'K' is :

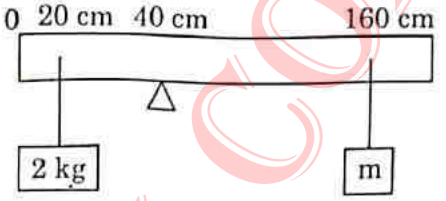
(1) $\frac{3}{4}$

(2) $\frac{7}{8}$

(3) $\frac{1}{4}$

(4) $\frac{1}{8}$

45. A uniform rod of length 200 cm and mass 500 g is balanced on a wedge placed at 40 cm mark. A mass of 2 kg is suspended from the rod at 20 cm 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. ($g = 10\ m/s^2$)



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

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

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

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

46. Twenty seven drops of same size are charged at 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

47. A car starts from rest and accelerates at 5 m/s^2. 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 $g = 10\ m/s^2$)

(1) 20 m/s, 5 m/s^2

(2) 20 m/s, 0

(3) $20\sqrt{2}$ m/s, 0

(4) $20\sqrt{2}$ m/s, 10 m/s^2

48. A particle of mass 'm' is projected with a velocity $v = kV_e (k < 1)$ from the surface of the earth.
(V_e = escape velocity)
The maximum height above the surface reached by the particle is :

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

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

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

(4) $\frac{Rk^2}{1-k^2}$

49. A ball of mass 0.15 kg is dropped from a height 10 m, strikes the ground and rebounds to the same height. The magnitude of impulse imparted to the ball is ($g = 10\ m/s^2$) nearly :

(1) 0 kg m/s

(2) 4.2 kg m/s

(3) 2.1 kg m/s

(4) 1.4 kg m/s

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

(1) $\frac{R_1}{R_2}$

(2) $\frac{R_2}{R_1}$

(3) $\frac{R_1^2}{R_2}$

(4) $\frac{R_2^2}{R_1}$

Section - A (Chemistry)

51. 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

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

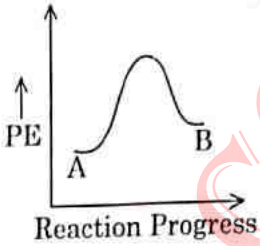
(1) belonging to same group

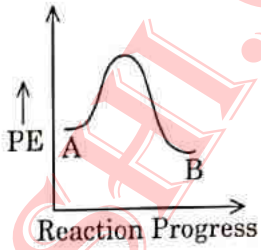
(2) diagonal relationship

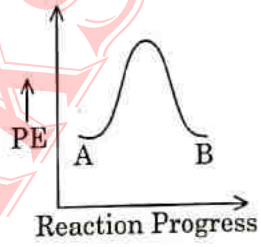
(3) lanthanoid contraction

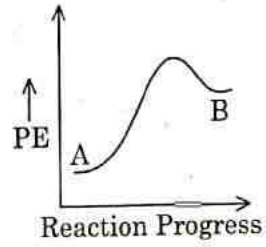
(4) having similar chemical properties

53. For a reaction A→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.

(1) 

(2) 

(3) 

(4) 

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

(1) Beta (β^-)

(2) Alpha (α)

(3) Gamma (γ)

(4) Neutron (n)

55. The RBC deficiency is deficiency disease of :

(1) Vitamin B_{12}

(2) Vitamin B_6

(3) Vitamin B_1

(4) Vitamin B_2

56. The molar conductance of NaCl, HCl and CH_3COONa at infinite dilution are 126.45, 426.16 and 91.0 S $cm^2\ mol^{-1}$ respectively. The molar conductance of CH_3COOH at infinite dilution is. Choose the right option for your answer.

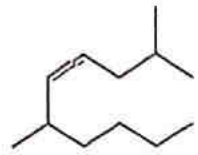
(1) 201.28 S $cm^2\ mol^{-1}$

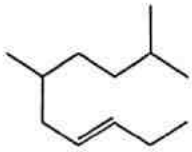
(2) 390.71 S $cm^2\ mol^{-1}$

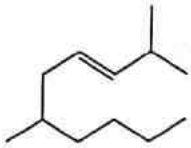
(3) 698.28 S $cm^2\ mol^{-1}$

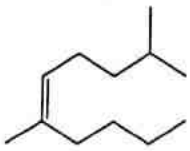
(4) 540.48 S $cm^2\ mol^{-1}$

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

(1) 

(2) 

(3) 

(4) 

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

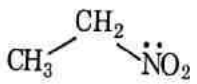
(1) upto 1200 K

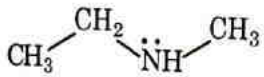
(2) upto 2200 K

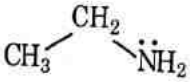
(3) upto 1900 K

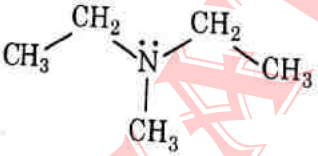
(4) upto 5000 K

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

(1) 

(2) 

(3) 

(4) 

60. 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) $P_3 > P_1 > P_2$

61. The major product of the following chemical reaction is :

$$\begin{matrix}CH_3\\CH_3\end{matrix}\!\!>\!CH-CH=CH_2+HBr \xrightarrow{(C_6H_5CO)_2O_2} ?$$

(1) $\begin{matrix}CH_3\\CH_3\end{matrix}\!\!>\!CH-CH_2-CH_2-Br$

(2) $\begin{matrix}CH_3\\CH_3\end{matrix}\!\!>\!CH-CH_2-CH_2-O-COC_6H_5$

(3) $\begin{matrix}CH_3\\CH_3\end{matrix}\!\!>\!CH-\underset{Br}{CH}-CH_3$

(4) $\begin{matrix}CH_3\\CH_3\end{matrix}\!\!>\!CBr-CH_2-CH_3$

62. Given 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 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.

63. The correct sequence of bond enthalpy of 'C–X' bond is :

(1) $CH_3-F < CH_3-Cl < CH_3-Br < CH_3-I$

(2) $CH_3-F > CH_3-Cl > CH_3-Br > CH_3-I$

(3) $CH_3-F < CH_3-Cl > CH_3-Br > CH_3-I$

(4) $CH_3-Cl > CH_3-F > CH_3-Br > CH_3-I$

64. BF_3 is planar and electron deficient compound. Hybridization and number of electrons around the central atom, respectively are :

(1) sp^3 and 4

(2) sp^3 and 6

(3) sp^2 and 6

(4) sp^2 and 8

65. 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) $C_V = RC_P$

66. 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

67. 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) CH_2
(3) CH_3
(4) CH_4

68. 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
(3) Hofmann Rule
(4) Huckel's Rule

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

$$\text{Acetone} \xrightarrow[\text{(ii) } H_2O,\ H^+]{\text{(i) } C_2H_5MgBr,\ \text{dry Ether}} \text{Product}$$

(1) 2-methyl propan-2-ol
(2) pentan-2-ol
(3) pentan-3-ol
(4) 2-methyl butan-2-ol

70. 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 have very high melting and boiling points.
(3) Noble gases have weak dispersion forces.
(4) Noble gases have large positive values of electron gain enthalpy.

71. The pK_b of dimethylamine and pK_a of acetic acid are 3.27 and 4.77 respectively at T (K). The correct option for the pH of dimethylammonium acetate solution is :

(1) 8.50
(2) 5.50
(3) 7.75
(4) 6.25

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

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

73. **Statement I :**

Acid strength increases in the order given as HF << HCl << HBr << HI.

Statement II :

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

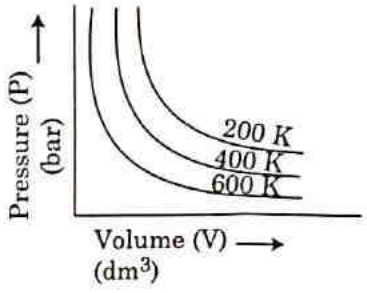
In the light of the above statements, choose the **correct** answer from the options given below.

(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.

74. 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

75. Choose the correct option for graphical representation of Boyle's law, which shows a graph of pressure vs. volume of a gas at different temperatures :

(1)


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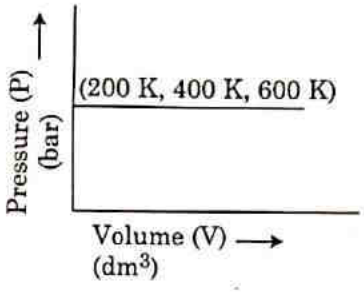

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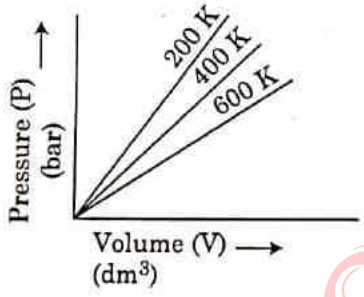

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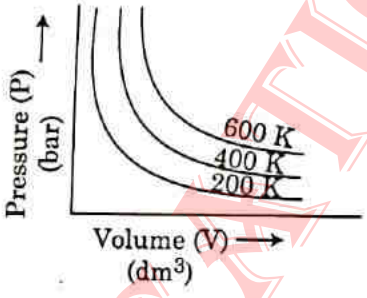

76. The structures of beryllium chloride in solid state and vapour phase, are :

(1) Chain and dimer, respectively
(2) Linear in both
(3) Dimer and Linear, respectively
(4) Chain in both

77. 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

78. The compound which shows metamerism is :

(1) C_5H_{12}
(2) C_3H_8O
(3) C_3H_6O
(4) $C_4H_{10}O$

79. 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

80. Which one of the following polymers is prepared by addition polymerisation ?

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

81. 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, $c = 3.0 \times 10^8\ ms^{-1}$]

(1) 219.3 m
(2) 219.2 m
(3) 2192 m
(4) 21.92 cm