PHYSICS

1. Half life of radioactive element is 5 min. At the end of 20 min its _____% quantity is disintegrated.

(A) 6.25 (B) 75

(C) 25 (D) 93.75

Answer (D)

Sol. Half life $t_{1/2}$ = 5 min

Total time t = 20 min

Number of half lives = $\frac{20}{5} = 4$

$$\Rightarrow \frac{N}{N_0} = \left[\frac{1}{2}\right]^n = \left[\frac{1}{2}\right]^4$$

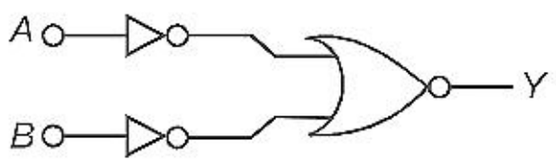
$$\Rightarrow \frac{N}{N_0} = \frac{1}{16}$$

$$N = \frac{N_0}{16}$$

Disintegrated $y \Rightarrow \left[\frac{N_0 - N}{N_0}\right] \times 100 = \left[1 - \frac{N}{N_0}\right] \times 100$

$$\Rightarrow \left[1 - \frac{1}{16}\right] \times 100 = 93.75\%$$

2. Which logic gate is represented by the following logic gates?



(A) NOR

(B) NAND

(C) AND

(D) OR

Answer (C)

Sol. Truth table

This belongs to AND gate

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

3. In CE NPN transistor 10^{10} electrons enter the emitter in 10^{-6} s when it is connected to battery. About 5% electrons recombine with holes in the base. The current gain of the transistor is _____

($e = 1.6 \times 10^{-19}$ C)

(A) 0.98 (B) 19

(C) 49 (D) 0.95

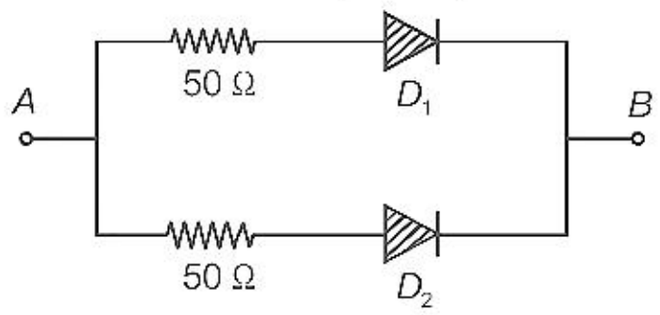
Answer (B)

Sol. Current gain common emitter $B = \frac{i_C}{i_B}$

$$B = \frac{95\% \text{ of } i_E}{5\% \text{ of } i_E}$$

$$B = \frac{95}{5} = 19$$

4. For the circuit shown in the figure. The equivalent resistance between point A & B for the two cases (i) $V_A > V_B$, (ii) $V_B > V_A$ respectively is _____ Ω and _____ Ω respectively. (D_1 and D_2 are ideal diodes)



(A) 25, ∞

(B) 50, ∞

(C) ∞, 25

(D) 25, 25

Answer (A)

Sol. For $V_A > V_B$

Both diodes are forward biased so equivalent resistance $R_1 = \frac{50 \times 50}{50 + 50} = 25\ \Omega$

$V_A < V_B$

Both diodes are reverse biased so equivalent resistance is infinity

5 The amplitude of carrier wave is 12 V. For modulation index of 50%, the amplitude of modulating signal is _____ V.

(A) 3 (B) 6

(C) 12 (D) 9

Answer (B)

Sol. Modulation index $\mu = \frac{A_m}{A_c}$

$$A_m = \mu.A_c = \left(\frac{50}{100}\right) \times 12$$

$\Rightarrow A_m = 6$ volt

6. Height of T.V. tower is h_T. The area of transmission of T.V. waves is $\propto$ _____.

(A) h_T^2 (B) $h_T^{1/2}$

(C) $h_T^{1/3}$ (D) h_T

Answer (D)

Sol. Height of T.V. tower = h_T

Range $\propto \sqrt{h_T}$

and area $\propto$(Range)^2

so Area $\propto h_T$

7. The shape of wave front at a very large distance from source is _____.

(A) Circular (B) Spherical

(C) Cylindrical (D) Plane

Answer (D)

8. The total energy of an electron in the first excited state of H -atom is – 3.4 eV, then its potential energy is in this state is _____ eV.

(A) 6.8 (B) 3.4

(C) – 6.8 (D) – 3.4

Answer (C)

Sol. Total energy of electron E = – 3.4 eV

Potential energy $U = 2E$

$\Rightarrow U$ = – 6.8 eV

9. Electric field intensity at points in between and outside two thin separated parallel sheets of infinite dimension with like charges of same surface charge density (σ) are _____ and _____ respectively.

(A) σ/ϵ_0, σ/ϵ_0 (B) 0, σ/ϵ_0

(C) 0, 0 (D) σ/ϵ_0, 0

Answer (B)

Sol. $E_1 = E_2 = \frac{\sigma}{2\epsilon_0}$

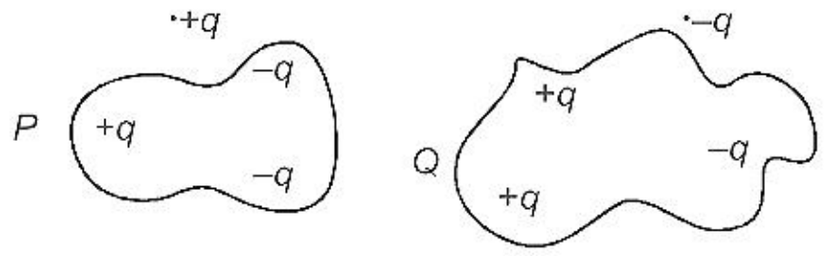
Between plates $E = E_1 - E_2$

$\Rightarrow E = 0$

Outside plates $E = E_1 + E_2$

$\Rightarrow E = \frac{\sigma}{\epsilon_0}$

10. Arrangement of charges are shown in the figure. Flux linked with the closed surface P and Q respectively are _____ and _____.



(A) Zero, zero (B) $\frac{q}{\epsilon_0}, \frac{-q}{\epsilon_0}$

(C) $-q/\epsilon_0$, q/ϵ_0 (D) q/ϵ_0, zero

Answer (C)

$$\text{Flux} = \frac{\text{Total enclosed charge}}{\epsilon_0}$$

$$\phi_1 = \frac{-q}{\epsilon_0}, \quad \phi_2 = \frac{q}{\epsilon_0}$$

11. The dimensional formula of capacitance is _____. Take Q as the dimension formula of charge.

(A) $M^1L^{-2}T^{-2}Q^{-2}$ (B) $M^1L^2T^{-2}Q^{-2}$

(C) $M^1L^{-2}T^2Q^2$ (D) $M^{-1}L^{-2}T^2Q^2$

Answer (D)

Sol. Capacitance $C = \frac{Q}{V}$

but $V = \frac{W}{Q}$

$$C = \frac{Q^2}{W}$$

$$C = \frac{\left[Q^2\right]}{\left[ML^2T^{-2}\right]} = \left[M^{-1}L^{-2}T^2Q^2\right]$$

12. A uniform electric field is prevailing in X - direction in certain region. The co-ordinates of points P, Q, and R are (0, 0), (2, 0) and (0, 2) respectively. Which of the following alternatives is true for the potentials at these points?

(A) $V_P = V_Q$, $V_Q > V_Q$ (B) $V_P > V_Q$, $V_P = V_R$

(C) $V_P < V_R$, $V_Q = V_R$ (D) $V_P = V_Q$, $V_P > V_R$

Answer (B)

13. An electric dipole of dipole moment $\vec{P}$ is placed parallel to the uniform electric field of intensity $\vec{E}$. On rotating it through 180°, the amount of work done is _____.

(A) $2PE$ (B) Zero

(C) PE (D) $-2PE$

Answer (A)

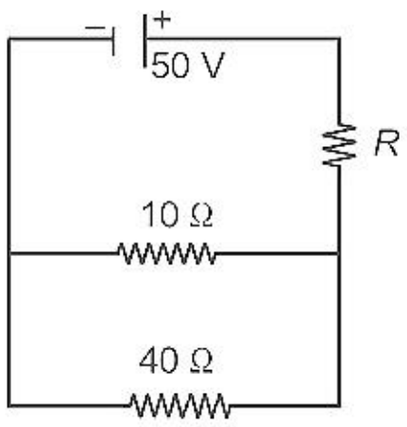
Sol. Work done by external agent in rotating the dipole

$W = PE\,[\cos\theta_1 - \cos\theta_2]$

$\theta_1 = 0$ and $\theta_1 = 180°$

$\Rightarrow W = 2PE$

14.



In above circuit if current through 10 Ω resistor is 2.5 A, value of R is _____.

(A) 50 Ω (B) 40 Ω

(C) 8 Ω (D) 10 Ω

Answer (C)

Sol. $i_1 = 2.5$ A

so $i = i_1 + i_2$

So voltage across 10 Ω = $i \times R = 25$

Voltage across 40 Ω = $10 \times 2.5 = 25$ V

$$R = \frac{25}{i_1 + i_2}$$

$$i_2 = \frac{25}{40}\text{A}$$

$\therefore R = 8\ \Omega$

15. Brown, Red and Orange coloured bands on a Carbon resistor are followed by silver band. The value of resistor is _____

(A) 320 Ω ± 5% (B) 12 kΩ ± 5%

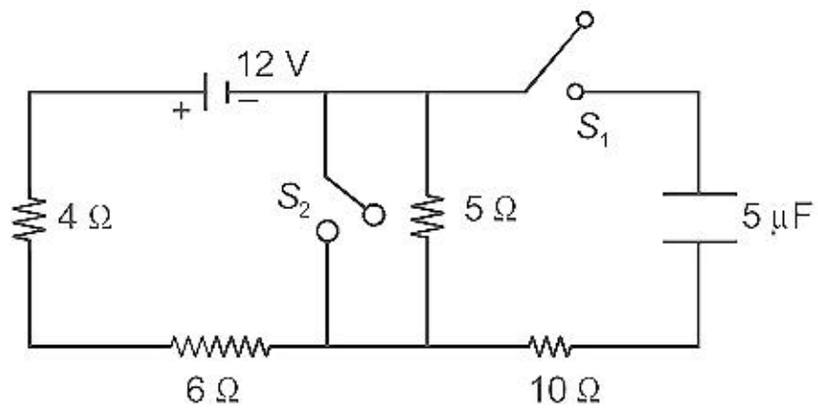
(C) 320 Ω ± 10% (D) 12 kΩ ± 10%

Answer (D)

Sol. Brown Red Orange

$\Rightarrow 12\ \text{k}\Omega \pm 10\%$

16. What is the current in the 4 Ω resistor when switch S_1 is open and switch S_2 is closed in the given circuit?



A) 3.0 A (B) 0.8 A

(C) 1.5 A (D) 1.2 A

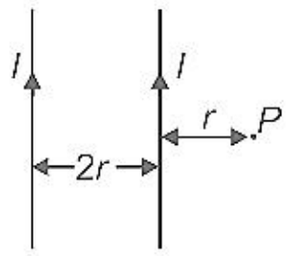
Answer (D)

Sol. S_1 is open and S_2 is closed

So $i = \dfrac{12}{10}$

$\Rightarrow i = 1.2$ A

17. Two very long straight wires are set parallel to each other. Each carries a current I in the same direction and the separation between them is $2r$. The intensity of magnetic field at point P as shown in figure is _____.



(A) $\dfrac{3}{8}\dfrac{\mu_0 I}{\pi r}$ (B) $\dfrac{2\mu_0 I}{\pi r}$

(C) $\dfrac{2}{3}\dfrac{\mu_0 I}{\pi r}$ (D) $\dfrac{\mu_0 I}{2\pi r}$

Answer (C)

Sol. Magnetic field due to first wire $B_1 = \dfrac{\mu_0 i}{2\pi r}$

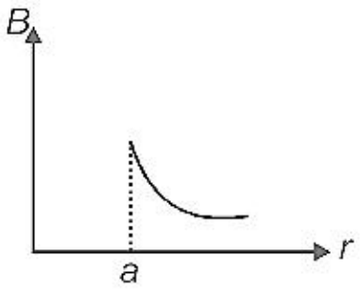
Magnetic field due to second wire $B_2 = \dfrac{\mu_0 i}{6\pi r}$

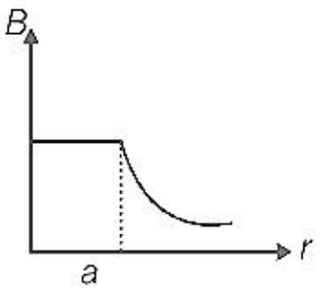
Net Magnetic field at P, $B = B_1 + B_2$

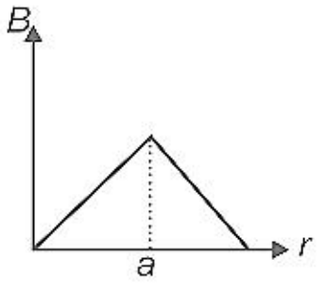
$$B = \frac{\mu_0 I}{2\pi r} + \frac{\mu_0 I}{6\pi r}$$

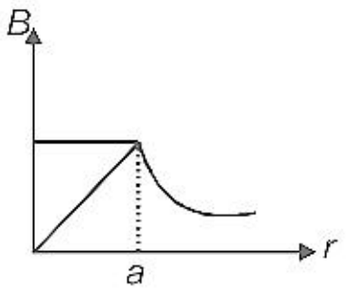
$$= \frac{2}{3}\frac{\mu_0 i}{\pi r}$$

18. The magnetic field due to a straight long conductor of uniform cross-section of radius a and carrying a steady current is represented by

(A) 

(B) 

(C) 

(D) 

Answer (D)

Sol. Magnetic field inside the wire $B_{in} \propto r$

and out side the wire $B_{out} \propto \frac{1}{r}$

So option (D) is correct

19. A proton is moving perpendicular to a uniform magnetic field of 2.5 tesla with 2 MeV kinetic energy. The force on proton is _____ N. (Mass of proton = 1.6×10^{-27} kg. Charge of proton = 1.6×10^{-19} C)

(A) 8×10^{-12}

(B) 8×10^{-11}

(C) 3×10^{-11}

(D) 3×10^{-10}

Answer (A)

Sol. Force on moving charge in magnetic field

$F = qvB\sin\theta$

but $\theta = 90$

$F = qvB$

Hence velocity $v = \sqrt{\frac{2E}{m}}$ { E is kinetic energy of proton}

putting the values we get

$F = 5.6 \times 10^{-12}$N

20. A particle of mass m and charge q is incident on XZ plane with velocity v in a direction making angle θ with a uniform magnetic field applied along X-axis. The nature of motion performed by the particle is

(A) Circular (B) Helical

(C) Parabola (D) Straight line

Answer (B)

Sol. Due to parallel component of velocity to the field particle moves in direction of field and due to perpendicular component of velocity particle follows circular path so combined path is helical.

21. Select the dimensional formula of $B^2/2\mu_0$.

(A) $M^1L^1T^2$

(B) $M^{-1}L^1T^2$

(C) $M^{-1}L^{-1}T^{-2}$

(D) $M^1L^{-1}T^{-2}$

Answer (D)

Sol. $\frac{B^2}{2\mu_0} = \text{Energy density} = \frac{\text{Energy}}{\text{Volume}}$

$$\Rightarrow \frac{\left[ML^2T^{-2}\right]}{\left[L^3\right]} = \left[ML^{-1}T^{-2}\right]$$

22. μ_0 is permeability of vacuum, χ_m is susceptibility then permeability of material is

(A) $\mu = \mu_0 1 + \chi_m$ (B) $\mu = \mu_0(\chi_m - 1)$

(C) $\mu = \mu_0(1 - \chi_m)$ (D) $\mu = \mu_0(1 + \chi_m)$

Answer (D)

Sol. $\mu = \mu_0\left[1 + \chi_m\right]$

23. In Raman scattering, Stokes and Antistokes lines respectively represents lines with _____ and _____ wavelength.

(A) Low, High (B) High, High

(C) High, Low (D) Low, Low

Answer (C)

Sol. High Low

24. For the astronomical telescope, the focal length of objective lens is f_0 and the eye piece lens is f_e. Then the tube length of the telescope is _____.

(A) $L \geq f_0 - f_e$ (B) $L \geq f_0 + f_e$

(C) $L < f_0 + f_e$ (D) $L \leq f_0 - f_e$

Answer (B)

Sol. For astronomical telescope

$|v_1| = f_0$

$|u_2| \leq f_e$

Probable answer would be (C) conceptually correct.

25. Time taken by the sunlight to pass through a slab of 4 cm and refractive index 1.5 is _____ s.

(A) 2×10^{10} (B) 2×10^{-8}

(C) 2×10^{8} (D) 2×10^{-10}

Answer (D)

Sol. $d = 4$ cm

$\mu = 1.5$

$$\mu = \frac{c}{v} \Rightarrow v = \frac{c}{\mu} = \frac{3\times10^8}{1.5} = 2\times10^8 \text{ m/s}$$

$$\text{Time } t = \frac{d}{v} = \frac{4\times10^{-2}}{2\times10^8} = 2\times10^{-10} \text{ second.}$$

26. A convex lens of focal length 12.5 cm is used as a simple microscope. When the image is formed at infinite, Magnification is _____ (Near point for the normal vision is 25 cm).

(A) 25 (B) 2.5

(C) 2.0 (D) 1.0

Answer (C)

Sol. Magnifying power $M = \frac{D}{f} = \frac{25}{12.5}$ $M = 2$

27. In experiment of Davisson-Germer, emitted electron from filament is accelerated through voltage V then de-Broglie wavelength of that electron will be _____ m.

(A) $\frac{2Vem}{\sqrt{h}}$ (B) $\frac{\sqrt{h}}{2Vem}$

(C) $\frac{\sqrt{2Vem}}{h}$ (D) $\frac{h}{\sqrt{2Vem}}$

Answer (D)

Sol. Kinetic energy $\frac{1}{2}mv^2 = eV$

$$v = \sqrt{\frac{2eV}{m}}$$

$$\text{Wavelength } \lambda = \frac{h}{mv}$$

$$\lambda = \frac{h}{m\sqrt{\frac{2eV}{m}}} = \frac{h}{\sqrt{2eVm}}$$

28. Photons of energy 1 eV and 2.5 eV successively illuminated a metal whose work function is 0.5 eV. The ratio of maximum speeds of emitted electron is

(A) 1 : 3 (B) 1 : 2

(C) 3 : 1 (D) 2 : 1

Answer (B)

Sol. Energy of photon $E = \phi + \frac{1}{2}mv^2$

$$V_{max} = \sqrt{\frac{2(E-\phi)}{m}}$$

So putting values

$$\frac{v_{max1}}{v_{max2}} = \sqrt{\frac{1-0.5}{2.5-0.5}}$$

$$\frac{v_{max1}}{v_{max2}} = \frac{1}{2}$$

29. The number of turns in the coil of an A.C. generator are 100 and its cross-sectional area is 2.5 m^2. The coil is revolving in a uniform magnetic field of strength 0.3 T with the uniform angular velocity of 60 rad/s. The value of maximum value produced is _____ kV.

(A) 1.25 (B) 4.50

(C) 6.75 (D) 2.25

Answer (B)

Sol. Induced emf $e = NBA\omega \sin\omega t$

for e_{max} $\sin\omega t = 1$

So $e_{max} = NBA\omega$

putting values

$e_{max} = 4.5 \times 10^3$ volt

$e_{max} = 4.5$ kV

30. If R and L denote resistance and inductance respectively which of the following has dimension of time?

(A) $\sqrt{\frac{L}{R}}$ (B) $\frac{L}{R}$

(C) $\sqrt{\frac{R}{L}}$ (D) $\frac{R}{L}$

Answer (B)

Sol. Time constant has the dimension same as that of time.

$$\text{Time constant} = \frac{L}{R}$$

31. In an AC circuit, current is 3 A and voltage 210 V and power is 63 W. The power factor is

(A) 0.11 (B) 0.09

(C) 0.08 (D) 0.10

Answer (D)

Sol. Power P = I.V. cos0

$$\therefore \quad \cos\theta = \frac{P}{IV} = \frac{63}{3\times 210} = 0.1$$

32. For an A.C given by $I = 50 \cos (100t + 45°)$A. The value of I_{rms} = _____ A.

(A) Zero (B) $50\sqrt{2}$

(C) 25 (D) $25\sqrt{2}$

Answer (D)

Sol. Comparing the equation by $I = I_0 \cos(\omega t + \phi)$

$I_0 = 50$ A so $I_{rms} = \frac{I_0}{\sqrt{2}} = 25\sqrt{2}$ A

33. An A.C voltage $V = 5 \cos (1000t)$ V is applied to a L-R series circuit of inductance 3 mH and resistance 4 Ω. The value of maximum current in the circuit is _____ A.

(A) 0.8 (B) 1.0

(C) $\frac{5}{7}$ (D) $\frac{5}{\sqrt{7}}$

Answer (B)

Sol. $V = 5 \cos 1000t$ volt

$V = V_0 \cos \omega t$

$V_0 = 5$ volt $\omega = 1000$ rad/s

$L = 3 \times 10^{-3}$ H, $R = 4\Omega$

Maximum current $10 = \frac{V_0}{Z}$

$$10 = \frac{5}{\sqrt{\omega^2 L^2 + R^2}} = \frac{5}{5} = 1\,A$$

34. In medicine, to destroy cancer cells _____ rays are used.

(A) Ultraviolet (B) Visible

(C) Gamma (D) Infrared

Answer (C)

35. For a radiation of 9 GHz passing through air. The number of waves passing through 1 m length is

(A) 30 (B) 5

(C) 20 (D) 3

Answer (A)

Sol. $f = 9\ GHz = 9 \times 10^9$ Hz

$c = 3 \times 10^8$ m/s

$$\lambda = \frac{c}{f} = \frac{3\times 10^8}{9\times 10^9} = \frac{10^{-1}}{3} m$$

Number of waves in a given length

$$N = \frac{\text{length}}{\lambda} = \frac{1}{\frac{10^{-1}}{3}} = 30$$

36. In Young's double slit experiment, if the distance between two slits is equal to the wavelength of used light. Then the maximum number of bright fringes obtained on the screen will be

(A) Infinite (B) 3

(C) 7 (D) 5

Answer (B)

Sol. We know

$d \sin\theta = \pm m\lambda$

but $d = \lambda$

so $\sin\theta = \pm m$

for max. $\Rightarrow \sin\theta = 1$

$m = \pm 1$

so maximum number of bright fringes = 3

Central maxima + either side of central maxima

37. If the wavelength of light used is 6000 Å. The angular resolution of telescope of objective lens having diameter 10 cm is _____ rad.

(A) 7.52×10^{-6} (B) 6.10×10^{-6}

(C) 6.55×10^{-6} (D) 7.32×10^{-6}

Answer (D)

Sol. Limit of resolution $\sin\theta = \theta = \frac{1.22\lambda}{D}$

putting values we get option (B)

38. In the discharge tube as the density of atom increases, the intensity of spectral lines

(A) Decreases continuously

(B) Increases continuously

(C) Remains constant

(D) None of these

Answer (B)

Sol. Intensity increases with density of atoms.

39. The ionization potential of hydrogenic ions P and Q are V_P and V_Q respectively. If $V_Q < V_P$ then radii

(A) $r_P > r_Q$ (B) $r_P < r_Q$

(C) $r_P = r_Q$ (D) None of these

Answer (B)

Sol. Ionisation potential $V \propto \frac{1}{r}$

So $r_P < r_Q$ because $V_P > V_Q$

40. In the given nuclear reaction

$${}^{9}_{4}Be + {}^{4}_{2}He \longrightarrow {}^{12}_{6}C + X$$

X represents

(A) Neutron (B) Proton

(C) Positron (D) Electron

Answer (A)

Sol. Balancing atomic number and mass number on both sides ${}^{1}_{0}n$ (neutron)

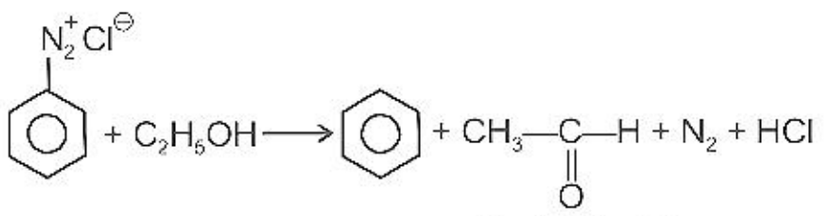
CHEMISTRY

41. Which oxidised product is obtained when benzene diazonium chloride reacts with ethanol?

(A) Acetaldehyde (B) Phenol

(C) Benzaldehyde (D) Benzene

Answer (A)

Sol. 

(Acetaldehyde)

42. Which amino acid contain secondary amino group in its structure?

(A) Proline (B) Glycine

(C) Alanine (D) Lysine

Answer (A)

Sol. Fact.

43. Which of the following protein is present in silk?

(A) Insulin (B) Keratin

(C) Albumin (D) Myosin

Answer (B)

Sol. Fact.

44. Which of the following polymer is condensation as well as cross-linked polymer?

(A) Bakelite (B) Nylon 6,6

(C) Nylon-2, Nylon-6 (D) Dacron

Answer (A)

Sol. Bakelite is condensation as well as cross linked polymer.

45. Which polymer is used in the preparation of hose-pipe?

(A) Orlon (B) Polystyrene

(C) Teflon (D) Neoprene

Answer (D)

Sol. Fact.

46. From the following substances, which carbohydrate has the maximum sweetness?

(A) Sucrolose (B) Saccharin

(C) Aspartame (D) Alitame

Answer (A)

Sol. Fact.

47. Which type of drug is veronal?

(A) Antihistamine

(B) Antifertility

(C) Tranquilizer

(D) Antimicrobial

Answer (C)

Sol. Veronal is Tranquilizer.

48. In which of the following pair of complexes, the experimental magnetic moment and the geometric shapes are same?

(A) $K[MnO_4]$ and $K_2[NiCl_4]$

(B) $K_2[Ni(CN)_4]$ and $K_4[Ni(CN)_4]$

(C) $K_2[Ni(CN)_4]$ and $[Ni(NH_3)_2Cl_2]$

(D) $K_3[Fe(CN)_6]$ and $K_4[Fe(CN)_6]$

Answer (C)

Sol. $K_2[Ni(CN)_4] \Rightarrow Ni^{+2} \Rightarrow 3d^8 4s^0$

With cyanide, Ni^{+2} form square planar and diamagnetic complex.

$K_2[Ni(NH_3)_2Cl_2] \rightarrow$ Diamagnetic and square planar complex.

49. A crystalline solid is made up of X and Y atoms, X atoms possesses CCP structure and Y atoms are arranged in tetrahedral voids. If all the atoms situated on a diagonal of one side are removed, what will be the molecular formula of the crystalline solid?

(A) X_3Y_2 (B) X_4Y_3

(C) X_2Y_3 (D) X_3Y_4

Answer (Delete)

50. In which crystal system, the length of each edge (edge length) is same?

(A) $BaSO_4$

(B) HgS

(C) $CaSO_4$

(D) ZnO

Answer (B)

Sol. HgS is Rhombohedral

Hence, a = b = c.

51. The depression in freezing point for 0.01 m aqueous solution of $K_x[Fe(CN)_6]$ is 0.0744 K. The molal depression constant for solvent is 1.86 K kg mol^{-1}. If the solute undergoes complete dissociation, what is the correct molecular formula for the solute?

(A) $K_2[Fe(CN)_6]$ (B) $K_3[Fe(CN)_6]$

(C) $K[Fe(CN)_6]$ (D) $K_4[Fe(CN)_6]$

Answer (B)

Sol. $\Delta T_b = iK_f m$

$0.0744 = i \times 1.86 \times 0.01$

$\Rightarrow \quad i = 4$

So, n = 4

Formula is $K_3[Fe(CN)_6]$

52. At certain temperature 1.6% solution of an unknown substance is isotonic with 2.4% solution of Urea. If both the solutions have the same solvent and both the solutions have same density 1 gm/cm^3, what will be the molecular mass of unknown substance in gm/mol.

[Molecular mass of urea = 60 gm/mol]

(A) 30 (B) 40

(C) 80 (D) 90

Answer (B)

Sol. $\frac{1.6}{M} = \frac{2.4}{60}$

$\Rightarrow \quad M = \frac{1.6}{2.4} \times 60 = 40$ g/mol

53. Which of the following aqueous solution will have the boiling point 102.2°C? The molal elevation constant for water is 2.2 K kg mol^{-1}.

(A) 1 m CH_3COOH (B) 1 m NaCl

(C) 1 M NaCl (D) 1 m glucose

Answer (D)

Sol. $\Delta T_b = 2.2 = i \times 2.2 \times 1$

$\Rightarrow \quad i = 1$

54. The graph of $\sqrt{C} \rightarrow \wedge_m$ for an aqueous solution of which substance is not obtained as a straight line?

(A) HCl (B) NaCN

(C) NaCl (D) HCN

Answer (D)

Sol. HCN is weak electrolyte.

55. Which option is incorrect for the working cell?

$$Pt\left|Cl_{2(g)}\right|_{1\,bar}\left|Cl^-_{(C_1)}\right\|Cl^-_{(C_2)}\left|Cl_{2(g)}\right|_{1\,bar}Pt$$

(A) ΔG = –ve (B) $C_2 > C_1$

(C) $E^\circ_{cell} = 0$ (D) $C_1 > C_2$

Answer (B)

Sol. $\underset{c_1}{Cl^\ominus} \longrightarrow \underset{c_2}{Cl^\ominus}$

$$E_{cell} = -0.059 \log \frac{c_2}{c_1}$$

$$= 0.059 \log\left(\frac{c_1}{c_2}\right)$$

$c_1 > c_2$

For spontaneous process so incorrect is B.

56. The pH of the solution _____ during the electrolysis of dilute aqueous solution of $CuSO_4$.

(A) First increases then decreases

(B) Decreases

(C) Remains constant

(D) Increases

Answer (B)

Sol. During electrolysis H_2SO_4 form, so pH decrease.

57. Which of the following process is for purification of metals?

(A) Froath floatation

(B) Leaching

(C) Liquidation

(D) Washing

Answer (C)

Sol. Liquation is method of purification.

58. Which of the following is the Ore of Cu?

(A) Ciderite (B) Magnetite

(C) Calamine (D) Malachite

Answer (D)

Sol. Malachite $CuCO_3.Cu(OH)_2$

59. How many gm of the oxidising agent gets reduced in the reaction of 65.4 gm of Zn with concentrated nitric acid?

[Atomic mass : Zn = 65.4, N = 14, H = 1, O = 16 gm mol^{-1}]

(A) 65.4 (B) 126

(C) 130.8 (D) 252

Answer (B)

Sol. $Zn + 4HNO_{3(conc.)} \longrightarrow Zn(NO_3)_2 + 2H_2O + 2NO_2$

60. In which of the following acid, the maximum number of hydrogen atoms are joined directly with phosphorous?

(A) Phosphoric acid

(B) Phosphorous acid

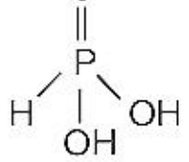
(C) Pyrophosphoric acid

(D) Phosphonic acid

Answer (D)

Sol. Phosphonic acid

H_3PO_3



61. The reaction of $(CH_3)_3$ CONa with ____ reagent is the most easy?

(A) C_6H_5Br (B) $(CH_3)_2CHBr$

(C) $(CH_3)_3CBr$ (D) CH_3CH_2Br

Answer (D)

Sol. S_N2 reaction

62. The organic product of which reaction from the following is used as anaesthetic?

(A) $CS_2 + 3Cl_2 \xrightarrow{Anh.AlCl_3}$

(B) Chloral + $Ca(OH)_2 \rightarrow$

(C) Chloral + Chlorobenzene $\rightarrow$

(D) $CHCl_3 \xrightarrow{H_2/Ni}$

Answer (B)

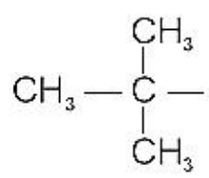
Sol. $Chloral + Ca(OH)_2 \longrightarrow \underset{Anaesthetic}{CHCl_3} + (HCOO)_2Ca$

63. Which of the following compound gives only one monochloro product on its chlorination in presence of sunlight?

(A) n - butane (B) Iso pentane

(C) Neo pentane (D) n - pentane

Answer (C)

Sol.  all H are same

64. Which products are obtained when phenyl ethanoate reacts in presence of Anh.$AlCl_3$?

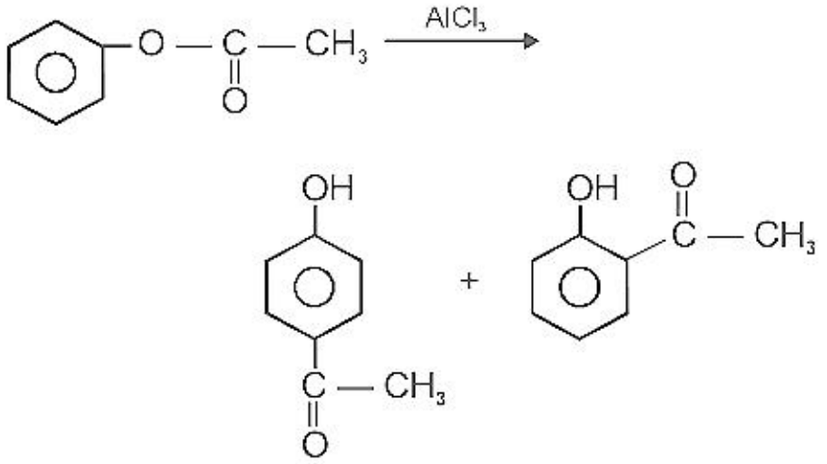
(A) o-Ethoxy acetophenone and p-Ethoxy acetophenone

(B) o-Hydroxy acetophenone and p-Hydroxy acetophenone

(C) o-Methyl acetophenone and p-Methyl acetophenone

(D) o-Methoxy acetophenone and p-Methoxy acetophenone

Answer (B)

Sol. 

65. How many gram of ethanol is required in the reaction with Na metal in order to give 560 ml. dihydrogen gas at STP?

(A) 11.5 (B) 1.15

(C) 4.6 (D) 2.3

Answer (D)

Sol. $C_2H_5OH + Na \rightarrow C_2H_5O^{\ominus}Na^{(+)} + \frac{1}{2}H_2$

66. The IUPAC name of the product obtained by the oxidation of phenol with the help of chromic acid is

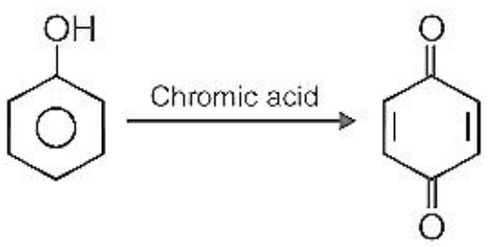
(A) Cyclo hexa-2,4-diene-1,4-diol

(B) Cyclo hexa-2,4-diene-1,4-dione

(C) Cyclo hexa-2,5-diene-1,4-diol

(D) Cyclo hexa-2,5-diene-1,4-dione

Answer (D)

Sol. 

67. At 298 K temperature the activation energy for the reaction $x_2 + y_2 \rightarrow 2xy + 20$ kJ is 15 kJ. What will be the activation energy for the reaction $2xy \rightarrow x_2 + y_2$?

(A) – 15 kJ (B) + 35 kJ

(C) – 5 kJ (D) – 35 kJ

Answer (B)

Sol. $\Delta_R H$ = activation energy of forward reaction – activation energy of backward reaction.

$\Rightarrow -20 = 15 - ?$

So, +35 kJ.

68. The half-life period for a radioactive substance is 15 minutes. How many grams of this radioactive substance is decayed from 50 gram of substance after one hour?

(A) 37.5 (B) 25

(C) 43.75 (D) 46.875

Answer (D)

Sol. $A_0 \xrightarrow{15} \frac{A_0}{2} \xrightarrow{30} \frac{A_0}{4} \xrightarrow{45} \frac{A_0}{8} \xrightarrow{60} \frac{A_0}{16}$

3.125 g remain

Decayed = 46.875

69. The rate constant value for a reaction is $1.75 \times 10^2\ L^2\ mol^{-2}\ sec^{-1}$. The half-life period $t_{1/2} \propto$ ____ .

(A) $[R_0]^{-1}$ (B) $[R_0]^{-2}$

(C) $[R_0]^2$ (D) $[R_0]$

Answer (B)

Sol. 3rd order reaction

$t_{1/2} \propto (R_0)^{1-n}$

So $(R_0)^{-2}$

70. The values of slope and intercept in the graph of Freundlich adsorption isotherm at 25°C temperature are 0.5 and 0.4771 respectively. What will be the proportion of adsorption at 4 bar pressure?

(A) 12 (B) 6

(C) 24 (D) 3

Answer (B)

Sol. $\log(x/m) = \log k + \frac{1}{n}\log p$

$\log k = 0.4771,\ k \simeq 3$

$\Rightarrow \frac{1}{n} = 0.5$

$\frac{x}{m} = (3)(4)^{0.5} \simeq 6$

71. In which emulsion coloured droplets are obtained when oil soluble dye is added to it?

(A) Cod liver oil (B) Cold cream

(C) Hair cream (D) Milk

Answer (D)

72. Which of the following is the correct order for the theoretical magnetic moment?

(A) $Cr^{3+} > Mn^{2+} = Fe^{3+}$

(B) $Cr^{3+} = Mn^{2+} < Fe^{3+}$

(C) $Cr^{3+} < Mn^{2+} = Fe^{3+}$

(D) $Cr^{3+} < Mn^{2+} < Fe^{3+}$

Answer (C)

Sol. $Cr^{+3} = 3d^3$ 3 unpaired electron.

$Mn^{+2} = 3d^5$ 5 unpaired electron.

$Fe^{+3} = 3d^5$ 5 unpaired electron.

73. Which statement is incorrect with reference to inner transition elements?

(A) The oxides of lanthanoids are basic

(B) Pm is radioactive element among actinoids

(C) The values of ionisation enthalpy of actinoids are less than the values of ionisation enthalpy of lanthanoids

(D) Only in the electronic configuration of lanthanoids like Ce, Gd, Lu the electrons are filled in 5*d* orbitals

Answer (B)

Sol. Pm is not actinoids

74. Which of the following complex ions absorbs the light of minimum wavelength?

(A) $[Co(H_2O)_6]^{3+}$ (B) $[CoF_6]^{3-}$

(C) $[Co(CN)_6]^{3-}$ (D) $[Co(NH_3)_6]^{3+}$

Answer (C)

Sol. Wavelength of light absorb $\propto \frac{1}{\text{stability of complex}}$

75. Which of the following pairs of complexes whose aqueous solutions gives pale yellow and white precipitates respectively with 0.1 M $AgNO_3$?

(A) $[Pt(NH_3)_4Br_2]Cl_2$ and $[Pt(NH_3)_4Cl_2]Br_2$

(B) $[Co(NH_3)_5NO_3]Br$ and $[Co(NH_3)_5Br]NO_3$

(C) $[Pt(NH_3)_4Cl_2]Br_2$ and $[Pt(NH_3)_4Br_2]Cl_2$

(D) $[Co(NH_3)_5NO_3]Cl$ and $[Co(NH_3)_5Cl]NO_3$

Answer (C)

Sol. AgBr → Pale yellow

AgCl → White

76. Which of the following is the disproportionation redox reaction?

(A) $2CH_3COOH \xrightarrow{P_2O_5/\Delta}$

(B) $2CH_3CHO \xrightarrow{\text{dil NaOH}}$

(C) $2CH_3COCH_3 \xrightarrow[H_2O]{\text{Mg-Hg}}$

(D) $2HCHO \xrightarrow{50\%\ NaOH(aq)}$

Answer (D)

Sol. $H-\underset{\underset{O}{\|}}{C}-H \xrightarrow{50\%\ NaOH} H-\underset{\underset{O}{\|}}{C}-O^{\ominus} + CH_3OH$

77. Which compound does not give Benedict test?

(A) $(CH_3)_3C{\cdot}CHO$

(B) C_6H_5CHO

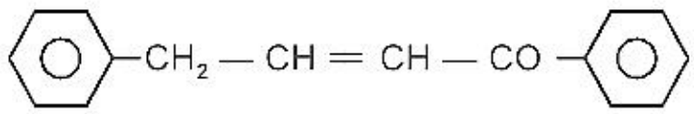
(C) CH_3CHO

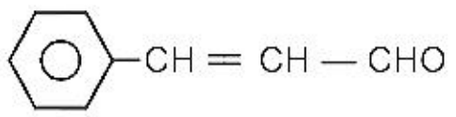
(D) $(CH_3)_2{\cdot}\ CHCHO$

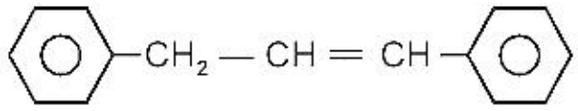
Answer (B)

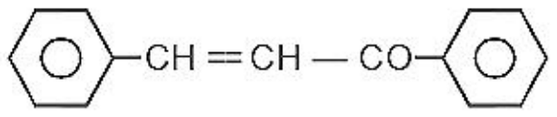
Aromatic aldehyde not give Benedict test.

78. What is the main product obtained by the cross-aldol condensation of benzene carbaldehyde and 1-Phenyl-Ethane - 1-one?

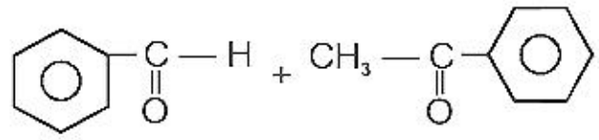
(A) 

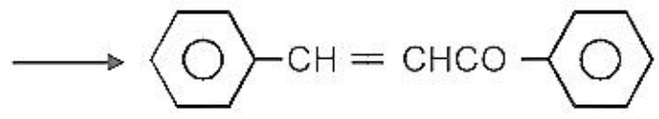
(B) 

(C) 

(D) 

Answer (D)

Sol. 



79. The main product of which of the following reactions gives tertiary sulphonamide with benzene sulphonyl chloride?

(A) $C_6H_5Cl + 2NH_3 \xrightarrow[473k,\ 60bar]{[Cu_2O]}$

(B) $CH_3CH_2NO_2 \xrightarrow{LiAlH_4}$

(C) $CH_3CH_2NC \xrightarrow{LiAlH_4}$

(D) $CH_3CONH_2 \xrightarrow[\Delta]{Br_2/NaOH}$

Answer (C)

Sol. $CH_3 - CH_2 - NC \xrightarrow{LiAlH_4} CH_3 - CH_2 - \underset{\underset{H}{|}}{N} - CH_3$

80. Which order is improper for amine compounds?

(A) Order of basicity in aq. medium:

$$CH_3 - NH - CH_3 > CH_3NH_2 > CH_3 - \underset{\underset{CH_3}{|}}{N} - CH_3$$

(B) Order of boiling point:

$$CH_3 - \underset{\underset{CH_3}{|}}{N} - CH_3 > CH_3 - CH_2 - NH - CH_3 > CH_3 - CH_2 - CH_2 - NH_2$$

(C) Order of basicity in gaseous state:

$$CH_3 - \underset{\underset{CH_3}{|}}{N} - CH_3 > CH_3 - NH - CH_3 > CH_3NH_2$$

(D) The order of aqueous solubility:

$$CH_3 - \underset{\underset{CH_3}{|}}{N} - CH_3 < CH_3 - CH_2 - NH - CH_3 < CH_3 - CH_2 - CH_2 - NH_2$$

Answer (B)

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