

Competishun

52/6, Opposite Metro Mas Hospital, Shipra Path, Mansarovar

Date: 03/01/2025

Time: 3 hours

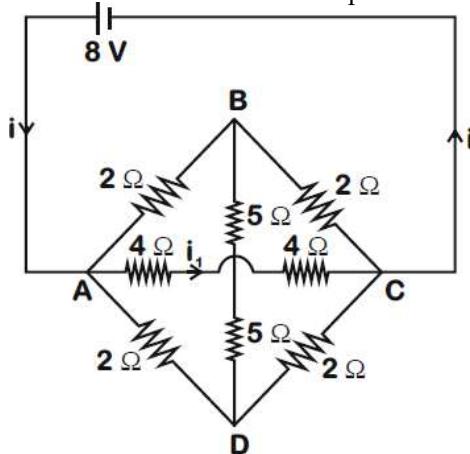
Max. Marks: 300

UTS-1_MT-15-(2025-26)

Physics

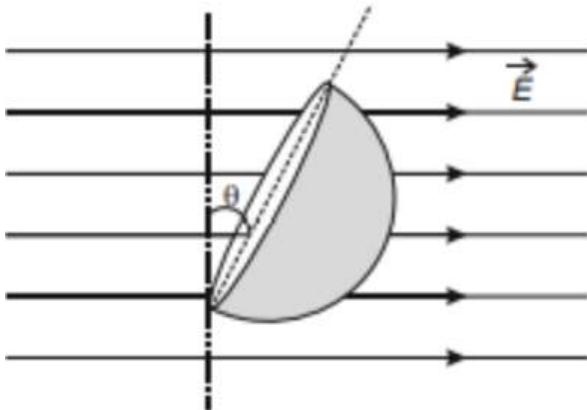
Single Choice Question

Q1 The value of current i_1 flowing from A to C in the circuit diagram is :



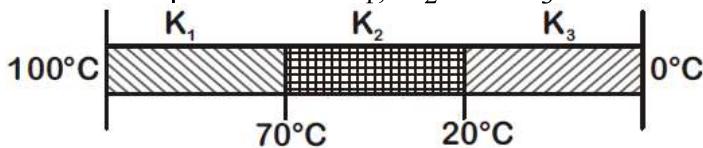
- a) 1 A b) 4 A c) 5 A d) 2 A

- Q2** A closed Gaussian surface consisting of a hemisphere and a circular disc of radius R is placed in a uniform electric field, \vec{E} , as shown in the figure. The circular disc makes an angle $\theta = 30^\circ$ with the vertical. The flux of the electric field vector coming out of the curved surface of the hemisphere is



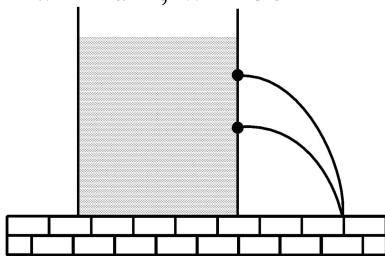
- a) $\frac{1}{2}\pi R^2 E$ b) $\frac{\sqrt{3}}{2}\pi R^2 E$ c) $\pi R^2 E$ d) $2\pi R^2 E$

- Q3** Three rods of identical cross-section and lengths are made of three different materials of thermal conductivity K_1 , K_2 and K_3 , respectively. They are joined together at their ends to make a long rod (see figure). One end of the long rod is maintained at 100°C and the other at 0°C (see figure). If the joints of the rod are at 70°C and 20°C in steady state and there is no loss of energy from the surface of the rod, the correct relationship between K_1 , K_2 and K_3 is



- a) $K_1 : K_3 = 2 : 3$, $K_2 : K_3 = 2 : 5$ b) $K_1 < K_2 < K_3$
 c) $K_1 : K_2 = 5 : 2$, $K_1 : K_3 = 3 : 5$ d) $K_1 > K_2 > K_3$

- Q4** In a cylindrical vessel containing liquid of density ρ , there are two holes in the side walls at heights of h_1 and h_2 respectively such that the range of efflux at the bottom of the vessel is same. The height of a hole for which the range of efflux would be maximum, will be –



- a) $h_2 - h_1$ b) $h_2 + h_1$ c) $\frac{h_2 - h_1}{2}$ d) $\frac{h_2 + h_1}{2}$

Q5

A car moves uniformly along a horizontal sine curve $y = A \sin \frac{x}{\alpha}$ where A and α are constants. The coefficient of friction between wheels and road is equal to μ . The maximum velocity with which car will ride without sliding. (Take $\mu = \frac{3}{4}$)

a) $\frac{\alpha}{3} \sqrt{\frac{2g}{A}}$

b) $\frac{\alpha}{2} \sqrt{\frac{3g}{A}}$

c) $\alpha \sqrt{\frac{3g}{2A}}$

d) $\alpha \sqrt{\frac{2A}{3g}}$

Q6 A particle performs uniform circular motion with angular momentum 'L'. If the frequency of particles motion is halved and its KE is doubled then the angular momentum becomes –

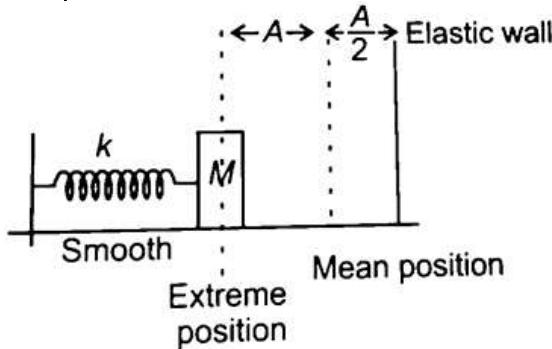
a) $\frac{L}{4}$

b) $4L$

c) $2L$

d) $L/2$

Q7 Consider the given situations of simple harmonic oscillation of a spring-mass system. Amplitude of oscillation is A . The block is released from extreme position.



Mark the correct statement.

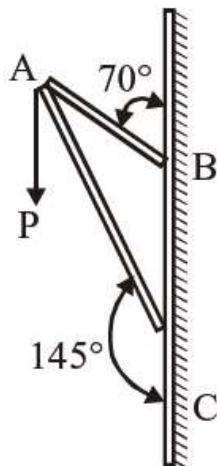
a) Time period of oscillation is $\frac{4\pi}{3} \sqrt{\frac{M}{k}}$

b) Magnitude of change in momentum of the block when it collides with wall is $A\sqrt{6Mk}$

c) Time period of oscillation depends on value of A .

d) Speed at mean position is independent of amplitude

- Q8** Consider a frame that is made up of two thin massless rods AB and AC as shown in the figure. A vertical force \vec{P} of magnitude 100 N is applied at point A of the frame.

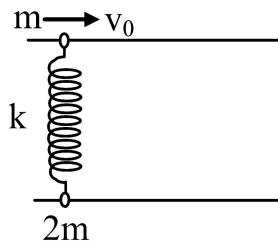


Suppose the force is \vec{P} resolved parallel to the arms AB and AC of the frame. The magnitude of the resolved component along the arm AC is xN . The value of x , to the nearest integer, is _____.

[Given : $\sin(35^\circ) = 0.573$, $\cos(35^\circ) = 0.819$
 $\sin(110^\circ) = 0.939$, $\cos(110^\circ) = -0.342$]

- a) 80 b) 81 c) 82 d) 85

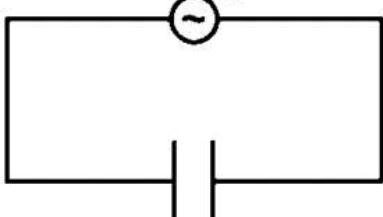
- Q9** Two ring of mass m and $2m$ are connected with a mass less spring and can slips over two frictionless parallel horizontal rails as shown in figure. Ring of mass m is given velocity ' v_0 ' in the direction shown. Maximum stretch in spring will be -



- a) $\sqrt{\frac{m}{k}}v_0$ b) $\sqrt{\frac{3m}{k}}v_0$ c) $\sqrt{\frac{2m}{3k}}v_0$ d) $\sqrt{\frac{2m}{k}}v_0$

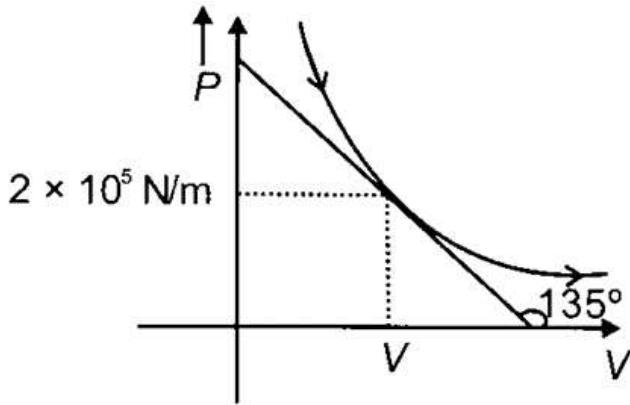
- Q10** An oscillating voltage $V(t) = V_0 \cos \omega t$ is applied across a parallel plate capacitor having a plate separation d . The displacement current density through the capacitor is

$$V(t) = V_0 \cos \omega t$$



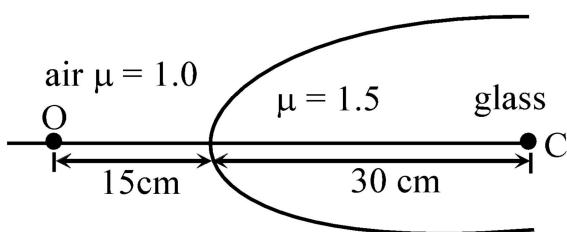
- a)** $\frac{\epsilon_0 \omega V_0 \cos \omega t}{d}$
- b)** $\frac{\epsilon_0 \mu_0 \omega V_0 \cos \omega t}{d}$
- c)** $-\frac{\epsilon_0 \mu_0 \omega V_0 \sin \omega t}{d}$
- d)** $-\frac{\epsilon_0 \omega V_0 \sin \omega t}{d}$
- Q11** In a capillary tube, water rises to a height of 4 cm. If the cross-sectional area of the tube were one-fourth, water would have risen to a height of
a) 2 cm **b)** 4 cm **c)** 8 cm **d)** 16 cm
- Q12** A thin film is illuminated by wavelength 600 nm in free space at normal incidence. Calculate the minimum thickness of the film ($\mu = \frac{3}{2}$) that results in constructive interference in the reflected light (in nm).
a) 100 **b)** 50 **c)** 150 **d)** 200

- Q13** A dia-atomic gas undergoes adiabatic expansion as shown in the figure. Find volume of gas when pressure of gas is $2 \times 10^5 \text{ N/m}^2$



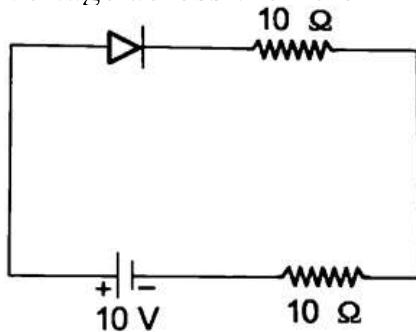
- a)** $14 \times 10^4 \text{ m}^3$ **b)** $1.4 \times 10^7 \text{ m}^3$ **c)** $28 \times 10^4 \text{ m}^3$ **d)** $28 \times 10^3 \text{ m}^3$

- Q14** The point C denotes the centre of curvature of the curved surface of refractive index 1.5. An object O is placed in air at a distance of 15 cm. Location of the image will be



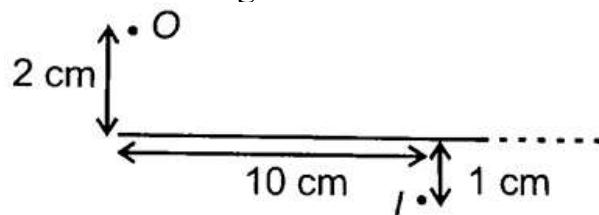
- a) -30 cm b) $+30\text{ cm}$ c) -20 cm d) $+20\text{ cm}$

- Q15** The voltage drop across a forward biased diode is 0.7 V. In the following circuit, the voltage across the 10 ohm resistance in series with the diode will be



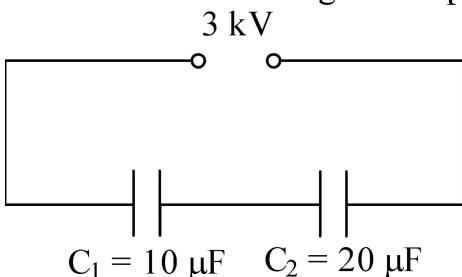
- a) 5 V b) 4.65 V c) 4 V d) 3.65 V

- Q16** The principal axis of a spherical mirror is shown by dotted line. O is the point object whose real image is I. Radius of curvature of spherical mirror is equal to



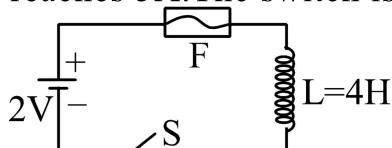
- a) $\frac{40}{3}\text{ cm}$ b) 20 cm c) 15 cm d) $\frac{20}{3}\text{ cm}$

- Q17** Capacitor C_1 ($10 \mu\text{F}$) and C_2 ($20 \mu\text{F}$) are connected in series across a 3kV supply as shown. What is charge on capacitor C_1 –

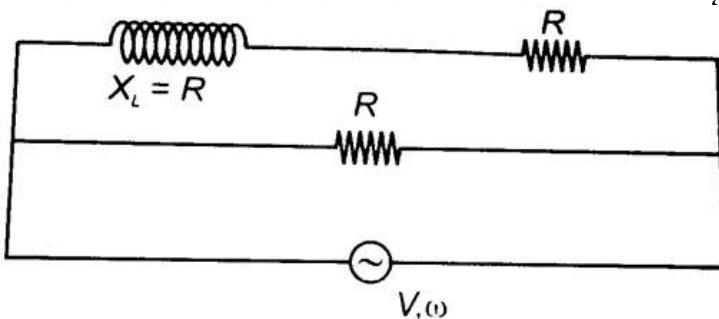


- a) $45000 \mu\text{C}$ b) $20000 \mu\text{C}$ c) $15000 \mu\text{C}$ d) $10000 \mu\text{C}$
- Q18** A long straight wire carrying a current of 30 A is placed in an external uniform magnetic field of induction $4 \times 10^{-4} \text{ T}$. The magnetic field is acting parallel to the direction of current. The magnitude of the resultant magnetic induction in tesla at a point 2.0 cm away from the wire is
 a) 10^{-4} b) 3×10^{-4} c) 5×10^{-4} d) 6×10^{-4}

- Q19** In the circuit shown the cell is ideal. The coil has an inductance of 4H and zero resistance. F is a fuse of zero resistance and will blow when the current through it reaches 5A . The switch is closed at $t = 0$. The fuse will blow -



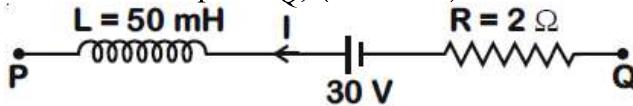
- a) after 5 sec b) after 2 sec c) after 10 sec d) almost at once
- Q20** Find the current drawn from the source in the given A.C circuit



- a) $\frac{V}{R} \sqrt{\frac{5}{2}}$ b) $\frac{V}{R} \sqrt{\frac{3}{2}}$ c) $\frac{V\sqrt{2}}{R}$ d) $\frac{V}{R} \sqrt{5}$

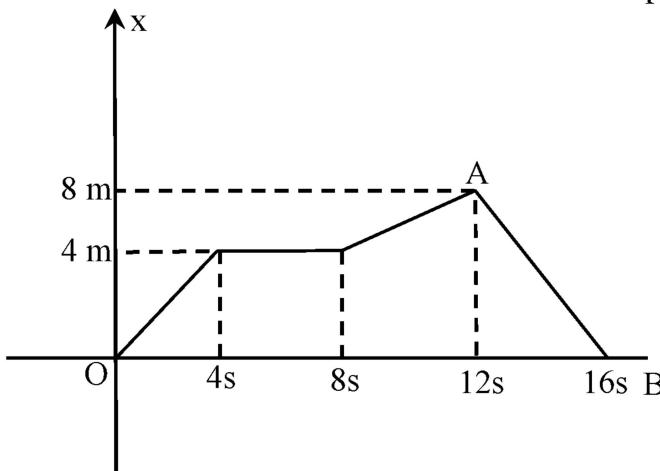
Numerical

- Q21** A part of a complete circuit is shown in the figure. At some instant, the value of current I is 1 A and it is decreasing at a rate of 10^2 A s^{-1} . The value of the potential difference $V_P - V_Q$, (in volts) at that instant, is _____.



- Q22** A string of length 0.4 m and mass 10^{-2} kg is tightly clamped at its ends. The tension in string is 1.6 N. Identical wave pulse are produced at one end at equal interval of time Δt . What is the minimum value of Δt (in sec) which allows constructive interference between successive pulses answer $10 \times \Delta t$.

- Q23** Figure shows the graph of the x-co-ordinate of a particle going along the x-axis as function of time. Find the instantaneous speed of particle at $t = 12.5 \text{ s}$ (in m/s)



- Q24** If photons of ultraviolet light of energy 12 eV are incident on a metal surface of work function of 4 eV, then the stopping potential (in V) will be

- Q25** The ratio of mass densities of nuclei ^{40}Ca and ^{16}O is close to :

Chemistry

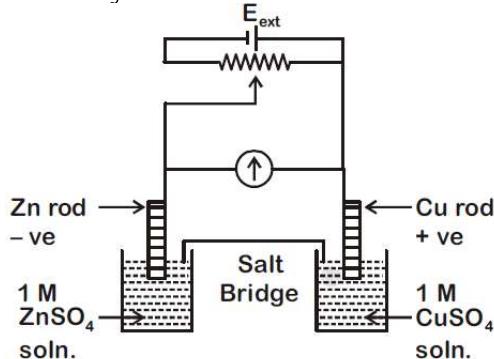
Single Choice Question

Q26 Match the following :

Test/Method	Reagent
(i) Lucas Test	(a) $C_6H_5SO_2Cl$ / aq. KOH
(ii) Dumas method	(b) HNO_3 / $AgNO_3$
(iii) Kjeldahl's	(c) CuO/CO_2 method
(iv) Hinsberg test	(d) Conc. HCl and $ZnCl_2$
	(e) H_2SO_4

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

Q27 Identify the incorrect statement from the option below for the above cell:



$$E_{Cu^{2+}|Cu}^0 = +0.34 \text{ V}$$

$$E_{Zn^{2+}|Zn}^0 = -0.76 \text{ V}$$

- a) If $E_{ext} < 1.1 \text{ V}$, Zn dissolves at anode and Cu deposits at cathode
 b) If $E_{ext} = 1.1 \text{ V}$, no flow of e^- or current occurs
 c) If $E_{ext} > 1.1 \text{ V}$, e^- flows from Cu to Zn
 d) If $E_{ext} > 1.1 \text{ V}$, Zn dissolves at Zn electrode and Cu deposits at Cu electrode

Q28 The first ionization energy of Na, Mg, Al & Si are in the order :

- a) $\text{Na} < \text{Mg} > \text{Al} < \text{Si}$ b) $\text{Na} > \text{Mg} > \text{Al} > \text{Si}$
 c) $\text{Na} < \text{Mg} < \text{Al} > \text{Si}$ d) $\text{Na} > \text{Mg} > \text{Al} < \text{Si}$

Q29 Among the given oxides of nitrogen; N_2O , N_2O_3 , N_2O_4 and N_2O_5 , the number of compound(s) having N–N bond is :

- a) 1 b) 2 c) 3 d) 4

Q30 In alkaline medium, MnO_4^- oxidises I^- to

- a) IO_4^- b) IO^- c) I_2 d) IO_3^-

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Q31 Arrange the following complexes in increasing order of conductivity of their solutions.

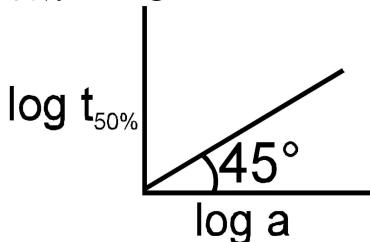
- | | |
|---|--|
| (i) $[\text{Co}(\text{NH}_3)_3 \text{Cl}_3]$ | (ii) $[\text{Co}(\text{NH}_3)_4 \text{Cl}_2]\text{Cl}$ |
| (iii) $[\text{Co}(\text{NH}_3)_6]\text{Cl}_3$ | (iv) $[\text{Co}(\text{NH}_3)_5 \text{Cl}]\text{Cl}_2$ |

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

Q32 The entropy change can be calculated by using the expression $\Delta S = \frac{q_{rev}}{T}$. When water freezes in a glass beaker, choose the correct statement amongst the following :

- a) ΔS (system) decreases but ΔS (surroundings) remains the same.
- b) ΔS (system) increases but ΔS (surroundings) decreases.
- c) ΔS (system) decreases but ΔS (surroundings) increases.
- d) ΔS (system) decreases and ΔS (surroundings) also decreases.

Q33 What will be the order of reaction and rate constant for a chemical change having $\log t_{50\%}$ vs log concentration of (A) curves as :



- | | | | |
|-----------|---------|---------|---------|
| a) 0, 1/2 | b) 1, 1 | c) 2, 2 | d) 3, 1 |
|-----------|---------|---------|---------|

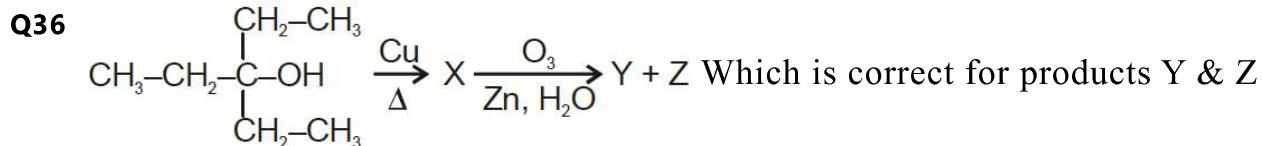
Q34 Which of the following allotropic form of phosphorus is thermodynamically most stable

- | | |
|---------------------|----------------------|
| a) White phosphorus | b) Yellow phosphorus |
| c) Red phosphorus | d) Black phosphorus |

Q35 Match List-I with List-II and select the correct answer using the codes given below the lists (ℓ and m are respectively the azimuthal and magnetic quantum no.)

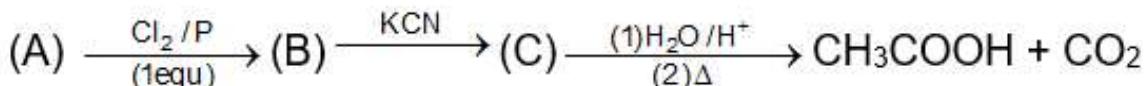
List-I	List-II
(A) Number of value of ℓ for an energy level	(1) 0, 1, 2, (n - 1)
(B) Value of ℓ for a particular type of orbital	(2) $+\ell$ to $-\ell$ through zero
(C) Number of values of m for $\ell = 2$	(3) 5
(D) Value of 'm' for a particular type of orbital	(4) n

- | | |
|-----------------------|-----------------------|
| a) A→4; B→1; C→2; D→3 | b) A→4; B→1; C→3; D→2 |
| c) A→1; B→4; C→2; D→3 | d) A→1; B→4; C→3; D→2 |

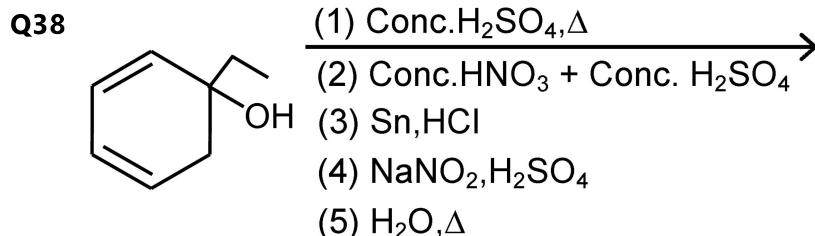


- a) Both can give Tollen's test positive
- b) Both can give Iodoform test positive
- c) Both can form two oximes each on reaction with NH_2OH
- d) Only one can give iodoform test positive

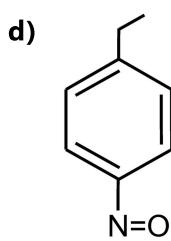
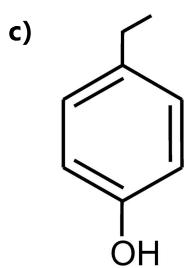
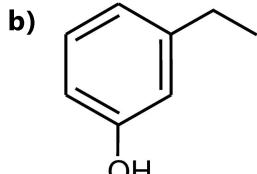
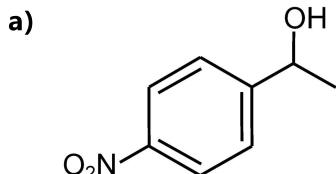
Q37 What is (A) in the following sequence of reactions :



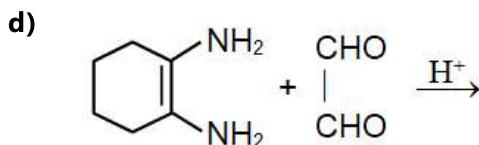
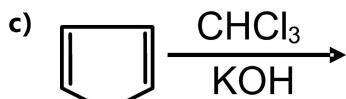
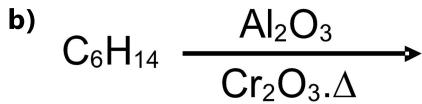
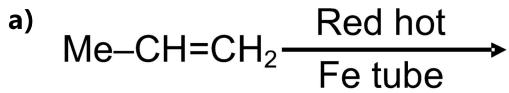
- a) $\text{CH}_3-\text{CH}=\text{O}$
- b) $\text{CH}_3-\text{CH}_2-\text{Br}$
- c) $\text{CH}_3-\text{CH}_2-\text{OH}$
- d) None of these



Final major product is :



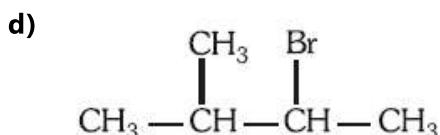
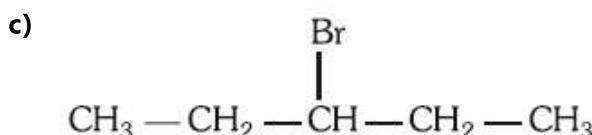
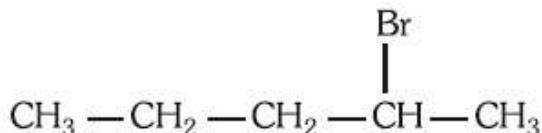
Q39 Which of the following reaction is not give aromatic product?



Q40 An halide $C_5H_{11}Br$ on treatment with alc KOH given 2-pentene only the halide will be



b)



Q41 How many gram of glucose should be dissolved in 500 gram of water in order to produce a solution with $105^{\circ}C$ difference between the freezing point and the boiling point ? For water, $K_f = 1.9 \text{ K-Kg/mol}$ and $K_b = 0.6 \text{ K-Kg/mol}$

- a) 60 b) 120 c) 180 d) 240

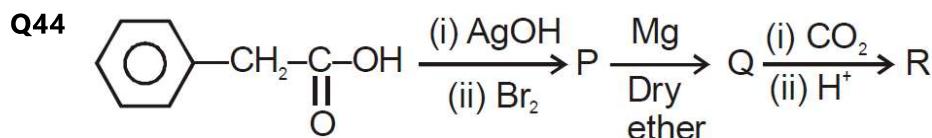
Q42 When Cu^{2+} ion is treated with KI, a white precipitate, X appears in solution. The solution is titrated with sodium thiosulphate, the compound Y is formed. X and Y respectively are

- a) $X = Cu_2I_2$ $Y = Na_2S_4O_5$ b) $X = Cu_2I_2$ $Y = Na_2S_4O_6$
 c) $X = CuI_2$ $Y = Na_2S_4O_3$ d) $X = CuI_2$ $Y = Na_2S_4O_6$

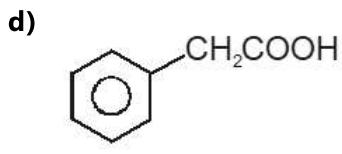
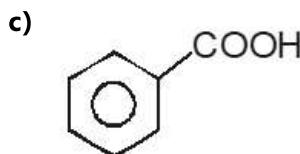
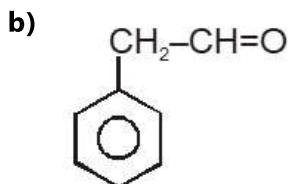
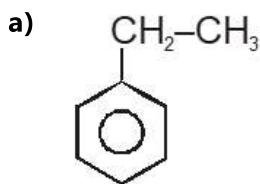
Q43 The minimum energy that must be possessed by photons in order to produce the photoelectric effect with platinum metal is:

[Given: The threshold frequency of platinum is $1.3 \times 10^{15} \text{ s}^{-1}$ and $h = 6.6 \times 10^{-34} \text{ J s.}$]

- a) $3.21 \times 10^{-14} \text{ J}$ b) $6.24 \times 10^{-16} \text{ J}$ c) $8.58 \times 10^{-19} \text{ J}$ d) $9.76 \times 10^{-20} \text{ J}$



Product R is :



Q45 For BF_3 molecule which of the following is true ?

- a) B-atom is sp^2 hybridised
- b) There is a $\text{p}\pi\text{-p}\pi$ back bonding in this molecule.
- c) Observed B–F bond length is found to be less than the expected bond length.
- d) All of these

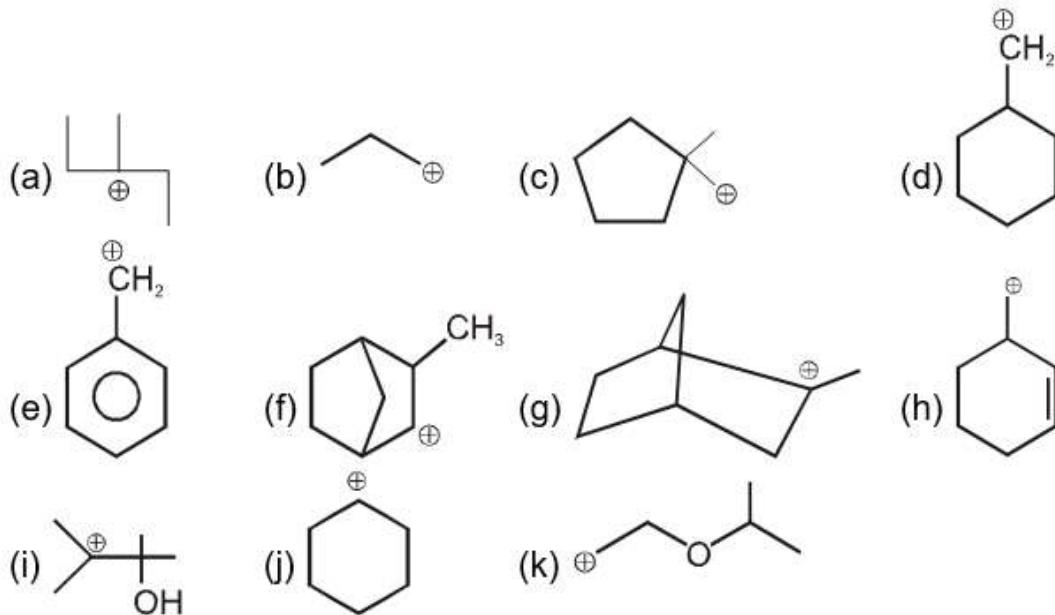
Numerical

Q46 A solution of phenol in chloroform when treated with aqueous NaOH gives compound P as a major product. The mass percentage of carbon in P is _____. (to the nearest integer)
(Atomic mass : C = 12; H = 1; O = 16)

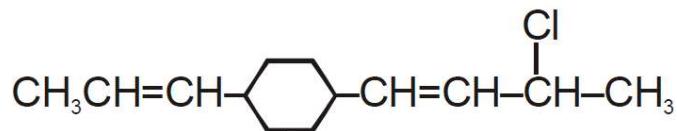
Q47 For the reaction $3 \text{ A (g)} + \text{B (g)} \rightleftharpoons 2 \text{ C (g)}$ at a given temperature, $K_c = 9.0$. What must be the volume of the flask, if a mixture of 2.0 mol each of A, B and C exist in equilibrium?

Q48 A soft drink was bottled with a partial pressure of CO_2 of 3 bar over the liquid at room temperature. The partial pressure of CO_2 over the solution approaches a value of 30 bar when 44 g of CO_2 is dissolved in 1 kg of water at room temperature. The approximate pH of the soft drink is $\text{_____} \times 10^{-1}$.
(First dissociation constant of $\text{H}_2\text{CO}_3 = 4.0 \times 10^{-7}$; $\log 2 = 0.3$; density of the soft drink = 1 g mL^{-1})

Q49 How many of the following carbocation can undergo rearrangement :



Q50 How many stereoisomers are possible for the



Mathematics

Single Choice Question

Q51 Number of real roots of the equation $\|2x-1|-3|=12e^x - 4e^{2x} - 10$ is
 a) 0 b) 1 c) 2 d) 3

Q52 a, b, c are three real number such that $a^2 + 2c = 7, c^2 + 4b = -7$ and $b^2 + 6a = -14$ then which of the following statement is correct
 a) Roots of the equation $x^2 + ax + bc = 0$ are real and distinct
 b) Roots of the equation $x^2 + ax + bc = 0$ are real and same
 c) Roots of the equation $x^2 + ax + bc = 0$ are real and irrational
 d) Roots of the equation $x^2 + ax + bc = 0$ are imaginary.

Q53 Let $R = \{(x, y) : x^2 + y^2 = 1; x, y \in R\}$ be a relation in R , then the relation R is:
 a) Reflexive b) Symmetric c) Transitive d) Equivalence

Q54 A circle $S = 0$ is described on the chord of parabola $y^2 = 4x$ as diameter passing through the point $(1, 0)$ and with gradient unity. Then radius of circle $S = 0$ is :
 a) 2 b) 3 c) 4 d) 8

Q55 $\lim_{x \rightarrow \pi/2} \frac{\sin x - (\sin x)^{\sin x}}{1 - \sin x + \ln \sin x} =$
 a) 1 b) 2 c) 3 d) 0

Q56 The mean of 5 observations is 4.4 and their variance is 8.24. If three of the observations are 1, 2 and 6. Find the other two observation:
 a) 4, 9 b) 8, 4 c) 4, 4 d) 9, 9

Q57
 If A is a square matrix such that $A(\text{adj } A) = \begin{bmatrix} 4 & 0 & 0 \\ 0 & 4 & 0 \\ 0 & 0 & 4 \end{bmatrix}$, then $\frac{|\text{adj}(\text{adj } A)|}{2 |\text{adj } A|}$ is equal to
 a) 0 b) 9 c) 16 d) 8

Q58 Let N be the sum of the numbers appeared when two fair dice are rolled and let the probability that $N - 2, \sqrt{3N}, N + 2$ are in geometric progression be $\frac{k}{48}$. Then the value of k is

- a) 2 b) 3 c) 4 d) 8

Q59 Let $\vec{a}, \vec{b}, \vec{c}$ be three mutually perpendicular vectors of the same magnitude and equally inclined at an angle θ , with the vector $\vec{a} + \vec{b} + \vec{c}$. Then $36\cos^2 2\theta$ is equal to _____.

- a) 4 b) 3 c) 6 d) 8

Q60 Let $f(x) = [\sin x] + [\sin 2x] \forall x \in (0, 10)$, $[.]$ is the greatest integer function, then $f(x)$ is discontinuous at:

- a) 8 points b) 9 points c) 10 points d) 11 points

Q61 The values of α for which the point $(\alpha - 1, \alpha + 1)$ lies in the larger segment of the circles $x^2 + y^2 - x - y - 6 = 0$ made by the chord whose equation is $x + y - 2 = 0$ are

- a) $-1 < \alpha < 1$ b) $1 < \alpha < \infty$ c) $-\infty < \alpha < -1$ d) $\alpha \leq 0$

Q62 If a curve passes through the point $M(-1, 1)$ and has slope $\left(2x - \frac{1}{x^2}\right)$ at any point $P(x, y)$ on it, then the ordinate of the point on the curve whose abscissa is -2, is

- a) $\frac{5}{2}$ b) $\frac{7}{2}$ c) $\frac{9}{2}$ d) $\frac{11}{2}$

Q63 The sum of an infinite geometric series with positive terms is 3 and the sum of the cubes of its terms is $\frac{27}{19}$. Then the common ratio of this series is

- a) $\frac{1}{3}$ b) $\frac{2}{9}$ c) $\frac{2}{3}$ d) $\frac{4}{9}$

Q64 Let the foci of the ellipse $\frac{x^2}{16} + \frac{y^2}{7} = 1$ and the hyperbola $\frac{x^2}{144} - \frac{y^2}{\alpha} = \frac{1}{25}$ coincide. Then the length of the latus rectum of the hyperbola is :

- a) $\frac{32}{9}$ b) $\frac{18}{5}$ c) $\frac{27}{4}$ d) $\frac{27}{10}$

Q65 If the point of intersections of the ellipse $\frac{x^2}{16} + \frac{y^2}{b^2} = 1$ and the circle $x^2 + y^2 = 4b$, $b > 4$ lie on the curve $y^2 = 3x^2$, then b is equal to :

- a) 12 b) 16 c) 10 d) 8

Q66 If $\int \frac{1}{x} \sqrt{\frac{1-x}{1+x}} dx = g(x) + c$, $g(1) = 0$, then $g\left(\frac{1}{2}\right)$ is equal to :

- a) $\log_e \left(\frac{\sqrt{3}-1}{\sqrt{3}+1} \right) + \frac{\pi}{3}$ b) $\log_e \left(\frac{\sqrt{3}+1}{\sqrt{3}-1} \right) + \frac{\pi}{3}$ c) $\log_e \left(\frac{\sqrt{3}+1}{\sqrt{3}-1} \right) - \frac{\pi}{3}$ d) $\frac{1}{2} \log_e \left(\frac{\sqrt{3}-1}{\sqrt{3}+1} \right) - \frac{\pi}{6}$

Q67 $\int_0^2 \left| 2x^2 - 3x \right| + \left[x - \frac{1}{2} \right] dx$, where $[t]$ is the greatest integer function, is equal to:

- a) $\frac{7}{6}$ b) $\frac{19}{12}$ c) $\frac{31}{12}$ d) $\frac{3}{2}$

Q68 The area of the region $S = \{(x,y) : y^2 \leq 8x, y \geq \sqrt{2}x, x \geq 1\}$ is

- a) $\frac{13\sqrt{2}}{6}$ b) $\frac{11\sqrt{2}}{6}$ c) $\frac{5\sqrt{2}}{6}$ d) $\frac{19\sqrt{2}}{6}$

Q69 If z is a complex number such that $\frac{z-i}{z-1}$ is purely imaginary, then the minimum value of $|z-(3+3i)|$ is :

- a) $2\sqrt{2}$ b) $2\sqrt{3}$ c) $2\sqrt{5}$ d) $2\sqrt{4}$

Q70 If the shortest distance between the lines $\frac{x+\sqrt{6}}{2} = \frac{y-\sqrt{6}}{3} = \frac{z-\sqrt{6}}{4}$ and $\frac{x-\lambda}{3} = \frac{y-2\sqrt{6}}{4} = \frac{z+2\sqrt{6}}{5}$ is 6, then the square of sum of all possible values of λ is

- a) 415 b) 110 c) 384 d) 125

Numerical

Q71 Let $f(x) = \alpha(x)\beta(x)\gamma(x)$ for all real x , where $\alpha(x), \beta(x)$ and $\gamma(x)$ are differentiable functions of x . If $f'(2) = 18f(2), \alpha'(2) = 3\alpha(2), \beta'(2) = -4\beta(2)$ and $\gamma'(2) = k\gamma(2)$, then the value of k is

Q72 The equation of line through the mid point of sides AB & AD of rhombus ABCD, whose one diagonal is $3x - 4y + 5 = 0$ and one vertex is $A(3,1)$ is $ax + by + c = 0$. The absolute value of $(a+b+c)$ is, where a, b, c are integer expressed in lowest form.

Q73 If y is a function of x and $\ln(x+y) - 2xy = 0$, then the value of $y'(0)$ is equal to

Q74

$$\text{If } f(x) = \begin{cases} \frac{\sqrt{2 + \cos x} - 1}{(\pi - x)^2} & x > \pi \\ a & x = \pi \\ \frac{1 + \sec^3 x}{2 \tan^2 x} + b & x < \pi \end{cases}$$

x = π is continuous at $x = \pi$ then $(a + b) \times 4$ equal to

- Q75** Three schools send 2, 4 and 6 students, respectively, to a summer camp. The 12 students must be accommodated in 6 rooms numbered 1,2,3,4,5,6 in such a way that each room has exactly 2 students and both from the same school. The number of ways the students can be accommodated in the rooms is $p^a q^b r^c$ (where p,q,r are prime numbers and a, b, c are natural numbers) then $(a \times b \times c - p \times q \times r)$ is

Answer Key

Que.	1	2	3	4	5	6	7	8	9	10
Ans.	A	B	A	D	B	B	A	C	C	D
Que.	11	12	13	14	15	16	17	18	19	20
Ans.	C	A	C	A	B	A	B	C	C	A
Que.	21	22	23	24	25	26	27	28	29	30
Ans.	33	1	2	8	1	B	D	A	C	D
Que.	31	32	33	34	35	36	37	38	39	40
Ans.	A	C	A	D	B	D	D	C	A	C
Que.	41	42	43	44	45	46	47	48	49	50
Ans.	C	B	C	D	D	69	6	37	7	16
Que.	51	52	53	54	55	56	57	58	59	60
Ans.	A	A	B	C	B	A	D	C	A	B
Que.	61	62	63	64	65	66	67	68	69	70
Ans.	A	C	C	D	A	A	B	B	A	C
Que.	71	72	73	74	75					
Ans.	19	1	1	5	2					