Competishun

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

Date: 25/11/2024
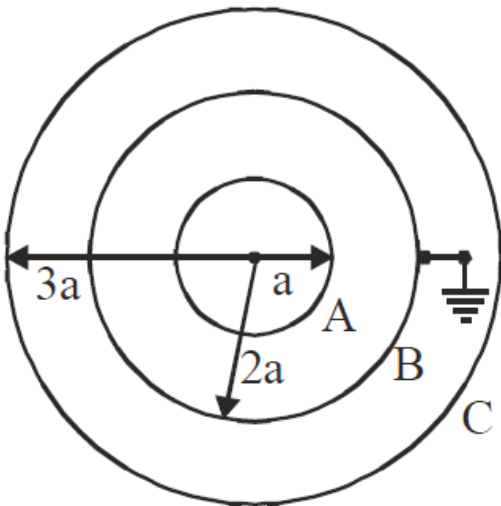**Time:** 3 hours   **Max. Marks:** 300

> ## UTS-1_MT-4 (24-25)

Physics

Single Choice Question

Q1 Figure shows a system of three concentric metal shells A, B and C with radii a, 2a and 3a respectively.
Shell B is earthed and shell C is given a charge Q. Now if shell C is connected to shell A, then the final charge on the shell B, is equal to :


a) $-\dfrac{4Q}{13}$

b) $-\dfrac{8Q}{11}$

c) $-\dfrac{5Q}{3}$

d) $-\dfrac{3Q}{7}$

Q2 A parallel plate capacitor has plates of area A separated by distance 'd' between them. It is filled with a dielectric which has a dielectric constant that varies as k(x) = K(1 + αx) where 'x' is the distance measured from one of the plates. If (αd) << 1, the total capacitance of the system is best given by the expression

a) $\frac{AK\varepsilon_0}{d}(1 + \alpha d)$

b) $\frac{A\varepsilon_0 K}{d}\left(1 + \frac{\alpha^2 d^2}{2}\right)$

c) $\frac{AK\varepsilon_0}{d}\left(1 + \frac{\alpha d}{2}\right)$

d) $\frac{A\varepsilon_0 K}{d}\left(1 + \left(\frac{\alpha d}{2}\right)^2\right)$

Q3 The magnetic field of a plane electromagnetic wave is given by

$$\vec{B}- = 2 \times 10^{-8} \sin\left(0.5 \times 10^3 x + 1.5 \times 10^{11} t\right) \hat{j} T$$

The amplitude of the electric field would be

a) 6 Vm^{-1} along x-axis

b) 3 Vm^{-1} along x-axis

c) 6 Vm^{-1} along z-axis

d) $2 \times 10^{-8} \text{ Vm}^{-1}$ along z-axis

Q4 Visible light of wavelength 6000×10^{-8} cm falls normally on a single slit and produces a diffraction pattern. It is found that the second diffraction minimum is at 60° from the central maximum. If the first minimum is produced at θ_1, then θ_1 is close to

a) 25°

b) 30°

c) 35°

d) 45°

Q5 In the given circuit, value of Y is
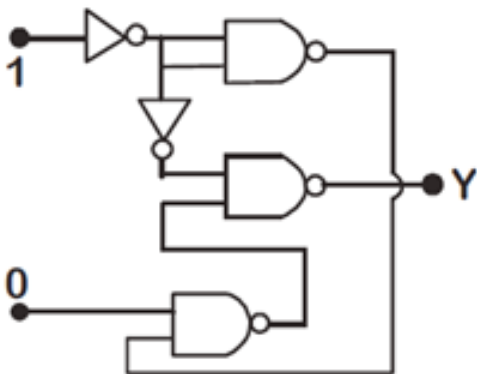
a) Toggles between 0 and 1

b) 0

c) 1

d) Will not execute

Q6 Consider a mixture of n moles of helium gas and 2n moles of oxygen gas (molecules taken to be rigid) as an ideal gas. Its C_p/C_v value will be

a) 40/27

b) 19/13

c) 67/45

d) 23/15

Q7　As shown in the figure, a battery of emf E is connected to an inductor L and resistance R in series. The switch is closed at t = 0. The total charge that flows from the battery, between t = 0 and t = t_C (t_C is the time constant of the circuit) is :
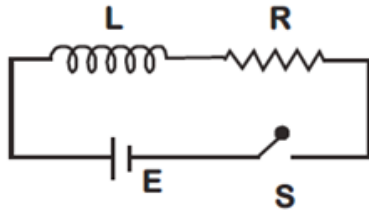

a)　$\dfrac{EL}{R^2}$

b)　$\dfrac{EL}{eL^2}$

c)　$\dfrac{EL}{R^2}\left(1-\dfrac{1}{e}\right)$

d)　$\dfrac{EL}{eR^2}$

Q8　Velocity (in m/s) of a particle moving in a straight line is given by V = (t^2 –2t + 1):

List-I　　　　　　　　　　　　　　　　　　　**List-II**
(P) Velocity (in m/s) of particle at t = 3sec is　　(1) 1
(Q) Acceleration (in m/s^2) of particle at t = 2 is　(2) 2
(R) Time when particle is at rest is　　　　　　　(3) 3
(S) Magnitude of average acceleration of particle in　(4) 4
first one second is

a)　$P \to 3; Q \to 2; R \to 4; S \to 1$　
b)　$P \to 4; Q \to 3; R \to 2; S \to 1$　
c)　$P \to 4; Q \to 2; R \to 1; S \to 1$

d)　$P \to 1; Q \to 4; R \to 3; S \to 2$

Q9　A thin circular dise of radius R is uniformly charged with density σ > 0 per unit area. The disc rotates about its axis with a uniform angular speed ω. The magnetic moment of the disc is

a)　$\pi R^4 \sigma \omega$

b)　$\dfrac{\pi R^4}{2}\sigma \omega$

c)　$\dfrac{\pi R^4}{4}\sigma \omega$

d)　$2\pi R^4 \sigma \omega$

Q10　In a series LCR resonance circuit, if we change the resistance only, from a lower to higher value

a)　The quality factor and the resonance frequency will remain constant

b)　The resonance frequency will increase

c)　The bandwidth of resonance circuit will increase

d)　The quality factor will increase

For More Material Join: @JEEAdvanced_2025

Q11 The current flowing in the loop is shown in figure. Then the magnetic field at point O (centre) is :
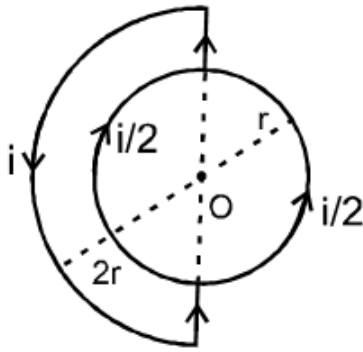
a) $\dfrac{3\mu_0 i}{8r}$

b) $\dfrac{5\mu_0 i}{8r}$

c) $\dfrac{\mu_0 i}{8r}$

d) None of these

Q12 Ge and Si diodes start conducting at 0.3 V and 0.7 V respectively. In the following figure if Ge diode connection are reversed, the value of V_0 changes by: (assume that the Ge diode has large breakdown voltage)
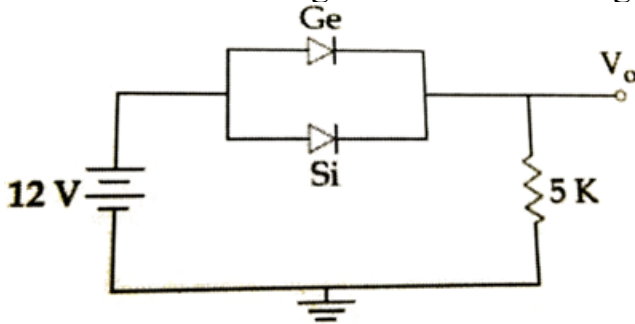
a) 0.8 V

b) 0.6 V

c) 0.2 V

d) 0.4 V

Q13 The total current supplied to the circuit by the battery is -
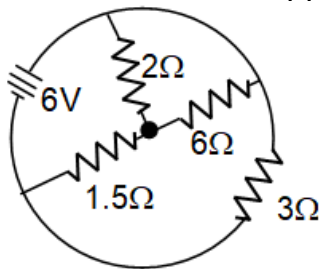
a) 1A

b) 2A

c) 4A

d) 6A

Q14 In a Young's double slit experiment, the slits are placed 0.320 mm apart. Light of wavelength $\lambda = 500$ nm is incident on the slits. The total number of bright fringes that are observed in the angular range
$-30° \le \theta \le 30°$ is:

a) 640

b) 320

c) 321

d) 641

Q15 Choose the correct P-V graph of ideal gas for given V-T graph.

a)

b)

c)

d)
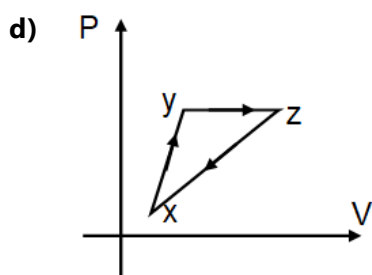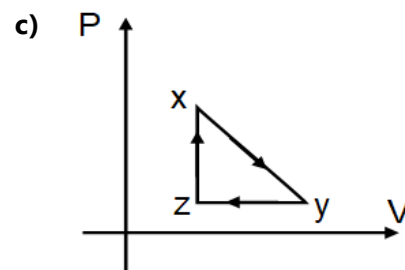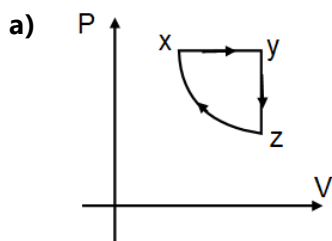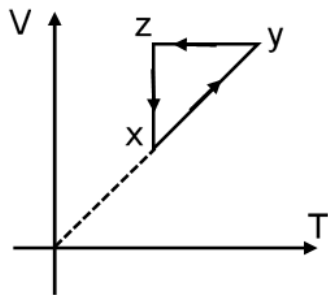
Q16 A screw gauge advances by 3mm in 6 rotations. There are 50 divisions on circular scale. Find least count of screw gauge?
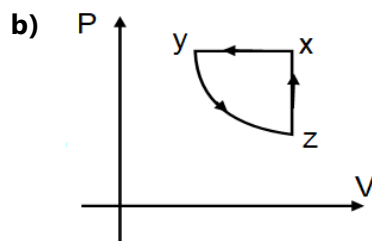
a) 0.002 cm   b) 0.001 cm   c) 0.01 cm   d) 0.02 cm

Q17 Three blocks A, B and C are in equilibrium. If string is cut between block A and B then calculate acceleration of block 'B' just after cutting the string.
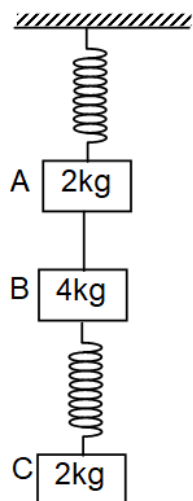
a) 0   b) 15 m/s^2 upward   c) 15 m/s^2 downward   d) 30 m/s^2 upward

Q18 In the following diagram if $V_2 > V_1$ then -
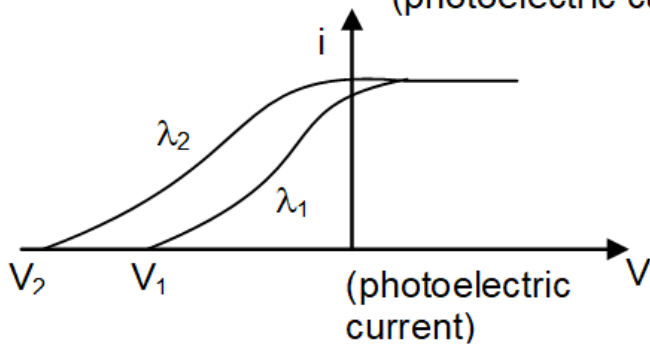
a) $\lambda_1 = \sqrt{\lambda_2}$ b) $\lambda_1 < \lambda_2$ c) $\lambda_1 = \lambda_2$ d) $\lambda_1 > \lambda_2$

Q19 The block of mass M moving on the frictionless horizontal surface collides with the spring of spring constant K and compresses it by length L. The maximum momentum of the block after collision is -
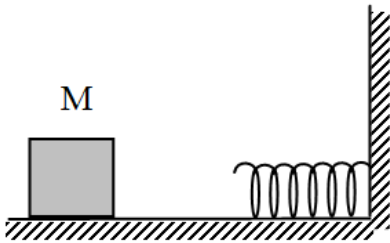
a) $\sqrt{MKL}$ b) $\dfrac{KL^2}{2M}$ c) zero   d) $\dfrac{ML^2}{K}$

Q20 A force F is needed to break a copper wire having radius R. The force needed to break a copper wire of the same length and radius 2R will be -

a) $\dfrac{F}{2}$ b) 2F   c) 4F   d) $\dfrac{F}{4}$

Numerical

Q21 A quarter cylinder of radius R and refractive index 1.5 is placed on a table. A point Object P is kept at a distance mR from it. Find the value of $100 \times m$ for which a ray from P will emerge parallel to the table as shown in figure
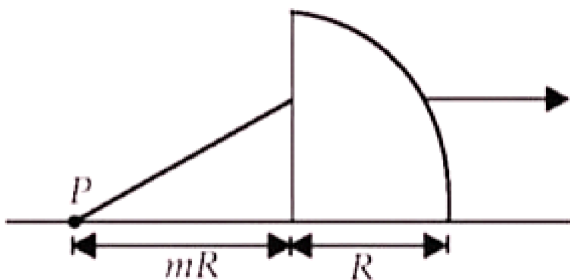
Q22 Four balls A, B, C and D are placed on a smooth horizontal surface. Ball B collides with ball C with an initial velocity u as shown in figure. If all collisions are elastic, find the total number of collisions between the balls.
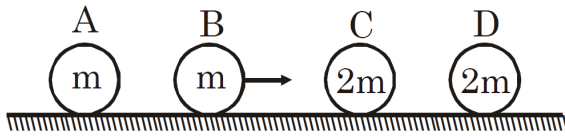
Q23 In Bohr's model, if B and 'a' denote the magnetic field at centre and centripetal acceleration, where electron is in n^{th} orbit, then it is found that $\dfrac{a}{B} \propto \dfrac{n^{\alpha}}{z^{\beta}}$, where z = atomic number, find value of ($\alpha + \beta$).

Q24 There is no friction between surface and block. If system is slightly displaced and released, it executes S.H.M., spring constant of the spring is K and co-efficient of friction between the blocks is μ. Maximum amplitude of oscillation so that upper block does not slip on the lower block is $\alpha \dfrac{\mu mg}{K}$ then α is
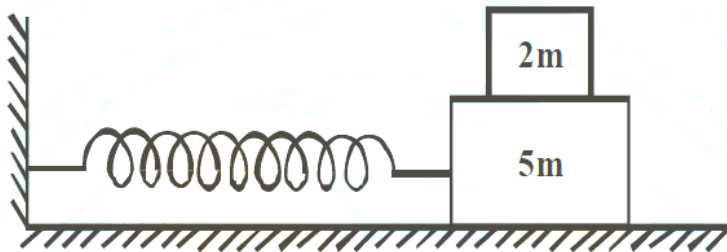
Q25 Consider a ring of mass m and radius R with four light spokes. A point mass m is placed on one horizontal spoke. (see the figure)
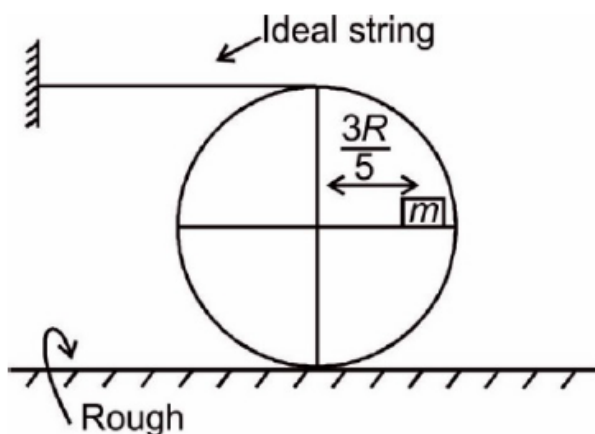
If the shown system is at rest then minimum value of coefficient of friction is given by $\dfrac{3}{n}$. Find the value of n.

Chemistry

Single Choice Question

Q26 5.1 g NH_4SH is introduced in 3.0 L evacuated flask at 327ºC. 30% of the solid NH_4SH decomposed to NH_3 and H_2S as gases. The K_p of the reaction at 327ºC is (R = 0.082 L atm mol⁻¹K⁻¹, Molar mass of S = 32 g mol⁻¹, molar mass of N = 14 g mol⁻¹)

a) 4.9×10^{-3} atm²   b) 0.242 atm²   c) 1×10^{-4} atm²   d) 0.242×10^{-4} atm²

Q27 Two pi and half sigma bonds are present in

a) O_2^+ b) O_2 c) N_2^+ d) N_2

Q28 When a certain metal was irradiated with light of frequency 3.2×10^{16} Hz, photo electrons emitted had twice the kinetic energy as did photoelectrons emitted when same metal was irradiated with light at frequency 2.0×10^{16} Hz. The work function of metal will be-

a) 4.2×10^{20} J   b) 3.1×10^{19} J   c) 5.3×10^{-18} J   d) 2.2×10^{20} J

Q29 Which is a true statement?

a) Larger is the value of ionisation energy easier is the formation of cation.

b) Larger is the value of electron affinity easier is the formation of anion.

c) Larger is the value of ionisation energy as well as electron affinity the smaller is the electronegativity of atom.

d) Larger is the Z_{eff} larger is the size of atom

Q30 Select the incorrect statement ?

a) In graphite, carbon is sp² hybridised while in diamond, is carbon is sp³ hybridised

b) CO is toxic because it forms a complex with haemoglobin in the blood

c) Graphite is anisotropic in nature with respect to conductivity

d) $COCl_2$ is called phosphine gas

Q31 Select the correct order for the given properties–
(I) Thermal Stability : $BaSO_4 > SrSO_4 > CaSO_4 > MgSO_4$
(II) Basic Nature : $ZnO > BeO > MgO > CaO$
(III) Solubility in water : $LiOH > NaOH > KOH > RbOH$
(IV) Melting point : $NaCl > KCl > RbCl > LiCl$

a) I, IV   b) I, II and IV   c) II, III   d) All are correct

Q32 Given below are two statements:
Statements-I : In Hofmann degradation reaction, the migration of only an alkyl group takes place from carbonyl carbon of the amide to the nitrogen atom.
Statement-II : The group is migrated in Hofmann degradation reaction to electron deficient atom. In the light of the above statement, choose the most appropriate answer from the options given below:

a) Both Statement-I and Statement-II are correct

b) Both Statement-I and Statement-II are incorrect

c) Statement-I is correct but Statement-II is incorrect

d) Statement-I is incorrect but Statement-II is correct
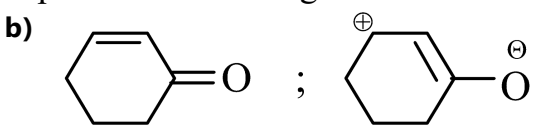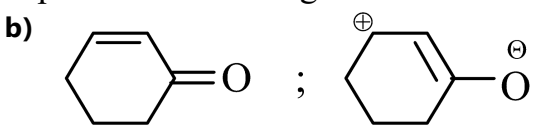
Q33 In a Cu-voltameter, mass deposited in 30s is m gm. If the time-current graph is shown in the following figure
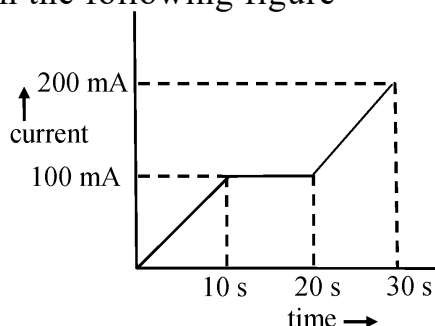
What is the electrochemical equivalent of Cu?

a) $m/2$

b) $m/3$

c) $m/4$

d) $\dfrac{m}{63.5}$

Q34 Which of the following pairs of structures do not represent resonating structures ?

a)
$$CH_3 - \overset{\overset{\displaystyle O}{\|}}{C} - CH_3 \quad ; \quad CH_3 - \overset{\overset{\displaystyle OH}{|}}{C} = CH_2$$

b)

c)
$$CH_3 - \overset{\overset{\displaystyle \oplus OH}{\|}}{C} - CH_3 \quad ; \quad CH_3 - \underset{\underset{\displaystyle \oplus}{}}{\overset{\overset{\displaystyle OH}{|}}{C}} - CH_3$$

d)
$$CH_3 - \underset{\underset{\displaystyle O}{\|}}{C} - OH \quad ; \quad CH_3 - \underset{\underset{\displaystyle O}{|\ominus}}{\overset{\overset{\displaystyle \oplus}{}}{C}} = OH$$

Q35 Given below are two statements : one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): Cis form of alkene is found to be more polar than the trans form
Reason (R): Dipole moment of trans isomer of 2-butene is zero.
In the light of the above statements, choose the correct answer from the options given below :

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

b) (A) is true but (R) is false

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

d) (A) is false but (R) is true
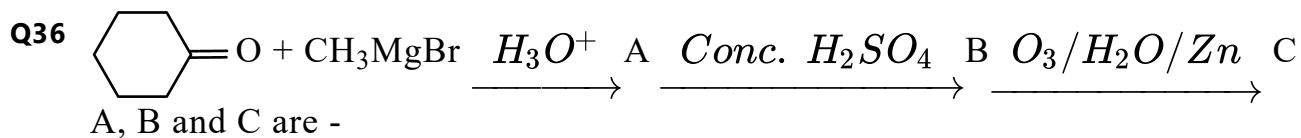
Q36

$$\bigcirc\!\!=O + CH_3MgBr \xrightarrow{H_3O^+} A \xrightarrow{Conc.\ H_2SO_4} B \xrightarrow{O_3/H_2O/Zn} C$$

A, B and C are -

a)

A→ (HO, CH₃ on cyclohexane) B→ (CH₃ cyclohexene) C→ (CH₃ C=O, CHO chain)

b)

A→ (HO, CH₃ on cyclohexane) B→ (CH₂ methylenecyclohexane) C→ (cyclohexanone), HCHO

c)

A→ (HO, CH₃ on cyclohexane) B→ (CH₃ cyclohexene) C→ (CH₃, CHO, CHO chain)

d)

A→ (HO, CH₃ on cyclohexane) B→ (CH₃ cyclohexene) C→ (CH₃ C=O, COOH chain)

Q37

$$\bigcirc + \triangle\!O \xrightarrow{BF_3} \text{product} -$$

a) (benzyl–CH₂–epoxide)

b) (CH₃, OH substituted phenyl chain)

c) (phenyl–CH(CH₃)–CH(OH)–CH₃)

d) none of the above

Q38 Which of the following hydrides of the oxygen family shows the lowest boiling point?

a) H_2O **b)** H_2S **c)** H_2Se **d)** H_2Te

Q39 The major product in the reaction

$$CH_3-\underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}}-Cl + \overset{+}{K}\ \overset{-}{O}-\underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}}-CH_3 \longrightarrow ? \text{ is}$$
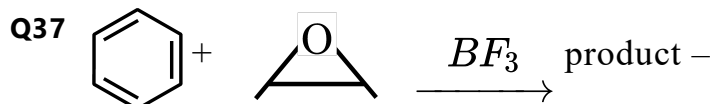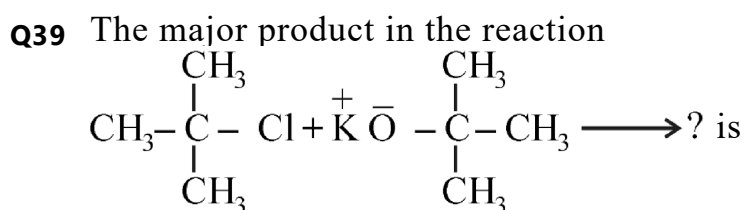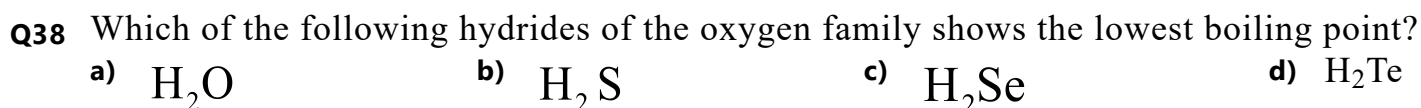
a) t-Butyl ethyl ether **b)** 2,2-Dimethyl butane **c)** 2-Methyl pent-1-ene

d) 2-Methyl prop-1-ene

Q40

$$A \xrightarrow[\text{one. Eq. of } CH_3I]{OH^-} C_9H_{10}O_3 \xrightarrow{KMnO_4} C_9H_{10}O_4$$

$(HCO_3^-$ soluble)
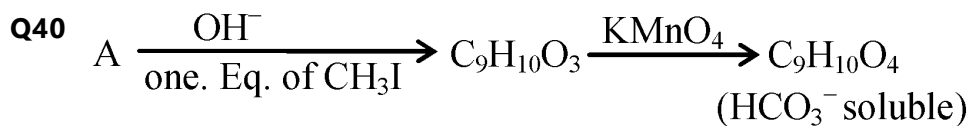
(It gives intense colour
with $FeCl_3$ and Positive
Tollen's test)

3,4-dihydroxy $\xleftarrow[\Delta]{\text{Conc. HI}}$
Benzoic acid

Starting substrate 'A' is -

a)

OH
OH
H_3C
CH_3

b)

OH
OMe
CHO

c)

OH
OH
OHC
CH_3

d)

OCH_3
OCH_3
CHO
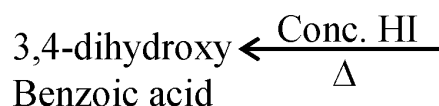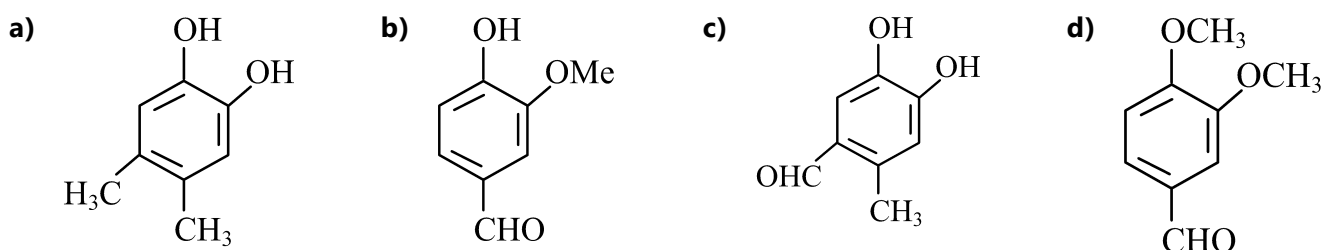
Q41 The correct IUPAC name of the following compound is :

O_2N ... H
O   O
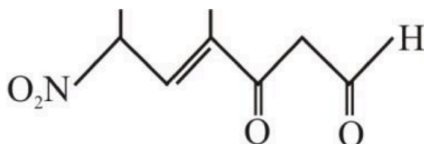
a) 4-methyl-2-nitro-5-oxohept-3-enal   b) 4-methyl-5-oxo-2-nitrohept-3-enal
c) 4-methyl-6-nitro-3-oxohept-4-enal   d) 6-formyl-4-methyl-2-nitrohex-3-enal

Q42 In which of the following hexose C-4 epimer of D-glucose is
a) D-Altrose   b) D–mannose   c) D-Galactose   d) D-fructose

Q43 Match the complexes given in column I with the oxidation states of central metal atoms given in column II and mark the appropriate choice.
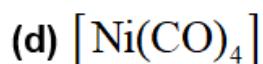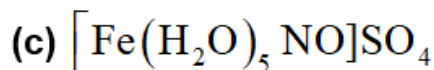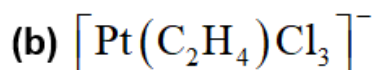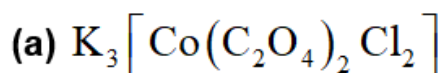
Column I	Column II
(Complex)	**(Oxidation state of central atom)**
(a) $K_3\left[Co(C_2O_4)_2 Cl_2\right]$	(i) 0
(b) $\left[Pt(C_2H_4)Cl_3\right]^-$	(ii) +1
(c) $\left[Fe(H_2O)_5 NO\right]SO_4$	(iii) +3
(d) $\left[Ni(CO)_4\right]$	(iv) +2

a) (a) (ii), (B) (i), (C) (iv), (D) (iii)   b) (a) (iv), (B) (ii), (C) (i), (D) (iii)
c) (a) (iii), (B) (iv), (C) (ii), (D) (i)   d) (a) (i), (B) (ii), (C) (iii), (D) (iv)

Q44 The IUPAC name of the complex $[Pt(NH_3)_2\ Cl(NH_2CH_3)]Cl$ is :
   a) Diamminechlorido(methanamine)platinum (II) chloride
   b) Diammine(methanamine)chloridoplatinum (II) Chloride
   c) Bisammine(methanamine)chloridoplatinum (II) chloride
   d) Diamminechlorido(aminomethane)platinum (IV) chloride

Q45 Arrange the following elements in the increasing order of number of unpaired electrons in it.
   (A) Sc   (B) Cr   (C) V   (D) Ti   (E) Mn
   Choose the correct answer from the options given below:
   a) $(C) < (E) < (B) < (A) < (D)$
   b) $(B) < (C) < (D) < (E) < (A)$
   c) $(A) < (D) < (C) < (B) < (E)$
   d) $(A) < (D) < (C) < (E) < (B)$

Numerical

Q46 The following results were obtained during kinetic studies of the reaction ; $2\,A + B \longrightarrow$ Products

Experiment	[A] (in mol L^{-1})	[B] (in mol L^{-1})	Initial Rate of reaction (in mol L^{-1} min^{-1})
I	0.10	0.20	6.93×10^{-3}
II	0.10	0.25	6.93×10^{-3}
III	0.20	0.30	1.386×10^{-2}

The time (in minutes) required to consume half of A is

Q47 20 ml of 0.1 M $H_2\,SO_4$ solution is added to 30 Ml of 0.2 M $NH_4\,OH$ solution. The pH of the resultant mixture is : [pK_b of $NH_4\,OH = 4.7$]

Q48 A solution of sodium sulfate contains 92 g of Na+ ions per kilogram of water. The molality of Na$^+$ ions in that solution in mol kg^{-1} is:

Q49 A process had $\Delta H = 200$ Jmol^{-1} and $\Delta S = 40$ JK^{-1} mol^{-1}. The minimum temperature (in K) above which the process will be spontaneous.

Q50 Relative decrease in vapour pressure is 0.4 for a solution containing 1 mole AB in 3 mol H_2O, therefore AB is ionised at the extent of X% then the value of $\dfrac{X}{20}$ is :

Mathematics

Single Choice Question

Q51 $96\cos\dfrac{\pi}{33}\cos\dfrac{2\pi}{33}\cos\dfrac{4\pi}{33}\cos\dfrac{8\pi}{33}\cos\dfrac{16\pi}{33}$ is equal to

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

Q52   If α, β and γ are non zero rational numbers, and S is the set of possible values of $\dfrac{|\alpha|}{\alpha}+\dfrac{|\beta|}{\beta}+\dfrac{|\gamma|}{\gamma}$ then S is

   a) {3,1}   **b)** {-3,1,-1}   **c)** {3,-3,0,1,-1}   **d)** {3,-3,1,-1}

Q53   Let $\cos^2$ a+p and $\sin^2$ a+p are the roots of the equation $x^2+4x+\dfrac{61}{16}=0$. Then the equation whose roots are $\tan^2$ a and $\cot^2$ a is

   a) $x^2 - 4x+1=0$ **b)** $x^2 - 10x+1=0$ **c)** $x^2 + 10x + 1 = 0$ **d)** $x^2 - 14x + 1 = 0$

Q54   Let for $A=\begin{bmatrix} 1 & 2 & 3 \\ \alpha & 3 & 1 \\ 1 & 1 & 2 \end{bmatrix}$, $|A| = 2$. If $|2\,\text{adj}\,(2\,\text{adj}\,(2A))| = 32^n$, then $3n + \alpha$ is equal to −

   a) 10   **b)** 12   **c)** 11   **d)** 16

Q55   If the domain of the function $f(x) = \log_e (4x^2 + 11x + 6) + \sin^{-1}(4x+3)+\cos^{-1}\left(\dfrac{10x+6}{3}\right)$ is (α, β], Then 36 |α + β| is equal to -

   a) 63   **b)** 45   **c)** 72   **d)** 54

Q56   If $a, b, c, \in R$ satisfy the equations $a+[b]+\{c\} = 3.1, \{a\}+b+[c]= 4.3$ and $[a]+\{b\}+c = 5.4$ (where [.] denotes the greatest integer function and {.} is fractional part), then 6a+b-3c is

   a) 0   **b)** 2   **c)** 4   **d)** 6.3

Q57   If $xf(x)+\displaystyle\int_0^x f(t)\,dt = \dfrac{3x^2}{2}$ and $f(1)=1$, then $f(3)$ is equal to

   a) 1   **b)** 3   **c)** 9   **d)** 28

Q58

The value of definite integral $\dfrac{2^{2010}\displaystyle\int_0^1 t^{1004}(1-t)^{1004}\,dt}{\displaystyle\int_0^1 t^{1004}\left(1-t^{2010}\right)^{1004}\,dt}$ is

a) 4000 **b)** 40021 **c)** 4020 **d)** 4021

Q59

Consider the function $f(x)=\begin{cases}\dfrac{g(x)}{x-2}; & x\neq 2\\ 7; & x=2\end{cases}$ where $g(x)$ is polynomial function

such that $g'''(x)$ is identically equal to zero and $g(3)=9$. If $f(x)$ is continuous at $x=2$, then $g(x)$ is

a) $2x^2+x+6$ **b)** $2x^2-x-6$ **c)** x^2+3 **d)** x^2-x+7

Q60

The centre of an ellipse $\dfrac{x^2}{25}+\dfrac{y^2}{16}=1$ is C and PN is any ordinate & A, A' are the end

points of major axis, then the value of $\dfrac{PN^2}{ANA'N}$ is

a) 9 **b)** $\dfrac{16}{25}$ **c)** $\dfrac{25}{16}$ **d)** 41

Q61 The set of all a $\in \mathbb{R}$ for which the equation x | x -1| + | x + 2 | + a = 0 has exactly one real root is :

a) (-6, -3) **b)** (-∞, ∞) **c)** (-6, ∞) **d)** (-∞, −3)

Q62 The area of the region $\{(x, y) : x^2 \le y \le |x^2 - 4|, y \ge 1\}$ is

a) $\dfrac{3}{4}(4\sqrt{2}-1)$ **b)** $\dfrac{4}{3}(4\sqrt{2}-1)$ **c)** $\dfrac{4}{3}(4\sqrt{2}+1)$ **d)** $\dfrac{3}{4}(4\sqrt{2}+1)$

Q63

Let $I(x)=\displaystyle\int \dfrac{x^2\left(x\sec^2 x+\tan x\right)}{\left(x\tan x+1\right)^2}dx$ .If $I(0) = 0$ the $I\left(\dfrac{\pi}{4}\right)$ is equal to

a) $\log_e \dfrac{(\pi+4)^2}{16}-\dfrac{\pi^2}{4(\pi+4)}$

b) $\log_e \dfrac{(\pi+4)^2}{16}+\dfrac{\pi^2}{4(\pi+4)}$

c) $\log_e \dfrac{(\pi+4)^2}{32}-\dfrac{\pi^2}{4(\pi+4)}$

d) $\log_e \dfrac{(\pi+4)^2}{32}+\dfrac{\pi^2}{4(\pi+4)}$

Q64 Let two non-collinear vectors $\vec{a}$ and $\vec{b}$ inclined at an angle $\frac{2\pi}{3}$ be such that $|\vec{a}| = 3$ and $|\vec{b}| = 4$. A point P moves so that at any time t the position vector $\overrightarrow{OP}$ (where O is the origin) is given as $\overrightarrow{OP} = (e^t + e^{-t})\vec{a} + (e^t - e^{-t})\vec{b}$. If the least distance of P from origin is $\sqrt{2}\sqrt{\sqrt{a} - b}$ where a, b ∈ N then find the value of (a + b).

a) 165   b) 488   c) 485   d) 450

Q65 If the points with vectors $\alpha\hat{i} + 10\hat{j} + 13\hat{k}, 6\hat{i} + 11\hat{j} + 11\hat{k}, \frac{9}{2}\hat{i} + \beta\hat{j} - 8\hat{k}$ are collinear, then $(19\alpha - 6\beta)^2$ is equal to

a) 36   b) 16   c) 25   d) 49

Q66 If $\lim\limits_{x \to 0} \dfrac{e^{ax} - \cos(bx) - \dfrac{cxe^{-cx}}{2}}{1 - \cos(2x)} = 17$, then $5a^2 + b^2$ is equal to ____.

a) 72   b) 76   c) 68   d) 64

Q67 Let R = {a, b, c, d, e} and S = {1, 2, 3, 4}. Total number of onto function f : R → S such that f(a) ≠ 1, is equal to _____.

a) 175   b) 185   c) 172   d) 180

Q68 If in the expansion of $\left(x^3 - \dfrac{2}{\sqrt{x}}\right)^n$ a term like x^2 exists and 'n' is a double digit number, then least value of 'n' is -

a) 10   b) 11   c) 12   d) 13

Q69 If the system of linear equations 2x − 3y = γ + 5, αx + 5y = β +1, where α, β, γ ∈ **R** has infinitely many solutions, then the value of |9α + 3β + 5γ| is equal to

a) 50   b) 52   c) 54   d) 58

Q70 A running track of 440 ft. is to be laid out enclosing a football field, the shape of which is a rectangle with a semi-circle at each end. If the area of the rectangular portion is to be maximum then the lengths of its sides are -

a) 110, 70   b) 130, 50   c) 120, 60   d) None

Numerical

Q71 The number of terms common to the two A.P.'s 3, 7, 11,……..407 and 2 , 9,16,……..709 is

Q72 If $\left(\dfrac{1+i}{1-i}\right)^{m/2} = \left(\dfrac{1+i}{i-1}\right)^{n/3} = 1$, (m, n ∈ N) Then the greatest common divisor of the least values of m and n is _____.

Q73 The probability of a man hitting a target is $1/10$. The least number of shots required, so that the probability of his hitting the target at least once is greater than $1/4$, is_____.

Q74 A circle passing through the point $P(\alpha, \beta)$ in the first quadrant touches the two coordinate axes at the points A and B. The point P is above the line AB. The point Q on the line segment AB is the foot of perpendicular from P on AB. If PQ is equal to 11 units, then the value of $\left(\dfrac{\alpha\beta-1}{2} \right)$ is_____.

Q75 Let the solution curve $x = x(y)$, $0 < y < \dfrac{\pi}{2}$, of the differential equation

$(\log_e(\cos y))^2 \cos y \, dx - (1 + 3x \log_e(\cos y)) \sin y \, dy = 0$ satisfy $x\left(\dfrac{\pi}{3}\right) = \dfrac{1}{2\log_e 2}$. If

$x\left(\dfrac{\pi}{6}\right) = \dfrac{1}{\log_e m - \log_e n}$, where m and n are co-prime, then mn is equal to

Answer Key

Que.	1	2	3	4	5	6	7	8	9	10
Ans.	**B**	**C**	**C**	**A**	**B**	**B**	**D**	**C**	**C**	**C**
Que.	11	12	13	14	15	16	17	18	19	20
Ans.	**C**	**D**	**C**	**D**	**A**	**B**	**C**	**D**	**A**	**C**
Que.	21	22	23	24	25	26	27	28	29	30
Ans.	**133**	**3**	**1**	**7**	**20**	**B**	**C**	**C**	**B**	**D**
Que.	31	32	33	34	35	36	37	38	39	40
Ans.	**A**	**D**	**B**	**A**	**C**	**A**	**C**	**B**	**D**	**B**
Que.	41	42	43	44	45	46	47	48	49	50
Ans.	**C**	**C**	**C**	**A**	**D**	**5**	**9**	**4**	**5**	**5**
Que.	51	52	53	54	55	56	57	58	59	60
Ans.	**C**	**D**	**D**	**C**	**B**	**C**	**B**	**C**	**B**	**B**
Que.	61	62	63	64	65	66	67	68	69	70
Ans.	**B**	**B**	**C**	**B**	**A**	**C**	**D**	**A**	**D**	**A**
Que.	71	72	73	74	75					
Ans.	**14**	**4**	**3**	**60**	**12**					