Competishun

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

Date: 16/12/2024

Time: 3 hours **Max. Marks:** 300

UTS-1_MT-10 (24-25)

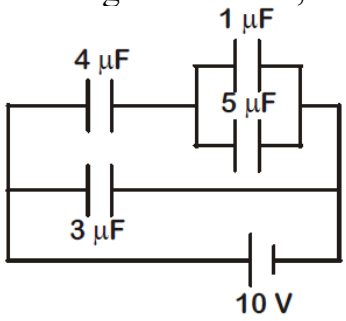
Physics

Single Choice Question

Q1 The impedance of a series RL circuit is same as the series RC circuit when connected to the same AC source separately keeping the same resistance. The frequency of the source is

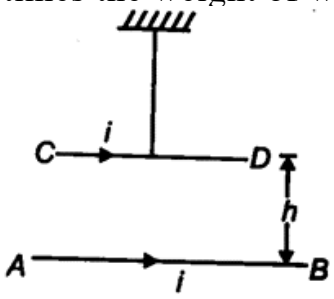
a) $\frac{1}{\sqrt{LC}}$ **b)** $\frac{1}{2\pi\sqrt{LC}}$ **c)** $\frac{R}{L}$ **d)** $\frac{1}{RC}$

Q2 In the given circuit, the charge on 4 μF capacitor will be



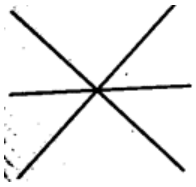
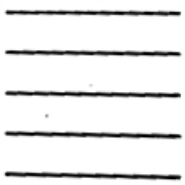
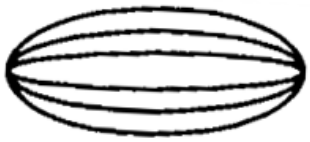
a) 5.4 μC **b)** 9.6 μC **c)** 13.4 μC **d)** 24 μC

Q3 In the arrangement shown, AB is a fixed current carrying long wire. Wire CD is held stationary with the help of an ideal string in gravity. If tension in the string is two times the weight of wire CD, mass per unit length of wire CD is



a) $\frac{\mu_0 i^2}{2\pi hg}$ **b)** $\frac{\mu_0 i^2}{4\pi hg}$ **c)** $\frac{\mu_0 i^2}{\pi hg}$ **d)** $\frac{\mu_0 i^2}{2hg}$

Q4 Which of the following represents the equipotential lines/surfaces of a dipole?

a)  **b)**  **c)**  **d)** 

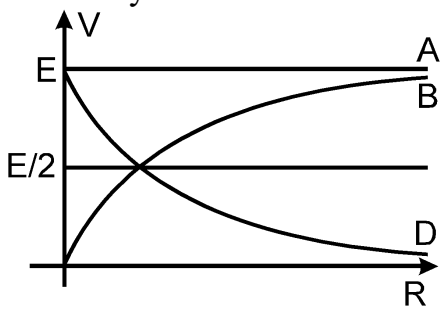
Q5 Two particles are moving towards each other along a line joining them, so that their centre of mass does not move. After elastic collision between them,

a) their centre of mass will move **b)** their velocities will not change

c) their speeds will not change

d) their velocities will not change only if they have equal mass

Q6 A cell of emf E having an internal resistance ' r ' is connected to a variable external resistance R. The potential difference ' v ' across the resistance R varies with R as shown by the curve:



a) A **b)** B **c)** C **d)** D

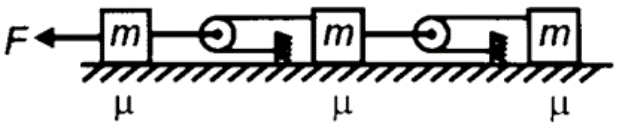
Q7 Let K_1 be the maximum kinetic energy of photoelectrons emitted by a light of wavelength λ_1 and K_2 corresponding to λ_2. If $\lambda_1 = 2\lambda_2$ then.

a) $K_1 < \frac{K_2}{2}$ **b)** $K_1 > 2K_2$ **c)** $2K_1 = K_2$ **d)** $K_1 = 2K_2$

Q8 Two beams of light having intensities 4I and 9I interfere to produce an interference pattern on a screen. The phase difference between the beams is $\frac{\pi}{2}$ at point A and π at point B. Then the difference between the resultant intensities at points A and B on the screen is

a) 12 I **b)** 6 I **c)** 9 I **d)** 8 I

Q9 On a table, three blocks (including the first block) are placed as shown in the figure. Mass of each block is m and coefficient of friction for each block is μ. A force F is applied on the first block so as to move the system. The minimum value of F should be

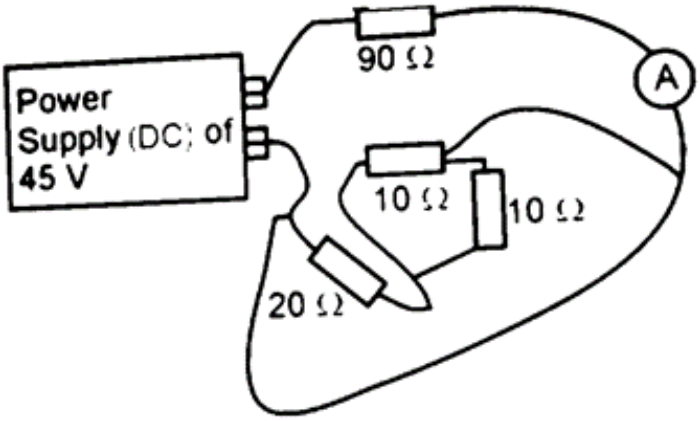


a) 8 μmg **b)** 9 μmg **c)** 7 μmg **d)** 5 μmg

Q10 A simple pendulum of length ℓ is hanging from ceiling of an elevator moving up with a constant velocity v. The time period of simple pendulum is

a) $T = 2\pi\sqrt{\frac{\ell}{g}}$ **b)** $T = 2\pi\sqrt{\frac{\ell}{g+v}}$ **c)** $T = 2\pi\sqrt{\frac{v\ell}{g}}$ **d)** $T = 2\pi\sqrt{\frac{\ell}{v}}$

Q11 What will the ideal ammeter read for the circuit shown here?



a) 0.5 A **b)** $\frac{45}{130}$ A **c)** $\frac{45}{94}$ A **d)** $\frac{9}{23}$ A

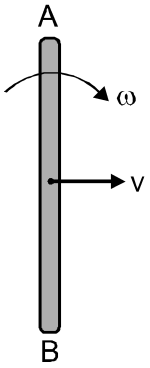
Q12 Instantaneous displacement current of 1.0 A in the space between the parallel plates of 1μF capacitor can be established by changing potential difference of:

a) 10^{-6} V/s **b)** 10^{6} V/s **c)** 10^{-8} V/s **d)** 10^{8} V/s

Q13 The energy spectrum of a black body exhibits maximum around a wavelength λ_0. The temperature of the black body is now changed such that the energy is maximum around a wavelength $\frac{3\lambda_0}{4}$. The power radiated by the black body will now increase by a factor of

a) $\frac{256}{81}$ **b)** $\frac{64}{27}$ **c)** $\frac{16}{9}$ **d)** $\frac{4}{3}$

Q14 A metal rod of length ℓ, moving with an angular velocity ω and velocity of its centre is v. Find potential difference between points A and B at the instant shown in figure. A uniform magnetic field of strength B exist perpendicular to plane of paper :



a) $B v \ell$ **b)** $B v \ell + \frac{1}{2} B \omega \ell^2$ **c)** $B \omega \ell - \frac{1}{2} B \omega \ell^2$ **d)** $B v \ell + B \omega \left(\frac{\ell}{2}\right)^2$

Q15 A pressure-pump has a horizontal tube of cross-sectional area 10 cm^2 for the outflow of water at a speed of 20 m/s. The force exerted on the vertical wall just in front of the tube which stops water horizontally flowing out of the tube, is: [given : density of water = 1000 kg/m^3]

a) 300 N **b)** 500 N **c)** 250 N **d)** 400 N

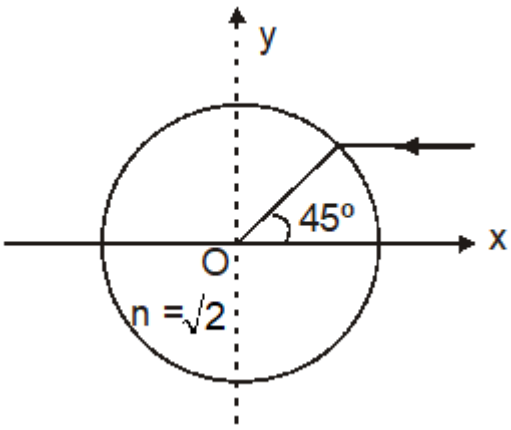
Q16 Pressure gradient in the horizontal direction in a static fluid is represented by (z–direction is vertically upwards, and x-axis is along horizontal,d is density of fluid) :

a) $\frac{\partial p}{\partial z} = -dg$ **b)** $\frac{\partial p}{\partial x} = dg$ **c)** $\frac{\partial p}{\partial x} = 0$ **d)** $\frac{\partial p}{\partial z} = 0$

Q17 A vernier calliper has 20 divisions on the vernier scale, which coincide with 19 on the main scale. The least count of the instrument is 0.1 mm. The main scale divisions are of-

a) 0.5 mm **b)** 1 mm **c)** 2 mm **d)** 1/4 mm

Q18 A light ray parallel to x-axis is incident on a transparent sphere of refreactive index $\sqrt{2}$ as shown in figure. Then unit vector in the direction of emergent ray is-



a) $-\hat{j}$ **b)** $-\frac{1}{\sqrt{2}}\hat{i} - \frac{1}{\sqrt{2}}\hat{j}$ **c)** $-\frac{1}{2}\hat{i} - \frac{\sqrt{3}}{2}\hat{j}$ **d)** $-\frac{\sqrt{3}}{2}\hat{i} - \frac{1}{2}\hat{j}$

Q19 A satellite is in a circular orbit around the earth has kinetic energy E_k. Minimum amount of energy that is added so that it escapes the earth's gravitational field is:

a) E_k **b)** $E_k/2$ **c)** $E_k/4$ **d)** $2\ E_k$

Q20 A ideal gas is expanded to double its volume by two different process. One is isobaric and the other is isothermal. Let W_1 and W_2 be the respective work done, then :

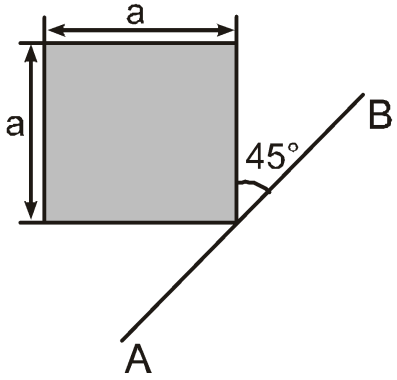
a) $W_2 = W_1\ \text{In}\ (2)$ **b)** $W_2 = \dfrac{W_1}{\text{In}\ (2)}$ **c)** $W_2 = \dfrac{W_1}{2}$ **d)** $W_1 = \dfrac{W_2}{2}$

Numerical

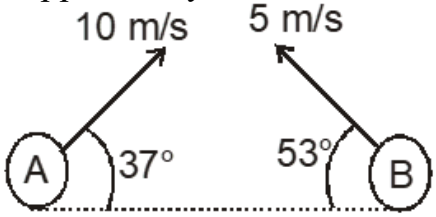
Q21 In Bohr's atomic model, the electron is assumed to revolve in a circular orbit of radius 0.5 Å. If the speed of electron is 2.2×16^6 m/s, then the current associated with the electron will be _____ $\times 10^{-2}$ mA. [Take π as $\frac{22}{7}$]

Q22 In the resonance tube experiment, first resonant length is ℓ_1 and the second resonant length is ℓ_2 , then the third resonant length is n ℓ_2 – m ℓ_1, find (m + n).

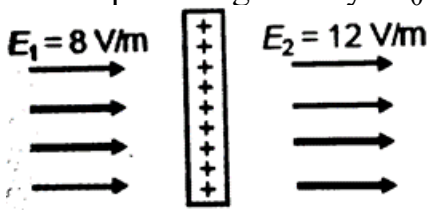
Q23 Find the moment of inertia (in kg.m^2) of a thin uniform square sheet of mass M = 3kg and side a = 2m about the axis AB which is in the plane of sheet :



Q24 Two stones are in the same horizontal line and are $50\sqrt{5}$ m away. They are projected with a velocity of 10 m/s and 5 m/s. respectively and with an angle of 37° and 53° with horizontal respectively. Find the minimum distance between them in meters. Suppose they don't strike the ground during the motion. (take g = 10m/s^2)



Q25 The net electric field on two sides of an infinite sheet is shown in the figure. Assuming that sheet is placed in a uniform electric field. The surface charge density on the plate is given by $n\varepsilon_0$. Value of n is _____.



Chemistry

Single Choice Question

Q26 If isotopic distribution of C^{12} and C^{14} is 98.0% and 2.0%, respectively, then the number of C^{14} atoms in 12 g of carbon is

a) 1.032×10^{22} **b)** 1.20×10^{22} **c)** 5.88×10^{23} **d)** 6.02×10^{23}

Q27 The correct order for the wavelength of absorption in the visible region is :

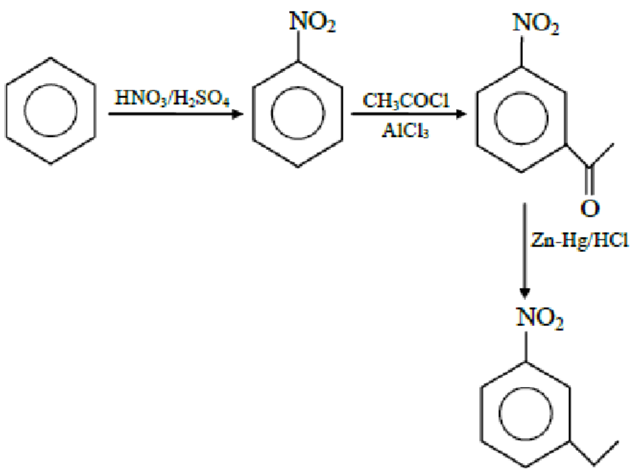
a) $[Ni(NO_2)_6]^{4-} < [Ni(NH_3)_6]^{2+} < [Ni(H_2O)_6]^{2+}$

b) $Ni(NO_2)_6]^{4-} < [Ni(H_2O)_6]^{2+} < [Ni(NH_3)_6]^{2+}$

c) $[Ni(H_2O)_6]^{2+} < [Ni(NH_3)_6]^{2+} < [Ni(NO_2)_6]^{4-}$

d) $[Ni(NH_3)_6]^{2+} < [Ni(H_2O)_6]^{2+} < [Ni(NO_2)_6]^{4-}$

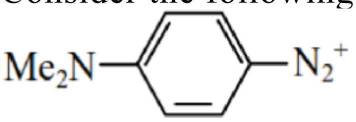
Q28



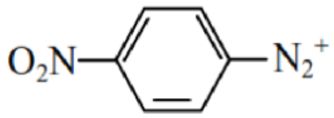
Which step is wrong in above synthesis ?

a) (i) **b)** (ii) **c)** (iii) **d)** None

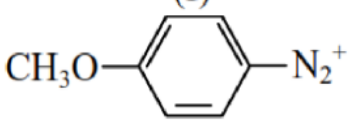
Q29 Consider the following diazonium ions :



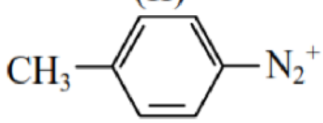
(I)



(II)



(III)



(IV)

The order of reactivity towards diazo-coupling with phenol in the presence of dil. NaOH is –

a) I < IV < II < III **b)** I < III < IV < II **c)** III < I < II < IV **d)** III < I < IV < II

Q30 Which of the following statement is correct regarding following process?

(i) $Cl \xrightarrow{E.A.} Cl^-$ (ii) $Cl^- \xrightarrow{I.E.} Cl$ (iii) $Cl \xrightarrow{I.E.} Cl^+$ (iv) $Cl^+ \xrightarrow{I.E.} Cl^{2+}$

a) | I.E. of process (ii) |=| E.A. of process (i) |

b) | I.E. of process (iii) |=|I.E. of process (ii) |

c) | I.E. of process (iv) |=|E.A. of process (i) |

d) | I.E. of process (iv) |=|I.E. of process (iii) |

Q31 In chromyl chloride, the number of d-electrons present on chromium is same as in (Given atomic no. of Ti : 22, V : 23, Cr : 24, Mn : 25, Fe : 26)

a) Ti (III) **b)** Fe (III) **c)** V (IV) **d)** Mn (VII)

Q32 If equivalent conductance of 1M benzoic acid is 12.8 $ohm^{-1}\ cm^2\ eq^{-1}$ and if the conductance of benzoate ion and H^+ ion are 42 and 288.42 $ohm^{-1}\ cm^2\ eq^{-1}$ respectively. its degree of dissociation is

a) 39% **b)** 3.9% **c)** 0.35% **d)** 0.039%

Q33 What is $[H^+]$ of a solution that is 0.01 M in HCN and 0.02 M in NaCN (K_a for HCN = 6.2×10^{-10})

a) 3.1×10^{10} **b)** 6.2×10^{5} **c)** 6.2×10^{-10} **d)** 3.1×10^{-10}

Q34

Cis-butene dioic acid $\overset{K_{a_1}(-H^+)}{\rightleftharpoons} X_1^- \overset{K_{a_2}(-H^+)}{\rightleftharpoons} X_2^{2-}$

Trans-butene dioic acid $\overset{K_{a_1}(-H^+)}{\rightleftharpoons} Y_1^- \overset{K_{a_2}'(-H^+)}{\rightleftharpoons} Y_2^{2-}$

The incorrect statement regarding above information is:

a) X_2^{2-} species is more basic than Y_2^{2-} species

b) X_1^- species is more basic than Y_1^- species **c)** K_{a_1} is greater than K_{a_1}'

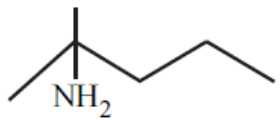
d) K_{a_2}' is greater than K_{a_2}'

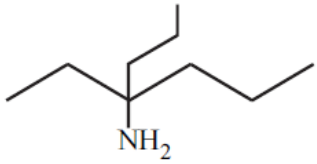
Q35 The electron gain enthalpy (in kJ/mol) of fluorine, chlorine, bromine and iodine, respectively, are :

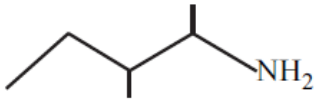
a) –296, –325, –333 and –349 **b)** –333, –325, –349 and –296

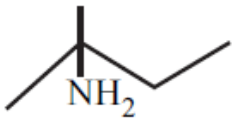
c) –349, –333, –325 and –296 **d)** –333, –349, –325 and –296

Q36 A primary amine on treatment with $NaNO_2$/HCl gives alcohol which on dehydration followed by ozonolysis gives two compounds. One of them gives +ve iodoform test but negative tollen's test whiles other gives +ve tollen's test but negative iodoform test. If alcohol does not produce any colour in victor maeyer test then structure of amine will be :

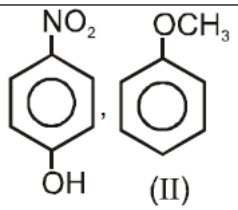
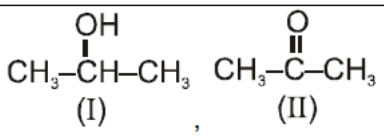
a) 

b) 

c) 

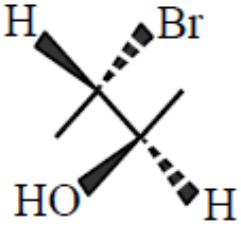
d) 

Q37 Match the compounds of column-I with the reagent of column-II, which can distinguish between the compounds of column-I.

	Column-I		Column-II
(P)	$CH_3–C\equiv C–H$ (I), $CH_3–CH=O$ (II)	(1)	Tollen's reagent
(Q)	 (I), (II)	(2)	Lucas reagent
(R)	 (I), (II)	(3)	Neutral $FeCl_3$

a) P–3; Q–2; R–1 **b)** P–1; Q–2; R–3 **c)** P–2; Q–1; R–3 **d)** P–1; Q–3; R–2

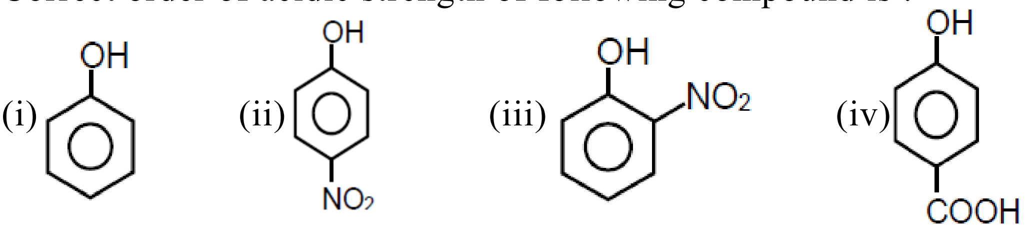
Q38 The correct IUPAC name of the compound is



a) (2R, 3R)-3-Bromo-2-butanol **b)** (2R, 3S)-3-Bromo-2-hydroxybutane

c) (2R, 3S)-3-Bromo-2-butanol **d)** (2S, 3R)-2-Bromo-3-butanol

Q39 Correct order of acidic strength of following compound is :

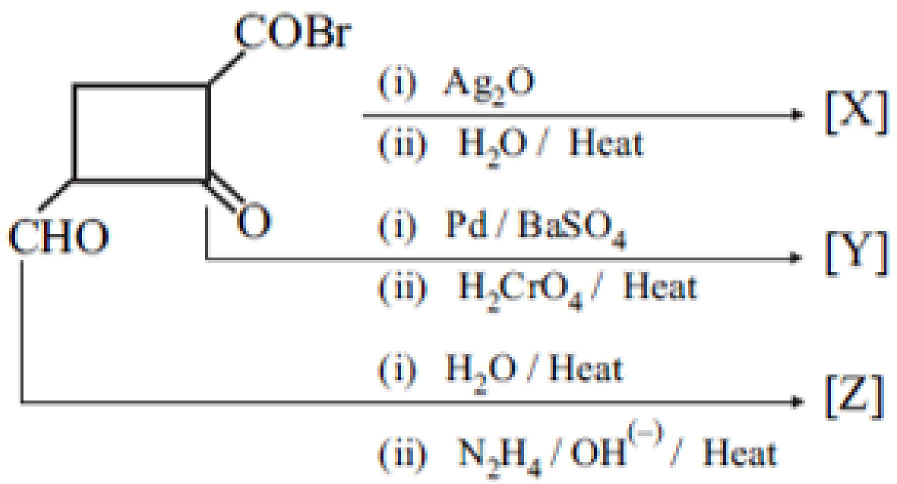


a) iv > ii > iii > i **b)** iii > ii > iv > i **c)** iv > iii > ii > i **d)** ii > iii > iv > i

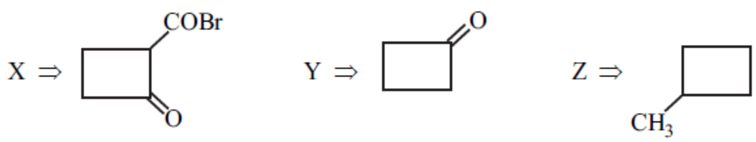
Q40 A doctor by mistake administers a $Ba(NO_3)_2$ solution to a patient for radiography investigations. Which of the following should be given as the best to prevent the absorption of soluble barium?

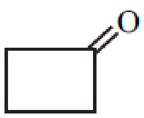
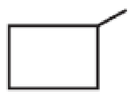
a) NaCl **b)** Na_2SO_4 **c)** Na_2CO_3 **d)** NH_4Cl

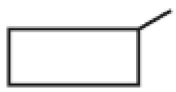
Q41



a)



b) X & Y are  & Z is 

c) X, Y & Z all are 

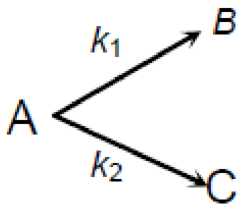
d) $X = Z \neq Y$

Q42 The acid D obtained through the following sequence of reactions is

$$C_2H_5Br \xrightarrow{\text{Alc.KOH}} A \xrightarrow[CCl_4]{Br_2} B \xrightarrow[\text{(excess)}]{\text{KCN}} C \xrightarrow{H_3O^+} D$$

a) Succinic acid **b)** Malonic acid **c)** Maleic acid **d)** Oxalic acid

Q43 A Substance undergoes first order decomposition. The decomposition follows two parallel first orderreactions as



$k_1 = 1.26 \times 10^{-4}\ s^{-1}$

$k_2 = 3.8 \times 10^{-5}\ s^{-1}$

The percentage distribution of B and C are

a) 75% B and 25% C **b)** 80% B and 20% C **c)** 60% B and 40% C
d) 76.83% B and 23.17% C

Q44

$$CH_3CH_2C \equiv CH \xrightarrow[\text{(ii) EtBr}]{\text{(i) NaNH}_2} \xrightarrow{H_2/Pd/BaSO_4} \xrightarrow[\text{ice cold}]{MnO_4^{(-)}}$$

Final product of this reaction

a) is optically active **b)** contain three chiral 'C' atoms **c)** is optically inactive
d) is a racemic mixture

Q45 Consider the following reaction,

$$\text{Ethanol} \xrightarrow{PBr_3} X \xrightarrow{\text{alc.KOH}} Y \xrightarrow[\text{(ii)}H_2O\text{,heat}]{\text{(i)}H_2SO_4\text{,roomtemperature}} Z,$$

the product Z, is

a) $CH_2{=}CH_2$ **b)** $CH_3CH_2OCH_2CH_3$ **c)** $CH_3CH_2OSO_3H$ **d)** CH_3CH_2OH

Numerical

Q46 C_6H_6 freezes at 5.5°C. The temperature at which a solution 10 g of C_4H_{10} in 200 g of C_6H_6 freeze is ________ °C. (The molal freezing point depression constant of C_6H_6 is 5.12°C/m.) (Rounded off to the nearest integer)

Q47 Assuming ideal behaviour, the magnitude of log K for the following reaction at 25°C is x × 10^{-1}. The value of x is ________. (Integer answer)

$$3HC \equiv CH_g \rightleftharpoons C_6H_{6(\ell)}$$

[Given: $\Delta_f G^\circ$ (HC ≡ CH) = –2.04 × 10^5 J mol^{-1}; $\Delta_f G^\circ(C_6H_6)$ = –1.24 × 10^5 J mol^{-1}; R = 8.314 J K^{-1} mol^{-1}]

Q48 Number of amphoteric compound among the following is ___________

(i) BeO (ii) BaO (iii) $Be(OH)_2$ (iv) $Sr(OH)_2$

Q49 A proton and a Li^{3+} nucleus are accelerated by the same potential. If λ_{Li} and λ_P denote the de Broglie wavelengths of Li^{3+} and proton respectively, then the value of $\frac{\lambda_{Li}}{\lambda_P}$ is x $\times 10^{-1}$. The value of x is ____.
(Rounded off to the nearest integer)
(Mass of Li^{3+} = 8.3 mass of proton)

Q50 Gaseous cyclobutene isomerizes to butadiene in a first order process which has a 'k' value of $3.3 \times 10^{-4} s^{-1}$ at 153°C. The time in minutes it takes for the isomerization to proceed 40 % to completion at this temperature is _____.
(Rounded off to the nearest integer)

Mathematics

Single Choice Question

Q51 The integral $\int \cos(\log_e x)dx$ is equal to (where C is a constant of integration)

a) $x[\cos(\log_e x) - \sin(\log_e x)] + C$

b) $\frac{x}{2}[\cos(\log_e x) + \sin(\log_e x)] + C$

c) $\frac{x}{2}[\sin(\log_e x) - \cos(\log_e x)] + C$

d) $x[\cos(\log_e x) + \sin(\log_e x)] + C$

Q52 If $a^2 + b = 2$ then maximum value of term independent of x in expression of $(ax^{1/6} + bx^{-1/3})^9$ $(a > 0, b > 0)$ is $9^k + k + 1$, then value of k is

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

Q53 If a, b, c are distinct odd integers and ω is non real cube root of unity and minimum value of $|a\omega^2 + b + c\omega|$ is k, then value of k^2 is

a) 12 b) 10 c) 14 d) 8

Q54 Let two points be A(1, –1) and B(0, 2). If a point $P(x', y')$ be such that the area of ΔPAB = 5 sq. units and it lies on the line, $3x + y - 4\lambda = 0$, then a value of λ is

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

Q55 If a, b, c are distinct & rational numbers then

$$\begin{vmatrix} (a^2+b^2+c^2) & ab+bc+ca & ab+bc+ac \\ ab+bc+ca & (a^2+b^2+c^2) & (bc+ca+ab) \\ ab+bc+ca & (ab+bc+ca) & (a^2+b^2+c^2) \end{vmatrix}$$

is always :-

a) Zero b) Rational & Positive c) Rational & Negative d) Irrational and Positive

Q56 If $\sum_{i=1}^{5} x_i^2 = 40$ & $\sum_{j=6}^{10} x_j^2 = 20$ and mean of $x_1, x_2, ...x_5$, is 1 and mean of $x_6, x_7, ...\ x_{10}$ is 2 then variance of $x_1, x_2, ...\ x_{10}$ is

a) $\frac{13}{4}$ b) $\frac{15}{4}$ c) $\frac{17}{4}$ d) $\frac{19}{4}$

Q57 Considering only the principal values of the inverse trigonometric functions, the domain of the function $f(x) = \cos^{-1}\left(\frac{x^2-4x+2}{x^2+3}\right)$ is :

a) $\left(-\infty, \frac{1}{4}\right]$ b) $\left[-\frac{1}{4}, \infty\right)$ c) $\left(-\frac{1}{3}, \infty\right)$ d) $\left(-\infty, \frac{1}{3}\right]$

Q58 Let S be the set of points where the function, $f(x)=\left|2-\left|x-3\right|\right|, x \in R$, is not differentiable. Then $\sum_{x \in S} f(f(x))$ is equal to_____.

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

Q59 Let $f(x) = e^x - x$ and $g(x) = x^2 - x$, $\forall x \in R$. Then the set of all $x \in R$, where the function $h(x) = (fog)(x)$ is increasing, is :

a) $\left[-1, \frac{-1}{2}\right] \cup \left[\frac{1}{2}, \infty\right)$ **b)** $[0, \infty)$ **c)** $\left[0, \frac{1}{2}\right] \cup [1, \infty)$ **d)** $\left[\frac{-1}{2}, 0\right] \cup [1, \infty)$

Q60 Let S be the set of all values of λ, for which the shortest distance between the line $\frac{x-\lambda}{0} = \frac{y-3}{4} = \frac{z+6}{1}$ and $\frac{x+\lambda}{3} = \frac{y}{-4} = \frac{z-6}{0}$ is 13. Then $8\left|\sum_{\lambda \in S} \lambda\right|$ is equal to -

a) 304 **b)** 308 **c)** 306 **d)** 302

Q61 The sum of the abosolute maximum and minimum values of the function $f(x) = |x^2 - 5x + 6| - 3x + 2$ in the interval $[-1, 3]$ is equal to :

a) 12 **b)** 15 **c)** 8 **d)** 10

Q62 Let $\vec{a}, \vec{b}$ and $\vec{c}$ be three unit vectors such that $|\vec{a} - \vec{b}|^2 + |\vec{a} - \vec{c}|^2 = 8$ Then $|\vec{a} + 2\vec{b}|^2 + |\vec{a} + 2\vec{c}|^2$ is equal to

a) 4 **b)** 2 **c)** 8 **d)** 6

Q63 If the order of the differential equation of the family of circles touching the x-axis at the origin is k, then 2k is equal to.

a) 2 **b)** 6 **c)** 3 **d)** 4

Q64 The area bounded by $y = xe^{|x|}$ and the lines $|x| = 1, y = 0$ is

a) 4 sq unit **b)** 6 sq units **c)** 1 sq unit **d)** 2 sq units

Q65 Let λ be number of points with integral coordinates lying inside the circle $x^2 + y^2 = 36$, then $\lambda =$

a) 110 **b)** 109 **c)** 120 **d)** 115

Q66 Let $E_1 : \frac{x^2}{a^2} + \frac{y^2}{b^2} = 1 a > b$. Let E_2 be another ellipse such that it touches the end points of major axis of E_1 and the foci of E_2 are the end points of minor axis of E_1. If E_1 and E_2 have same eccentricities, then its value is :

a) $\frac{-1+\sqrt{5}}{2}$ **b)** $\frac{-1+\sqrt{8}}{2}$ **c)** $\frac{-1+\sqrt{3}}{2}$ **d)** $\frac{-1+\sqrt{6}}{2}$

Q67 If P is a point on the parabola $y = x^2 + 4$ which is closest to the straight line $y = 4x - 1$, then the coordinates of P are :

a) $(3,13)$ b) $(1,5)$ c) $(-2,8)$ d) $(2,8)$

Q68 'A' throws a fair coin 3 times whereas 'B' throws the same coin 4 times. The probability that they get equal number of heads is

a) $\frac{23}{128}$ b) $\frac{35}{128}$ c) $\frac{25}{128}$ d) $\frac{17}{128}$

Q69 If A and B are two sets such that $A = \{1, 2, x\}$, $B = \{3, 4, y\}$ and $\{1,3\} \times \{2,4\} \subseteq A \times B$ then the value of $x + y$ is

a) 7 b) 2 c) 5 d) 4

Q70 $\lim_{x \to 0} \left[\min\left(y^2 - 4y + 11\right) \frac{\sin x}{x} \right]$ is equal to (where [.] denotes the greatest integer function) is :-

a) 2 b) 4 c) 6 d) 8

Numerical

Q71 Let a,b,c,d be four distinct real numbers in A.P. Find the smallest positive value of k satisfying $2(a - b) + k(b - c)^2 + (c - a)^3 = 2(a - d) + (b - d)^2 + (c - d)^3$.

Q72 A committee of 6 members is to be chosen from among 5 democrats and 3 republicians so that atleast two members of each party serve on the committee. Number of possible ways it can be done, is

Q73 Let S be the set which contains all possible values of l,m,n,p,q,r for which

$$A = \begin{bmatrix} l^2 - 3 & p & 0 \\ 0 & m^2 - 8 & q \\ r & 0 & n^2 - 15 \end{bmatrix}$$

be a non-singular idempotent matrix. Find the absolute value of sum of the products of elements of the set S taken two at a time.

Q74 If a and b are the roots of equation $x^2 - 7x - 1 = 0$, then the value of $\frac{a^{21} + b^{21} + a^{17} + b^{17}}{a^{19} + b^{19}}$ is equal to _______.

Q75 Let $\underset{0 \le x \le 2}{\text{Max}} \left\{ \frac{9 - x^2}{5 - x} \right\} = \alpha$ and $\underset{0 \le x \le 2}{\text{Max}} \left\{ \frac{9 - x^2}{5 - x} \right\} = \beta$

If $\int_{\beta - \frac{8}{3}}^{2\alpha - 1} \text{Max}\left\{ \frac{9 - x^2}{5 - x}, x \right\} dx = \alpha_1 + \alpha_2 \log_e\left(\frac{8}{15}\right)$ then $\alpha_1 + \alpha_2$ is equal to _______

Answer Key

Que.	1	2	3	4	5	6	7	8	9	10
Ans.	**B**	**D**	**A**	**D**	**C**	**B**	**A**	**A**	**C**	**A**
Que.	11	12	13	14	15	16	17	18	19	20
Ans.	**A**	**B**	**A**	**A**	**D**	**C**	**C**	**D**	**A**	**A**
Que.	21	22	23	24	25	26	27	28	29	30
Ans.	**112**	**3**	**7**	**20**	**4**	**B**	**A**	**B**	**B**	**A**
Que.	31	32	33	34	35	36	37	38	39	40
Ans.	**D**	**B**	**D**	**B**	**D**	**A**	**D**	**C**	**A**	**B**
Que.	41	42	43	44	45	46	47	48	49	50
Ans.	**B**	**A**	**D**	**C**	**D**	**1**	**855**	**2**	**2**	**26**
Que.	51	52	53	54	55	56	57	58	59	60
Ans.	**B**	**B**	**A**	**B**	**B**	**B**	**B**	**A**	**C**	**C**
Que.	61	62	63	64	65	66	67	68	69	70
Ans.	**D**	**B**	**A**	**D**	**B**	**A**	**D**	**B**	**C**	**C**
Que.	71	72	73	74	75					
Ans.	**16**	**25**	**29**	**51**	**34**					