Competishun

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

Date: 10/01/2025
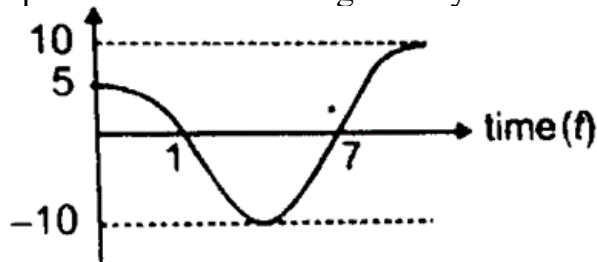**Time:** 3 hours   **Max. Marks:** 300

$$\boxed{\textbf{UTS-1-MT-17\_(24-25)}}$$

Physics

Single Choice Question

Q1 Displacement-time graph of particle executing S.H.M. is shown in the figure. The equation of S.H.M. is given by

a) $x = 10\sin\left(\frac{\pi t}{2} + \frac{5\pi}{6}\right)$

b) $x = 10\sin\left(\frac{\pi t}{6} + \frac{5\pi}{6}\right)$

c) $x = 10\sin\left(\frac{\pi t}{6} + \frac{\pi}{6}\right)$

d) $x = 10\sin\left(\frac{\pi t}{3} + \frac{\pi}{6}\right)$

Q2 An ac voltage source $V = V_0 \sin \omega t$ is connected across resistance R and capacitance C as shown in figure. It is given that $R = \dfrac{1}{\omega C}$. The peak current is I_0. If the angular frequency of the voltage source is changed to $\dfrac{\omega}{\sqrt{3}}$ then the new peak current in the circuit is :
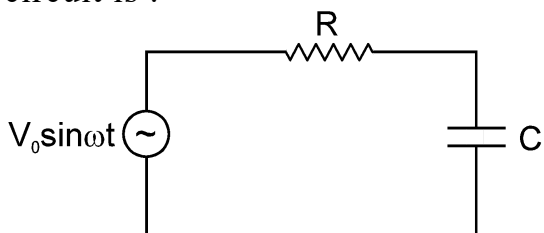
a) $\dfrac{I_0}{2}$ b) $\dfrac{I_0}{\sqrt{2}}$ c) $\dfrac{I_0}{\sqrt{3}}$ d) $\dfrac{I_0}{3}$

Q3 A man of mass m on an initially stationary boat gets off the boat by jumping to the left in an exactly horizontal direction. Immediately after the jump, the boat of mass M, is observed to be moving to the right at speed v. How much work did the man do during the jump (both on his own body and on the boat)?

a) $\dfrac{1}{2}(M+m)v^2$

b) $\dfrac{1}{2}\left(M+\dfrac{M^2}{m}\right)v^2$

c) $\dfrac{1}{2}\left(\dfrac{M\ m}{M+m}\right)v^2$

d) None of these

**Q4** A thin rod of negligible mass and area of cross-section 2×10^{-6} m^2, suspended vertically from one end, has a length of 0.5 m at 200^0C. The rod is cooled to 0^0C, but prevented from contracting by attaching a mass at the lower end. The value of this mass is : (Young's modulus = 10^{11} N/m^2, Coefficient of linear expansion 10^{-5} K^{-1} and g = 10 m/s^2) :

a) 20 kg

b) 30 kg

c) 40 kg

d) 50 kg

Q5 A soap bubble (surface tension = T) is charged to a maximum surface density of charge = σ, when it is just going to burst. Its radius R is given by:

a) $R = \dfrac{\sigma^2}{8\ \varepsilon_0\ T}$

b) $R = 8\varepsilon_0\dfrac{T}{\sigma^2}$

c) $R = \dfrac{\sigma}{\sqrt{8\ \varepsilon_0\ T}}$

d) $R = \dfrac{\sqrt{8\ \varepsilon_0\ T}}{\sigma}$

Q6 Consider a straight wire AB carrying a current i from B to A. Consider a small segment of this wire which subtends a small angle dθ (in degrees) at the point P as shown in the figure. The magnetic field produced by this small segment at the point P is: (current i is in ampere, a is in metres and the angles in degrees)
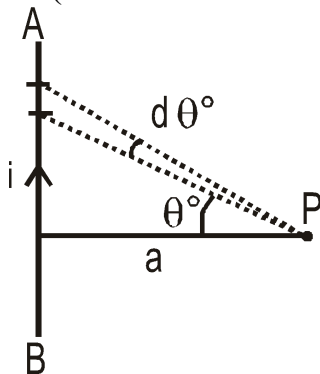

a) $\dfrac{\mu_0 i\cos\theta\, d\theta}{720a}$

b) $\dfrac{\mu_0 i\sin\theta\, d\theta}{4\pi a}$

c) $\dfrac{\mu_0 i\sin\theta\, d\theta}{72a}$

d) $\dfrac{\mu_0}{4\pi}\dfrac{i\cos\theta}{a}d\theta$

**Q7** A plane electromagnetic wave, has frequency of 2.0×10^{10} Hz and its energy density is 1.02×10^{-8} J/m^3 in vacuum. The amplitude of the magnetic field of the wave is close to $\left(\dfrac{1}{4\pi\varepsilon_0} = 9 \times 10^9\ \dfrac{Nm^2}{C^2}\right)$ and speed of light = 3×10^8 ms^{-1})

a) 190 nT

b) 160 nT

c) 150 nT

d) 180 nT

Q8 A U-tube of uniform cross-section as shown in figure is partially filled with a liquid I. Another liquid II which does not mix with liquid I is poured into one side. It is found that the liquid levels of the two sides of the tube are the same, while the level of liquid I has risen by 2 cm. If the specific gravity of liquid I is 1.1, the specific gravity of liquid II must be
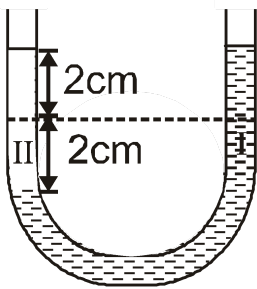

a) 1.12   **b)** 1.1   **c)** 1.05   **d)** 1.0

Q9 Radiation of two photons having energies twice and five times the work function of metal are incident successively on metal surface. The ratio of the maximum velocity of photoelectrons emitted in two cases will be

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

Q10 Consider a solid sphere of density ρ and radius 4R. Centre of the sphere is at origin. Two spherical cavities centred at (2R, 0) and (–2R, 0) are created in sphere. Radii of both cavities is R. In left cavity material of density 2ρ is filled while second cavity is kept empty. What is gravitational field at origin.
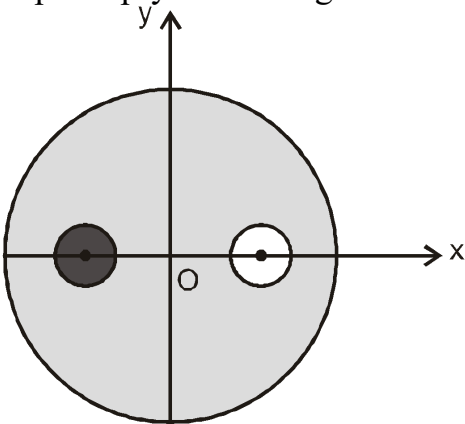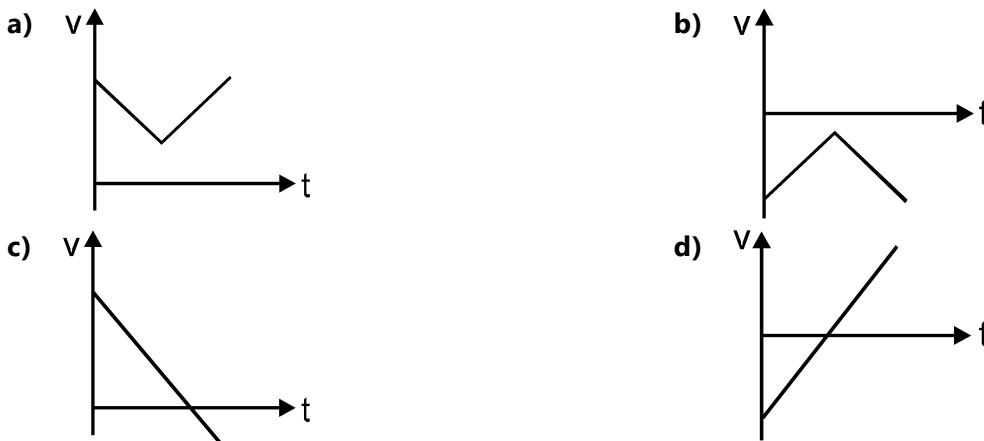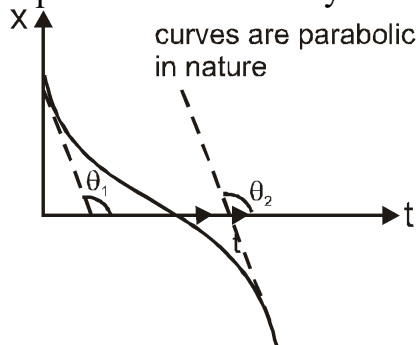

a) $\dfrac{G\rho\pi R}{3}$ **b)** $\dfrac{2G\rho\pi R}{3}$ **c)** $\dfrac{4G\rho\pi R}{3}$ **d)** $\dfrac{3G\rho\pi R}{2}$

Q11 Figure shows AB line with charge uniformly distributed over its length. P is a point in X–Y plane such that $\angle APN = 2\angle NPB = 60^\circ$. The electric field vector at this (P) point is along the straight line
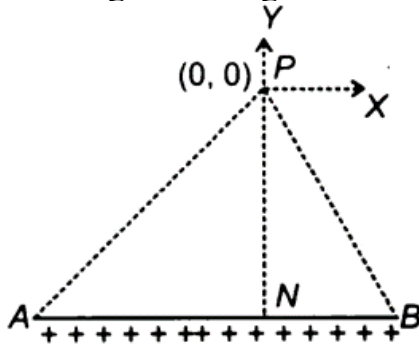
a) $y = x$

b) $y = \sqrt{3}x$

c) $y = \dfrac{1}{\sqrt{3}}x$

d) $y = \left(\tan 75^\circ\right)x$

Q12 The position time graph of a moving particle is shown. Then which of the below best represents its velocity time graph : $(\theta_1 = \theta_2 = 120^\circ)$

a)

b)

c)

d)

Q13 The rms speed of oxygen molecule in a vessel at particular temperature is $\left(1 + \dfrac{5}{x}\right)^{\frac{1}{2}}\upsilon$, where υ is the average speed of the molecule. The value of x will be: (Take $\pi = \dfrac{22}{7}$)

a) 28

b) 27

c) 8

d) 4

Q14 A frame made from 3 identical rods, each of mass m and length ℓ, is rotated about axis passing through A and perpendicular to the plane of frame. The moment of inertia is
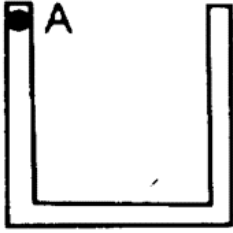
a) $3m\ell^2$

b) $\dfrac{7}{3}m\ell^2$

c) $\dfrac{8}{3}m\ell^2$

d) $\dfrac{9}{5}m\ell^2$

**Q15** Focal length of a biconvex lens in air is 40 cm. The focal length of the lens in water is 120 cm. If refractive index of water is $\dfrac{4}{3}$, then what is refractive index of the material of the lens :

a) 1.4

b) 1.5

c) 1.6

d) 1.7

Q16 The speed of sound in a mixture of $n_1 = 2$ moles of He, $n_2 = 2$ moles of H_2 at temperature $T = \dfrac{972}{5}$ K is $\eta \times 10$ m/s. Find η. (Take R $= \dfrac{25}{3}$ J/mole-K)

a) 80

b) 85

c) 90

d) 105

Q17 In the equation,
$x = 3yz^2$
x and z have dimensions of coefficient of viscosity and shear modulus of elasticity then dimensions of y are:

a) $[M \, L^{-1} \, T^{-3}]$

b) $[M^{-1} \, L^1 \, T^3]$

c) $[M \, L^{-2} \, T^{-3}]$

d) $[M^{-1} \, L^1 \, T^{-3}]$

Q18 The circuit shown below is equivalent to
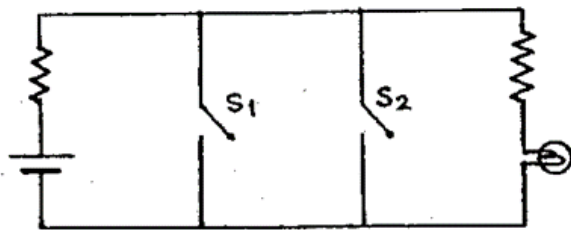
a) OR gate

b) NOR gate

c) AND gate

d) NAND gate

Q19 Loop A of radius r(r << R) moves towards loop B with a constant velocity V in such a way that their planes are always parallel. What is the distance between the two loops (x) when the induced emf in loop A is maximum
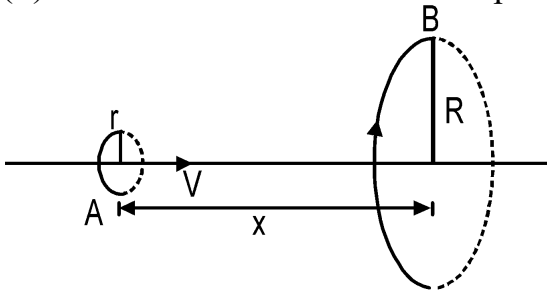
a) R

b) $\dfrac{R}{\sqrt{2}}$

c) $\dfrac{R}{2}$

d) $R\left(1-\dfrac{1}{\sqrt{2}}\right)$

Q20 A battery of internal resistance 4Ω is connected to the network of resistance as shown. In order to give the maximum power to the network, the value of R should be _____Ω
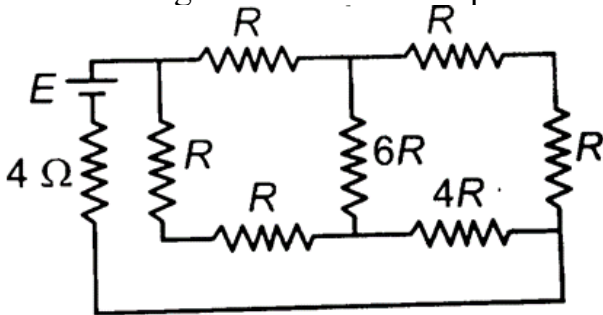
a) 3

b) 4

c) 2

d) 1

Numerical

Q21 A machine converts mechanical energy into electrical energy. A body of mass m = 0.4 kg is allowed to fall from rest in the machine through a height h = 1m under gravity g = 10 m/s². The body comes out of the machine with kinetic energy $\dfrac{mgh}{4}$. The machine uses 50% of the loss of the mechanical energy of the body in transferring charge Q = 3 Coul. from one plate of an initially uncharged capacitor to another plate. The capacitance of the capacitor, in Farad is :

Q22 Three 200Ω resistors are connected as shown in figure. The maximum power that can be dissipated in any one of the resistor is 50W. Find the total power in watts dissipated in the circuit for maximum voltage across the terminals A and B.
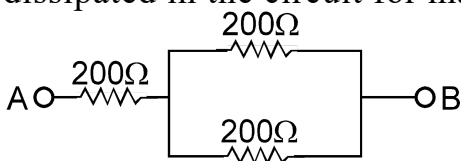
Q23 In an experiment for estimating the value of focal length of converging mirror, image of an object placed at 40 cm from the pole of the mirror is formed at distance 120 cm from the pole of the mirror. These distances are measured with a modified scale in which there are 20 small divisions in 1 cm. The value of error in measurement of focal length of the mirror is 1/K cm. The value of K is _____.

Q24 Two lighter nuclei combine to form a comparatively heavier nucleus by the relation given below:

$$_{1}^{2}X + {}_{1}^{2}X = {}_{2}^{4}Y$$

The binding energies per nucleon $_{1}^{2}X$ and $_{4}^{2}Y$ are 1.1 MeV and 7.6 MeV respectively. The energy released in this process is_____ . MeV.

Q25 In a Young's double slit experiment, the slits are 1 mm apart and are illuminated with a mixture of two wavelengths λ = 750 nm and λ' = 900 nm and distance between slit and screen is 2m. At what minimum distance (in mm) from the common central bright fringe on a screen the bright fringe from one interference pattern coincides with a bright fringe from the other?

Chemistry

Single Choice Question

Q26 0.1 M of $KMnO_4$ (in acidic medium) can not oxidise completely
(Assume the volume of reactant is same as of the $KMnO_4$ solution)

  a) 0.25 M $H_2C_2O_4$ **b)** 0.5 M $FeSO_4$ **c)** $\dfrac{M}{6} FeC_2O_4$ **d)** 0.6 M $K_2Cr_2O_7$

Q27 Pick out the complex compound in which the central metal atom obeys EAN rule strictly

  a) $K_4[Fe(CN)_6]$ **b)** $K_3[Fe(CN)_6]$ **c)** $[Cr(H_2O)_6]Cl_3$ **d)** $[Cu(NH_3)_4]SO_4$

Q28 In a 1 L container following equilibrium is establlished with equal moles of $NO_2(g)$ & $N_2O_4(g)$ $N_2O_4(g) \rightleftharpoons 2NO_2(g)$, at equlibrium $M_{avg.} = \dfrac{184}{3}$, then ratio of K_C & total initial moles is.

  a) 3   **b)** $\dfrac{3}{2}$ **c)** $\dfrac{27}{4}$ **d)** 6

Q29 The lithium ion (Li^+) and hydride ion (H^-) are isoelectronic ions. Which statement about this systems is true ?

  a) Chemical properties of these ions are identical since they are isoelectronic.

  b) Li^+ is a stronger reducing agent than H^-.

  c) More energy is needed to ionize H^- than Li^+

  d) Radius of H^- is larger than that of Li^+

Q30 The enthalipies of decomposition of methane (CH_4) (g) and ethane (C_2H_6)(g) are 400 and 670 kJ. mol^{-1}, respectively . The ΔH_{C-C} in $kJmol^{-1}$ is

  a) 270   **b)** 70   **c)** 200   **d)** 240 ml

Q31 Wave length of limiting line for lyman series in hydrogen spectrum will be-

  a) R   **b)** $\dfrac{1}{R}$ **c)** 4R   **d)** $\dfrac{1}{4R}$

Q32 Compound A contains 8.7% Hydrogen, 74% Carbon and 17.3% Nitrogen. The molecular formula of the compound is,
Given: Atomic masses of C, H and N are 12, 1 and 14 amu respectively.
The molar mass of the compound A is 162 g mol^{-1}.

  a) $C_4H_6N_2$ **b)** C_2H_3N **c)** C_5H_7N **d)** $C_{10}H_{14}N_2$

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Q33 What is the molar solubility of $Mn(OH)_2$ in a buffer solution containing equal amount of NH_4^+ and $NH_3(aq)$.

Given that $- (K_{sp})_{Mn(OH)_2} = 4.5 \times 10^{-14}$

$$(K_b)_{NH_3} = 1.8 \times 10^{-5}$$

a) 1.35×10^{-3} **b)** 1.38×10^{-4} **c)** 2.38×10^{-4} **d)** 3.2×10^{-4}

Q34 What is the product of following reaction?

$$\text{Hex} - 3 - \text{ynal} \xrightarrow[\substack{(ii)PBr_3 \\ (iii)Mg/ether \\ (iv)CO_2/H_3O^+}]{(i)\,NaBH_4} ?$$

a)
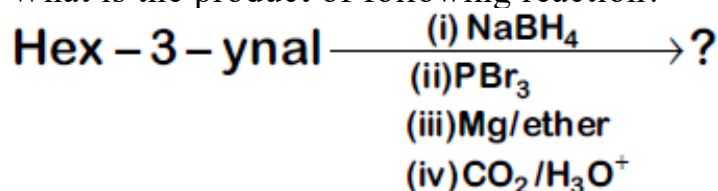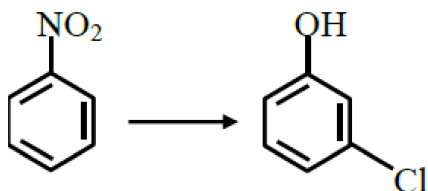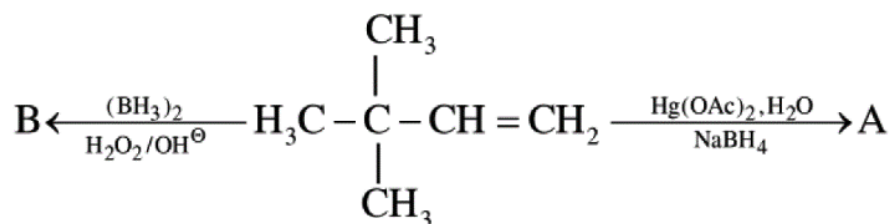
~~~~~~COOH

b)

~~~=~~~COOH

c)

~~~=~~~COOH

d)

\=≡/~~COOH

Q35 Out of the followings in which reaction(s) **polar** product is obtained ?

a)
$$CH_3 - C \equiv C - CH_3 \xrightarrow[\text{Quinoline}]{H_2/pd/CaCO_3}$$

b)
$$C_2H_5 - C \equiv C - C_2H_5 \xrightarrow{Na/NH_3(l)}$$

c)
$$CH_3 - CH = 0 \xrightarrow[\text{HCl}]{Zn-Hg}$$

d)
$$Ph - COOH \xrightarrow[\text{CaO}.\Delta]{NaOH}$$

Q36 The correct sequence of correct reagents for the following transformation is :-

NO_2 benzene → OH benzene with Cl

a) (i) Fe, HCl (ii) Cl_2, HCl, (iii) $NaNO_2$, HCl, 0°C (iv) H_2O/H^+

b) (i) Fe, HCl (ii) $NaNO_2$, HCl, 0°C (iii) H_2O/H^+ (iv) Cl_2, $FeCl_3$

c) (i) Cl_2, $FeCl_3$ (ii) Fe, HCl (iii) $NaNO_2$, HCl, 0°C (iv) H_2O/H^+

d) (i) Cl_2, $FeCl_3$ (ii) $NaNO_2$, HCl, 0°C (iii) Fe, HCl (iv) H_2O/H^+

Q37 Consider the hydrated ions of Ti^{2+}, V^{2+}, Ti^{3+}, and Sc^{3+}. The correct order of their spin-only magnetic moments is :

a) $Sc^{3+} < Ti^{3+} < Ti^{2+} < V^{2+}$ **b)** $Ti^{3+} < Ti^{2+} < Sc^{3+} < V^{2+}$

c) $Sc^{3+} < Ti^{3+} < V^{2+} < Ti^{2+}$ **d)** $V^{2+} < Ti^{2+} < Ti^{3+} < Sc^{3+}$

Q38 Choose the correct option for the following reactions.

$$B \xleftarrow[\text{H}_2\text{O}_2/\text{OH}^\ominus]{(\text{BH}_3)_2} \quad H_3C - \underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}} - CH = CH_2 \xrightarrow[\text{NaBH}_4]{\text{Hg(OAc)}_2, \text{H}_2\text{O}} A$$

a) 'A' and 'B' are both Markovnikov addition products.

b) 'A' is Markovnikov product and 'B' is anti–Markovnikov product.

c) 'A' and 'B' are both anti–Markovnikov products.

d) 'B' is Markovnikov and 'A' is anti–Markovnikov product.

Q39 Which of the following names is **wrong** according to IUPAC rules?
a) 4-Chloropentan-2-ol
b) 1-Bromohex-4-yne
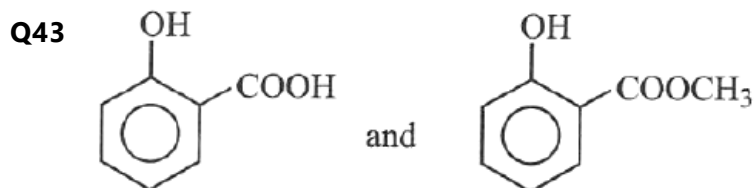**c)** 3-Hydroxybenzene-1-carbonitrile
d) 3-Bromo-1,1-dimethyl cyclopentane

Q40 Choose the correct statements about the hydrides of group 15 elements.
A. The stability of the hydrides decreases in the order
$NH_3 > PH_3 > AsH_3 > SbH_3 > BiH_3$
B. The reducing ability of the hydrides increases in the order
$NH_3 < PH_3 < AsH_3 < SbH_3 < BiH_3$
C. Among the hydrides, NH_3 is strong reducing agent while BiH_3 is mild reducing agent.
D. The basicity of the hydrides increases in the order
$NH_3 < PH_3 < AsH_3 < SbH_3 < BiH_3$
Choose the most appropriate from the option given below:

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

Q41 Equivalent conductivity of $Fe_2(SO_4)_3$ is related to molar conductivity by the expression.

a) $\Lambda_{eq} = \Lambda_m$

b) $\Lambda_{eq} = \Lambda_m / 3$

c) $\Lambda_{eq} = 3\Lambda_m$

d) $\Lambda_{eq} = \Lambda_m / 6$

Q42 75% of a first order reaction is completed in 30 minutes. What is the time required for 93.75% of thereaction (in minutes)
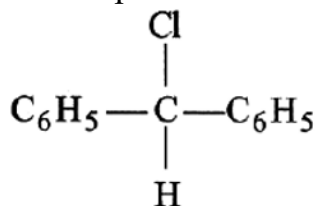**a)** 45   **b)** 120   **c)** 90   **d)** 60

Q43

can be differentiated by

a) NaOH   **b)** Na metal   **c)** $NaHCO_3$ **d)** $FeCl_3$

Q44 A Friedel–Crafts reaction of benzene with chloroform produces

a) $C_6H_5CHCl_2$

b)

$$C_6H_5-\overset{\overset{\displaystyle Cl}{|}}{\underset{\underset{\displaystyle H}{|}}{C}}-C_6H_5$$

c)

$$C_6H_5-\overset{\overset{\displaystyle C_6H_5}{|}}{\underset{\underset{\displaystyle H}{|}}{C}}-C_6H_5$$

d) $C_6H_5-CCl_3$

Q45 The numbers of chiral centers present in glucopyranose and fructofuranose are

a) 4 and 3   **b)** 5 and 4   **c)** 4 in each   **d)** 5 in each

Numerical

Q46 The modulus of entropy change when 10 moles of an deal gas expand from a volume V to a volume 10V reversibly and isothermally is ....R (Report your answer in terms of nearest integer)

Q47 For an H-like atom

$$\psi_{(r)} = K_1r[K_2r^2 + k_3r + k_4].\, e^{\dfrac{-Zr}{4a_0}}$$

Find the maximum value of n + ℓ + m for
The orbital, if k_1, k_2, k_3, k_4 & a_0 are constants

Q48 Identify number of substitutions those are deactivating but ortho and para directing

$$-\overset{..}{\underset{..}{F}}: ,-CF_3 ,-\overset{\overset{\displaystyle O}{||}}{C}-NH_2 ,-CH=CH-\overset{\overset{\displaystyle O}{||}}{C}-H ,-CH=CH-\overset{\overset{\displaystyle O}{||}}{C}-OH,$$

$$-\overset{\overset{\displaystyle O}{||}}{\underset{\underset{\displaystyle ..}{}}{S}}-C_2H_5 ,-\overset{\overset{\displaystyle O}{||}}{\underset{\underset{\displaystyle O}{||}}{S}}-C_2H_5 , \; -\overset{..}{N}=O ,-\overset{\overset{\displaystyle O}{||}}{C}-NH_2$$

Q49 Total number of vacant orbitals in valence shell of Br when it forms maximum covalent bonds

Q50 10.30 mg of O_2 is dissolved into a litre of sea water of density 1.03 g/mL. The concentration of O_2 in ppm is _____ .

Mathematics

Single Choice Question

Q51 $\int_0^\infty \frac{\ln(2x)}{1+x^2}\,dx$ is equal to

a) 0

b) $\frac{\pi}{8}\ell n\,2$

c) $\frac{\pi}{4}\ell n\,2$

d) $\frac{\pi}{2}\ell n\,2$

Q52

Function f(x) is defined such that $f(x) = \begin{cases} \int\limits_0^x (5+|1-t|)dt, & x > 2 \\ 5x + 1, & x \le 2 \end{cases}$ then identify the

INCORRECT option?

a) f(x) is non-differentiable at x = 2

b) f(x) is continuous at x = 2

c) f(x) is increasing at x = 2

d) $\int\limits_0^3 f(x)dx = \frac{140}{3}$

Q53 If z_1, z_2, z_3 are three points lying on the circle $|z| = 2$ then the minimum value of $|z_1 + z_2|^2 + |z_2 + z_3|^2 + |z_3 + z_1|^2$ is equal to

a) 6

b) 12

c) 15

d) 24

Q54 A man has 3 friends. If N is number of ways he can invite one friend everyday for dinner on 6 successive nights so that no friend is invited more than 3 times then the value of N/30 is.

a) 18

b) 16

c) 17

d) None of these

Q55 The sum of 20 terms of the series whose r^{th} term is given by $T(n) = (-1)^n \frac{n^2 + n + 1}{n!}$ is

a) $\frac{20}{19!} - 2$

b) $\frac{21}{20!} - 1$

c) $\frac{21}{20!}$

d) none of these

Q56 Let A and B are two points (1, 0) and (3, 0) and P is a variable point on y-axis then maximum value of angle APB is equal to

a) $22\frac{1}{2}^\circ$

b) 30°

c) 45°

d) 60°

Q57 Let f(x) and g(x) are twice differentiable functions such that f(x). g(x) = 1 for all x and f '(x) and g'(x) are never equal to zero then $\frac{f''(x)}{f'(x)} - \frac{g''(x)}{g'(x)}$ is equal to

a) $-\frac{2f'(x)}{f(x)}$

b) 0

c) $-\frac{f'(x)}{f(x)}$

d) $\frac{2f'(x)}{f(x)}$

Q58 Let $\vec{\alpha} = (\lambda - 2)\vec{a} + \vec{b}$ and $\vec{\beta} = (4\lambda - 2)\vec{a} + 3\vec{b}$ be two given vectors where vectors $\vec{a}$ and $\vec{b}$ are non-collinear. The value of $|\lambda|$ for which vectors $\vec{\alpha}$ are $\vec{\beta}$ collinear, is

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

Q59 A cube of ice melts without changing its shape at the uniform rate of 4 cm^3/min. The rate of change of the surface area of the cube, in cm^2/min, when the volume of the cube is 125 cm^3, is

a) –4   b) –16/5   c) –16/6   d) –8/15

Q60 If n is the number of terms of the series $\cot^{-1} 3$, $\cot^{-1} 7$, $\cot^{-1} 13$, $\cot^{-1} 21$, ..., whose sum is $\dfrac{1}{2}\cos^{-1}\left(\dfrac{24}{145}\right)$, then the value of n is _____.

a) 10   b) 11   c) 15   d) 16

Q61 If $y = \int \dfrac{dx}{\left(1 + x^2\right)^{3/2}}$ and y = 0 when x = 0, the value of y when x = 1 is

a) $\dfrac{1}{\sqrt{2}}$ b) $\sqrt{2}$ c) $2\sqrt{2}$ d) None of these

Q62 If P, Q and R are three points with co-ordinates (1, 4), (4, 2) and (m, 2m – 1) respectively then the value of m for which PR + RQ is minimum will be equal to

a) $\dfrac{17}{8}$ b) $\dfrac{5}{2}$ c) $\dfrac{7}{2}$ d) $\dfrac{15}{8}$

Q63 The point ([p + 1], [p]) lying inside the circle $x^2 + y^2 - 2x - 15 = 0$, then set of all values of p is (where [.] represent greatest integer function)

a) $[-2, 3)$ b) $(-2, 3)$ c) $[-2, 0) \cup (0, 3)$ d) $[0, 3)$

Q64 Let PQ be a focal chord of the parabola $y^2 = 36x$ of length 100, making an acute angle with the positive x-axis. Let the ordinate of P be positive and M be the point on the line segment PQ such that PM : MQ = 3 : 1. Then which of the following points does **NOT** lie on the line passing through M and perpendicular to the line PQ?

a) $(-3, 43)$ b) $(-6, 45)$ c) $(3, 33)$ d) $(6, 29)$

Q65 The domain of the function $f(x) = \left[\log_{10}\left(\dfrac{5x - x^2}{4}\right)\right]^{1/2}$ is

a) $-\infty < x < \infty$ b) $1 \leq x \leq 4$ c) $4 \leq x \leq 16$ d) $-1 \leq x \leq 1$

Q66 If $I_1 = \displaystyle\int_{-2017}^{2019} \dfrac{dx}{\left(5 + 2x - x^2\right)\left(1 + e^{3x-3}\right)}$ and $I_2 = \displaystyle\int_{-2017}^{2019} \dfrac{dx}{\left(5 + 2x - x^2\right)}$, then $\dfrac{2I_1}{I_2}$ is equal to _____.

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

Q67 $\lim\limits_{x \to 0} \dfrac{\sin^{-1} x - \tan^{-1} x}{x^3}$ is equal to

a) 2   b) 1   c) −1   d) 1/2

Q68 A parabola whose axis is parallel to x-axis passes through three points (2, 0), (0, −1) and (6, 1) then area enclosed by the parabola and line x − 2y − 8 = 0 is equal to

a) $\dfrac{125}{6}$ b) $\dfrac{64}{3}$ c) $\dfrac{108}{5}$ d) $\dfrac{41}{2}$

Q69 The point of intersection of the lines $\dfrac{x-5}{3} = \dfrac{y-7}{-1} = \dfrac{z+2}{1}$ and $\dfrac{x+3}{-36} = \dfrac{y-3}{2} = \dfrac{z-6}{4}$ is.

a) $\left(21, \dfrac{5}{3}, \dfrac{10}{3}\right)$ b) $(2, 10, 4)$ c) $(-3, 3, 6)$ d) $(5, 7, -2)$

Q70 If the focal distance of an end of the minor axis of any ellipse (its axes as x and y axis respectively) is k and the distance between the foci is 2h, then its equation is-

a) $\dfrac{x^2}{k^2} + \dfrac{y^2}{h^2} = 1$

b) $\dfrac{x^2}{k^2} + \dfrac{y^2}{k^2 - h^2} = 1$

c) $\dfrac{x^2}{k^2} - \dfrac{y^2}{k^2 - h^2} = 1$

d) $\dfrac{x^2}{k^2} + \dfrac{y^2}{k^2 + h^2} = 1$

Numerical

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

Q72 If for x ≥ 0, y = y(x) is the solution of the differential equation, $(x+1)dy = ((x+1)^2 + y-3) dx$, y(2) = 0, then y(3) is equal to_____.

Q73 If the matrices $A = \begin{bmatrix} 1 & 1 & 2 \\ 1 & 3 & 4 \\ 1 & -1 & 3 \end{bmatrix}$, B = adj A and C = 3A, then $\dfrac{|\text{adj}B|}{|C|}$ is equal to

Q74 Let A = {1, 2, 3, 4} and R be a relation on the set A × A defined by R = {((a,b),(c,d)) : 2a + 3b = 4c + 5d}. Then the number of elements in R is :

Q75 The mean and variance of 7 observations are 8 and 16 respectively. If one observation 14 is omitted a and b are respectively mean and variance of remaining 6 observation, then a + 3b − 5 is equal to_____.

Answer Key

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