

Competishun

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

Date: 17/11/2024

Time: 3 hours

Max. Marks: 300

UTS-1_MT-2 (24-25)

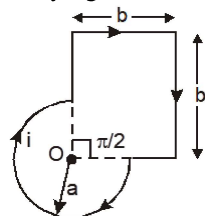
Physics

Single Choice Question

Q1 Calculate the magnetic field amplitude produced by the radiation from a 100 W point sized bulb at a distance of 3 m from it. The efficiency of bulb is 2.5%

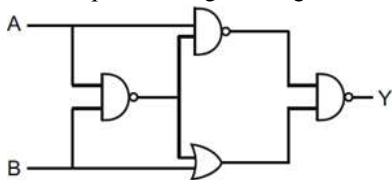
- a) $1.4 \times 10^{-8} \text{ T}$ b) $14 \times 10^{-8} \text{ T}$ c) $0.7 \times 10^{-8} \text{ T}$ d) $1 \times 10^{-8} \text{ T}$

Q2 The magnitude of magnetic field at O (centre of the circular part) of the current carrying coil as shown is:



- a) $\frac{\mu_0 i}{4\pi} \left(\frac{3\pi}{a} + \frac{\sqrt{2}}{b} \right)$ b) $\frac{\mu_0 i}{2\pi} \left(\frac{3\pi}{2a} + \frac{\sqrt{2}}{b} \right)$ c) $\frac{\mu_0 i}{2\pi} \left(\frac{\pi}{3a} + \frac{3}{\sqrt{2}b} \right)$ d) $\frac{\mu_0 i}{4\pi} \left(\frac{3\pi}{2a} + \frac{\sqrt{2}}{b} \right)$

Q3 The output of the given logic circuit is



- a) $A\bar{B} + \bar{A}B$ b) $A\bar{B}$ c) $AB + \bar{A}\bar{B}$ d) $\bar{A}\bar{B}$

Q4 Particle is projected with initial velocity at an angle such that it grazes the top of two poles of same height at time 2 and 6 sec. First pole is at distance 35 m from the point of projection. Then match the list-I and List-II:

List-I

- (P) Time of flight (in sec)
(Q) Height of the pole (in m)
(R) Maximum height reached by particle (in m)
(S) Distance between two poles (in m)

List-II

- (1) 80
(2) 70
(3) 8
(4) 60

- a) P → 3; Q → 2; R → 4; S → 1 b) P → 3; Q → 4; R → 2; S → 1
c) P → 2; Q → 4; R → 1; S → 3 d) P → 3; Q → 4; R → 1; S → 2

Q5 A metal ball of mass 0.1 kg is heated upto 500°C dropped into a vessel of heat capacity 800J K⁻¹ and containing 0.5 kg water. The initial temperature of water and vessel is 30°C. What is the approximate percentage increment in the temperature of the water? [Specific Heat Capacities of water and metal are, respectively, 4200J kg⁻¹ K⁻¹ and 400J kg⁻¹ K⁻¹]

- a) 20% b) 25% c) 15% d) 30%

Q6 The parallel combination of two air filled parallel plate capacitors of capacitance C and nC is connected to a battery of voltage V . When the capacitors are fully charged, the battery is removed and after that a dielectric material of dielectric constant K is placed between the plates of the first capacitor. The new potential difference of the combined system is

- a) $\frac{nV}{K+n}$ b) V c) $\frac{V}{K+n}$ d) $\frac{(n+1)V}{(K+n)}$

Q7 The potential energy of a particle of mass 1 kg in motion along the x -axis is given by $U = (10 - 10\cos 6x) \text{ J}$

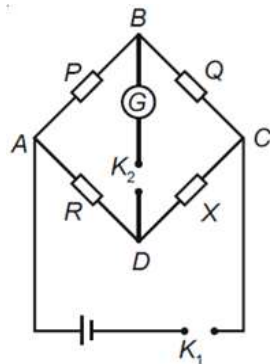
The period of small oscillations is ($\pi^2 \approx 10$)

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

Q8 A railway track is banked for a speed v , by making the height of the outer rail ' h ' higher than that of the inner rail. The horizontal separation between the rails is d . The radius of curvature of the track is ' r ': then which of the following relation is true?

- a) $\frac{h}{d} = \frac{v^2}{rg}$ b) $\tan\left(\sin^{-1}\frac{h}{d}\right) = \frac{v^2}{rg}$ c) $\tan^{-1}\left(\frac{h}{d}\right) = \frac{v^2}{rg}$ d) $\frac{h}{r} = \frac{v^2}{dg}$

Q9 In a Wheatstone bridge (see fig.), Resistances P and Q are approximately equal. When $R = 400 \Omega$, the bridge is balanced. On interchanging P and Q , the value of R , for balance, is 405Ω . The value of X is close to



- a) 404.5 ohm b) 401.5 ohm c) 402.5 ohm d) 403.5 ohm

Q10 The ratio of translational and rotational kinetic energies at 100 K temperature is $3 : 2$.

Then the internal energy of one mole gas at that temperature is [$R = 8.3 \text{ J/mol-K}$]

- a) 1175 J b) 1037.5 J c) 2075 J d) 4150 J

Q11 A transverse sinusoidal wave moves along a string in the positive x direction. In figure (I) displacement of particle at P as a function of time is given and in figure (II) at a particular time t the snap shot of wave is shown. The wave velocity (cm/s) and velocity of particle at P (cm/s) will be :

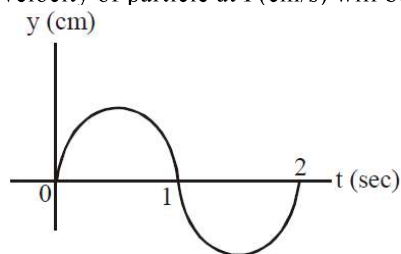


Figure-I

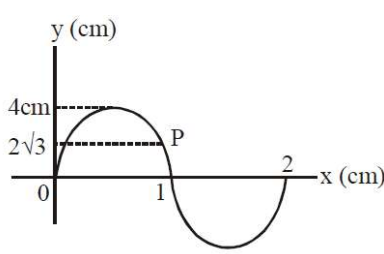
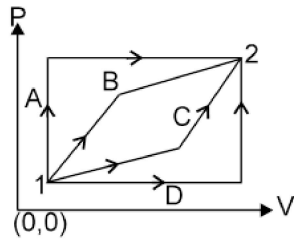


Figure-II

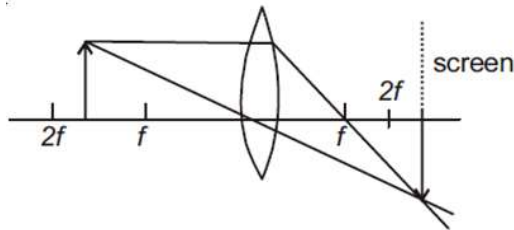
- a) $1\hat{i}, -3\pi\hat{j}$ b) $1\hat{i}, 3\pi\hat{j}$ c) $1\hat{i}, 2\pi\hat{j}$ d) $-1\hat{i}, -2\pi\hat{j}$

- Q12** An ideal gas is taken from state 1 to state 2 through optional path A, B C & D as shown in the PV diagram. Let Q, W & U represent the heat supplied, work done and change in internal energy of the gas respectively. Then,



- a) $Q_A - Q_D = W_A - W_D$ b) $Q_B - W_B > Q_C - W_C$
 c) $W_A - W_B < W_C - W_D$ d) $Q_A - Q_B < Q_C - Q_D$

- Q13** Formation of real image using a biconvex lens is shown below:



If the whole set up is immersed in water without disturbing the object and the screen positions, what will one observe on the screen?

- a) Erect real image b) No change
 c) Image disappears d) Magnified image
- Q14** An electron of mass m and magnitude of charge $|e|$ initially at rest gets accelerated by a constant electric field E . The rate of change of de-Broglie wavelength of this electron at time t ignoring relativistic effects is
- a) $-\frac{h}{|e|E\sqrt{t}}$ b) $-\frac{h}{|e|Et^2}$ c) $\frac{|e|Et^2}{h}$ d) $-\frac{h}{|e|Et}$

- Q15** Density of a planet of radius R varies with the distance r from its centre as

$$\rho = \rho_0 \left(1 - \frac{r}{2R}\right) \quad \text{for, } 0 \leq r \leq R$$

$$\rho = 0 \quad \text{for, } r > R$$

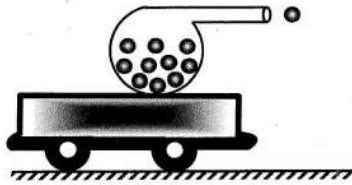
The acceleration due to gravity inside the planet at a distance r from its centre is

- a) $\pi G \rho_0 r \left(\frac{4}{3} - \frac{r}{2R}\right)$ b) $\pi G \rho_0 r \left(\frac{2}{3} - \frac{r}{4R}\right)$
 c) $\pi G \rho_0 r \left(1 - \frac{r}{2R}\right)$ d) $\pi G \rho_0 r \left(2 - \frac{r}{2R}\right)$

- Q16** Two coherent sources of different intensities send waves which interfere. The ratio of the maximum intensity to the minimum intensity is 25. The intensities are in the ratio :

- a) 25 : 1 b) 5 : 1 c) 9 : 4 d) 625 : 1

- Q17** A cannon of mass M with n cannon balls each of mass ' m ' rests on a smooth horizontal surface. The cannon fires n balls successively each with a muzzle speed v_0 relative to the cannon (in the state just before firing). The final recoil velocity of the cannon after firing the n shells will be:



- a) $\frac{nmv_0}{M}$
 b) $\frac{nmv_0}{M} \times \frac{1}{(n-1)} \times \frac{1}{(n-2)} \times \dots \times \frac{1}{2} \times \frac{1}{1}$
 c) $\frac{nmv_0}{M} \times \left[\frac{1}{(n-1)^2} + \frac{1}{(n-2)^2} + \dots + \frac{1}{2^2} + \frac{1}{1^2} \right]$
 d) $mv_0 \left[\frac{1}{M+(n-1)m} + \frac{1}{M+(n-2)m} + \dots + \frac{1}{M} \right]$

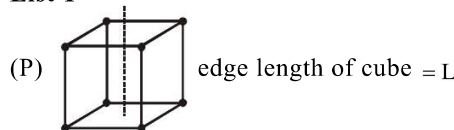
- Q18 Assertion :** For the scattering of α -particles at a large angles, only the nucleus of the atom is responsible.

Reason : Nucleus is very heavy in comparison to electrons.

- a) If both assertion and reason are true and the reason is the correct explanation of the assertion.
 b) If both assertion and reason are true but reason is not the correct explanation of the assertion.
 c) If assertion is true but reason is false.
 d) If the assertion and reason both are false.
- Q19** Figure shows particles each connected rigidly by massless thin rods. Mass of each particle is m . In each case calculate moment of inertia of assembly about axis shown in figure.

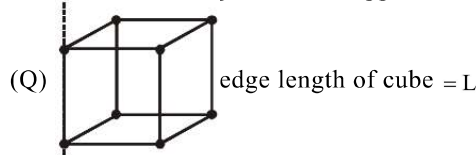
List-I

List-II



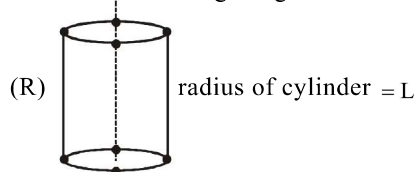
(1) $8mL^2$

Axis passing through centre of upper and lower faces



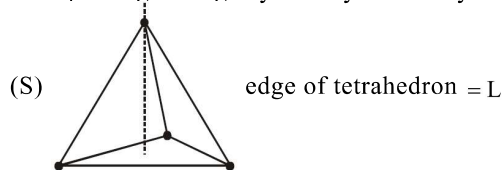
(2) $4mL^2$

Axis passing through edge of cube



(3) $3mL^2$

Axis passing through symmetry axis of cylinder

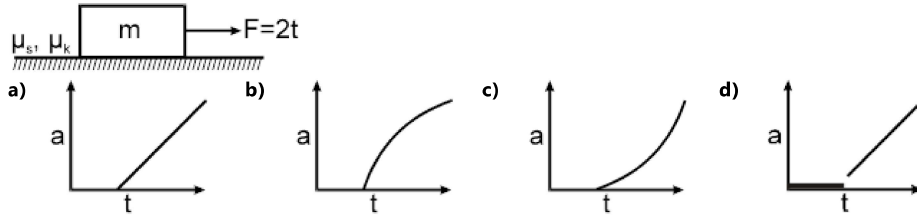


(4) mL^2

Axis passing through the centroid of base

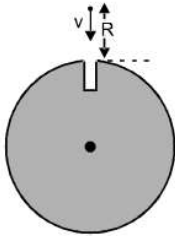
- a) $P \rightarrow 2; Q \rightarrow 4; R \rightarrow 1; S \rightarrow 3$ b) $P \rightarrow 2; Q \rightarrow 3; R \rightarrow 1; S \rightarrow 4$
 c) $P \rightarrow 2; Q \rightarrow 1; R \rightarrow 1; S \rightarrow 4$ d) $P \rightarrow 2; Q \rightarrow 1; R \rightarrow 1; S \rightarrow 3$

- Q20** A force $F = 2t$ (where t is time in seconds) is applied at $t = 0$ sec. to the block of mass m placed on a rough horizontal surface. The coefficient of static and kinetic friction between the block and surface are μ_s and μ_k respectively. Which of the following graphs best represents the acceleration vs time of the block. ($\mu_s > \mu_k$)

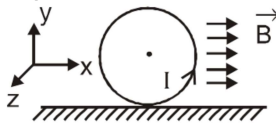


Numerical

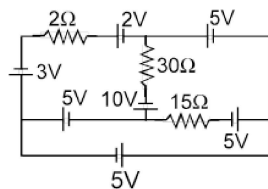
- Q21** A fixed sphere of radius R and charge Q (uniformly) has a small groove of length $\frac{R}{4}$ as shown in figure. Another point charge of mass ' m ' and charge ' q ' is projected towards the groove with some velocity in given direction. If maximum value of v so that it does not strike to sphere is $\frac{1}{8} \sqrt{\frac{KQq}{mR\pi\epsilon_0}}$, then find k . (Neglect gravity). (Both charges are of same nature)



- Q22** In the shown figure a conducting ring of mass $m = 2\text{ kg}$ and radius $R = 0.5\text{ m}$ lies on a smooth horizontal plane with its plane vertical. The ring carries a current of $I = \frac{1}{\pi}\text{ A}$. A horizontal uniform magnetic field of $B = 12\text{ T}$ is switched on at $t = 0$. The initial angular acceleration α in rad./sec^2 of the ring will be $4x$ if x is :



- Q23** In the circuit shown, current through the resistance 2Ω is i_1 and current through the resistance 30Ω is i_2 . Find the ratio $\frac{i_1}{i_2}$.



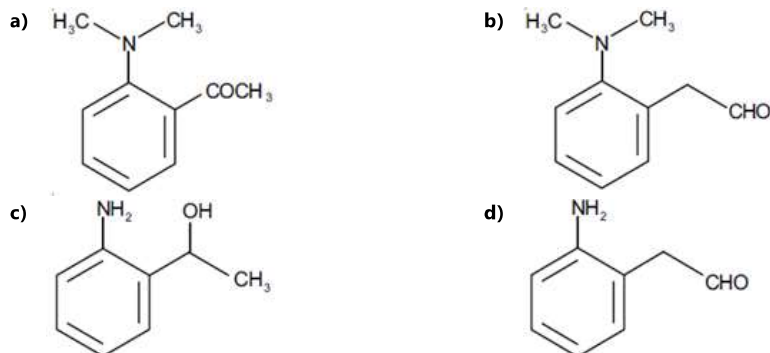
- Q24** A small town with a demand of 800 kW of electric power at 220 V is situated 15 km away from an electric plant generating power at 440 V . The resistance of the two-wire line carrying power is 0.5Ω per km . The town gets power from the line through a $4,000\text{--}220\text{ V}$, step-down transformer at a sub-station in the town. Estimate the line power loss in the form of heat in kW .

Q25 Two tubes of radii r_1 and r_2 and lengths l_1 and l_2 respectively, are connected in series and a liquid flows through each of them in streamline conditions. P_1 and P_2 are pressure differences across the two tubes. If $P_2 = 4P_1$ and $l_2 = \frac{l_1}{4}$, then the radius r_2 will be equal to $\frac{r_1}{x}$. Find 'x'

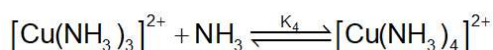
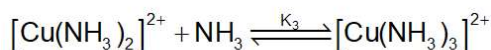
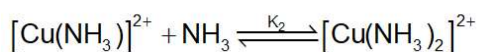
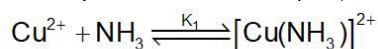
Q29 The tests performed on compound X and their inferences are :

Test	Inference
(1) 2,4-DNP test	Coloured precipitate
(2) Iodoform test	Yellow precipitate
(3) Azo-dye test	No dye formation

Compound 'X' is :



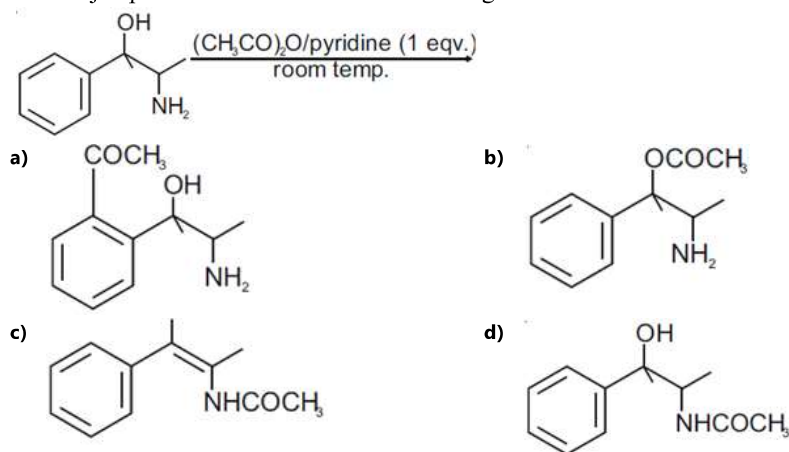
Q30 The stepwise formation of $[\text{Cu}(\text{NH}_3)_4]^{2+}$ is given below



The value of stability constants K_1 , K_2 , K_3 and K_4 are 10^4 , 1.58×10^3 , 5×10^2 and 10^2 respectively. The overall equilibrium constants for dissociation of $[\text{Cu}(\text{NH}_3)_4]^{2+}$ is

- a) 1.26×10^{-12} b) 9.28×10^{-12} c) 1.26×10^{12} d) 9.28×10^{-14}

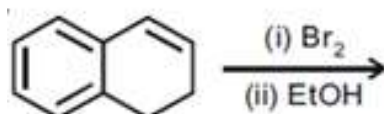
Q31 The major product obtained in the following reaction is :



Q32 CCl_4 is inert towards hydrolysis but SiCl_4 is readily hydrolysed because

- a) carbon cannot expand its octet but silicon can expand its octet
 b) ionisation potential of carbon is higher than silicon
 c) carbon forms double and triple bonds
 d) electronegativity of carbon is higher than that of silicon

- Q33** Given below are two statements : One is labeled as **Assertion A** and the other is labeled as **Reason R**
Assertion A : Zero orbital overlap is an out of phase overlap.
Reason R : It results due to different orientation/ direction of approach of orbitals. In the light of the above statements. Choose the correct answer from the options given below
- Both **A** and **R** are true and **R** is the correct explanation of **A**
 - Both **A** and **R** are true but **R** is NOT the correct explanation of **A**
 - A** is true but **R** is false
 - A** is false but **R** is true
- Q34** The number of stereoisomers possible for 1,2- dimethyl cyclopropane is :
- One
 - Four
 - Two
 - Three
- Q35** A reaction takes place in 3 steps, the rate constant are K_1, K_2 and K_3 and energies of activation are 40,30 and 20 kJ respectively. If overall rate constant $K = \frac{K_1 K_3}{K_2}$, then overall energy of activation is
- 10
 - 15
 - 30
 - 60
- Q36** The major product of the following reaction is



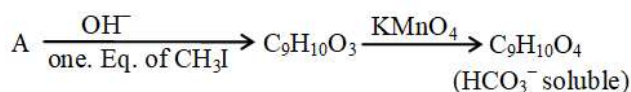
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-
-
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- Q37** Which of the following is strongest Bronsted base

-
-
-
-

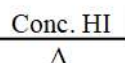
- Q38** Amylopectin is composed of
- β -D-glucose, $C_1 - C_4$ and $C_2 - C_6$ linkages
 - α -D-glucose, $C_1 - C_4$ and $C_2 - C_6$ linkages
 - β -D-glucose, $C_1 - C_4$ and $C_1 - C_6$ linkages
 - α -D-glucose, $C_1 - C_4$ and $C_1 - C_6$ linkages

Q39

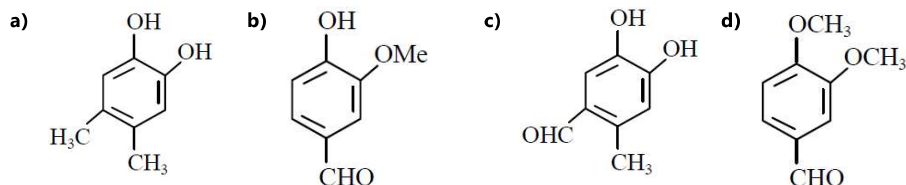


(It gives intense colour with FeCl_3 and Positive Tollen's test)

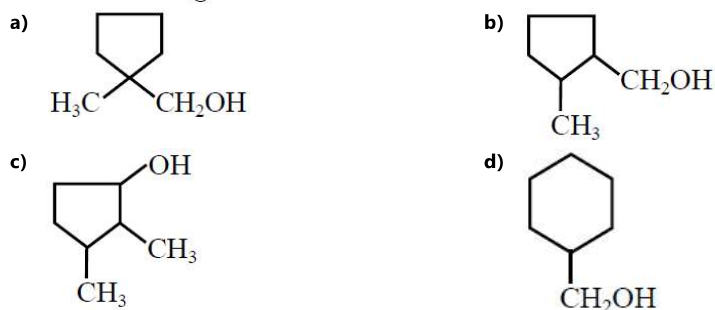
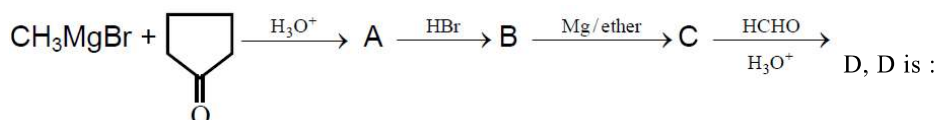
3,4-dihydroxy
Benzoic acid



Starting substrate 'A' is -



Q40



Q41 In the flame test of a mixture of salts, a green flame with blue centre was observed. Which one of the following cations may be present?

- a) Cu^{2+} b) Sr^{2+} c) Ba^{2+} d) Ca^{2+}

Q42 Which of the following is not optically active ?

- a) $[\text{Co}(\text{en})_3]^{3+}$ b) $[\text{Cr}(\text{ox})_3]^{3-}$
c) $\text{cis} - [\text{CoCl}_2(\text{en})_2]^+$ d) $\text{trans} - [\text{CoCl}_2(\text{en})_2]^+$

Q43 Given below are two statements : one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A) : Cu^{2+} in water is more stable than Cu^+ .

Reason (R) : Enthalpy of hydration for Cu^{2+} is much more negative than that of Cu^+ .

In the light of the above statements, choose the correct answer from the options given below :

- a) Both (A) and (R) are correct and (R) is the correct explanation of (A).
b) (A) is correct but (R) is not correct.
c) (A) is not correct but (R) is correct.
d) Both (A) and (R) are correct but (R) is not the correct explanation of (A).

Q44 Which of the following orders are correct for the ionization energies?

- (1) $\text{Ba} < \text{Sr} < \text{Ca}$ (2) $\text{S}^{2-} < \text{S} < \text{S}^{2+}$ (3) $\text{C} < \text{O} < \text{N}$ (4) $\text{Mg} < \text{Al} < \text{Si}$
a) 1, 2 and 4 b) 1, 3 and 4 c) 1, 2 and 3 d) 1, 2, 3 and 4

Q45 Change in internal energy (in kJ mol^{-1}) when 0.5 mole of Ar having a specific heat at constant pressure of $20.814 \text{ J g}^{-1} \text{ deg}^{-1}$ is heated from 27°C to 31°C at constant volume.

(Atomic mass of Ar = 40)

- a) 1.65 b) 3.64 c) 1648 d) 3.30

- Q46** The values of observed and calculated molecular weights of calcium nitrate are respectively 65.6 and 164. The degree of dissociation (in %) of calcium nitrate will be

Numerical

- Q47** The pH of a saturated aqueous solution of CO_2 is 5; For H_2CO_3 , $K_{a1} = 10^{-7}$ and $K_{a2} = 10^{-11}$. At the given pressure the solubility of CO_2 in water is 10^{-2} (M). What is the value of $-\log [\text{CO}_3^{2-}]$ in the nearest possible integers?
- Q48** In which of the following all bond length are not equal ?
 PCl_5 , SF_4 , ClF_3 , XeF_2 , $[\text{SF}_5]^+$, $[\text{ClF}_4]^+$, $[\text{XeF}_3]^+$, O_3 , P_4 (white)
- Q49** The work function (ϕ) of some metals is listed below. The number of metals which will show photoelectric effect when light of 300 nm wavelength falls on the metal is

Metal	Li	Na	K	Mg	Cu	Ag	Fe	Pt	W
(ϕ eV)	2.4	2.3	2.2	3.7	4.8	4.3	4.7	6.3	4.75

- Q50** Formation of polyethene from calcium carbide takes place as follows :
 $\text{CaC}_2 + \text{H}_2\text{O} \rightarrow \text{Ca(OH)}_2 + \text{C}_2\text{H}_2$;
 $\text{C}_2\text{H}_2 + \text{H} \rightarrow \text{C}_2\text{H}_4$
 $n(\text{C}_2\text{H}_4) \rightarrow (-\text{CH}_2-\text{CH}_2-)_n$.
 The amount of polyethylene (in kg) possibly obtainable from 64.0 kg CaC_2 can be

Mathematics

Single Choice Question

- Q51** If $x + y + z = 5$ and $xy + yz + zx = 3$, then least and largest value of x are :
- a) $\frac{10}{3}, 5$ b) $-1, \frac{13}{3}$ c) $\frac{17}{3}, 7$ d) None of these
- Q52** The sum of series $\sum_{k=1}^n \tan^{-1} \left(\frac{2k}{2+k^2+k^4} \right)$
- a) $\tan^{-1} (n^2 + n + 1)$ b) $\frac{\pi}{4} - \tan^{-1} (n^2 - n + 1)$
- c) $\frac{\pi}{4} + \cot^{-1} (n^2 + n + 1)$ d) None of these
- Q53** The sum of the series $1 + \frac{1}{4.2!} + \frac{1}{16.4!} + \frac{1}{64.6!} + \dots \infty$ is -
- a) $\frac{e+1}{2\sqrt{e}}$ b) $\frac{e-1}{2\sqrt{e}}$ c) $\frac{e+1}{\sqrt{e}}$ d) $\frac{e-1}{\sqrt{e}}$
- Q54** The number of common terms to the two A.P's $17 + 21 + 25 + \dots + 417$ and $16 + 21 + 26 + \dots + 466$ is
- a) 20 b) 19 c) 21 d) 18
- Q55** No. of values of x for which the sixth term of the expansion of $E = \left[3^{\log_3 \sqrt{9^{|x-2|}}} + 7^{\frac{1}{5} \log_7 [(4) \cdot 3^{|x-2|} - 9]} \right]^7$ is 567, is/are :
- a) 3 b) 2 c) 4 d) None
- Q56** Number of ways of selecting 5 letters from letters of word INDEPENDENT, is -
- a) 72 b) 68 c) 60 d) 52
- Q57** Let $A_0 A_1 A_2 A_3 A_4 A_5$ be a regular hexagon inscribed in a circle of unit radius. Then the product of the lengths of the line segments $A_0 A_1$, $A_0 A_2$ and $A_0 A_4$ is-
- a) $\frac{3}{4}$ b) $3\sqrt{3}$ c) 3 d) $\frac{3\sqrt{3}}{2}$
- Q58** Out of 21 tickets marked with numbers from 1 to 21, three are drawn at random. The chance that the numbers on them are in A.P. is
- a) $\frac{9}{1330}$ b) $\frac{9}{133}$ c) $\frac{10}{133}$ d) None of these
- Q59** If $f(y)$ is inverse of $g(y)$ and $g(y) = y^5 + 2y^3 + 3y + 4$, then the value of $28 \frac{d}{dy} (g^{-1}(y))$ at $y = -2$ is
- a) -2 b) 1 c) $1/14$ d) 2
- Q60** An ellipse with major axis 4 and minor axis 2 touches both the coordinate axes, then locus of its focus is
- a) $(x^2 - y^2)(1 + x^2 y^2) = 16x^2 y^2$ b) $(x^2 - y^2)(1 - x^2 y^2) = 16x^2 y^2$
- c) $(x^2 + y^2)(1 + x^2 y^2) = 16x^2 y^2$ d) $(x^2 + y^2)(1 - x^2 y^2) = 16x^2 y^2$
- Q61** The area enclosed between the curves $y = x^2$ and $y = \sqrt{|x|}$ is
- a) $1/3$ b) $2/3$ c) $4/3$ d) 2

Q62

If, $f(\alpha) = \begin{cases} 1 & ; \alpha = \pi/2 \\ \frac{\sin\{\cos\alpha\}}{(\alpha - \pi/2)} & ; \alpha \neq \pi/2 \end{cases}$, where $\{\cdot\}$ represents fractional part function,

then

- a) $f(\alpha)$ is continuous at $\alpha = \pi/2$
 b) $\lim_{\alpha \rightarrow \pi/2} f(\alpha)$ exists but not continuous at $\alpha = \pi/2$
 c) $\lim_{\alpha \rightarrow \pi/2} f(\alpha)$ does not exist
 d) $\lim_{\alpha \rightarrow \pi/2} f(\alpha) = 1$

Q63 Match the following

Column - I		Column - II	
(A)	$g(x) = 2 - x^{1/3}$ and $f(g(x)) = -x + 5x^{1/3} - x^{2/3}$, the local maximum value of $f(x)$ is	(P)	0
(B)	No. of points of intersection of the curves $\arg\left(\frac{z-3}{z-1}\right) = \frac{\pi}{4}$ and $z(1-i) + \bar{z}(1+i) - 4 = 0$	(Q)	1
(C)	If $f(x) = ax^3 + bx^2 + cx + d$, ($a, b, c, d \in \mathbb{Q}$) and two roots of $f(x) = 0$ are eccentricities of a parabola and a rectangular hyperbola, then $a + b + c + d =$	(R)	2
(D)	Number of solution of equation $1^x + 2^x + 3^x + \dots + n^x = (n+1)^x$ are	(S)	3

- a) $A \rightarrow Q$; $B \rightarrow S$; $C \rightarrow R$; $D \rightarrow P$ b) $A \rightarrow S$; $B \rightarrow Q$; $C \rightarrow P$; $D \rightarrow Q$
 c) $A \rightarrow S$; $B \rightarrow Q$; $C \rightarrow R$; $D \rightarrow Q$ d) $A \rightarrow S$; $B \rightarrow Q$; $C \rightarrow P$; $D \rightarrow R$

Q64

The value of $[100(k-1)]$ where $[x]$ represents the G.I.F. and $k = \frac{\sum_{r=1}^{440} \cos r^\circ}{\sum_{r=1}^{440} \sin r^\circ}$ is

- a) 144 b) 142 c) 141 d) 140

Q65 Solve $xdy + ydx + x^2y^3(xdy - ydx) = 0$

- a) $\frac{1}{(xy)^{5/2}} = 5\sqrt{\frac{y}{x}} + c$ b) $\frac{5}{(xy)^{5/2}} = 2\sqrt{y/x} + c$
 c) $\frac{-5}{(xy)^{5/2}} = -2\sqrt{y/x} + c$ d) None of these

Q66 Let $x = 2$ be a local minima of the function $f(x) = 2x^4 - 18x^2 + 8x + 12$, $x \in (-4, 4)$. If M is local maximum value of the function f in $(-4, 4)$, then $M =$

- a) $12\sqrt{6} - \frac{33}{2}$ b) $12\sqrt{6} - \frac{31}{2}$ c) $18\sqrt{6} - \frac{33}{2}$ d) $18\sqrt{6} - \frac{31}{2}$

Q67 Let $A(0,1)$, $B(1, 1)$ and $C(1, 0)$ be the mid - points of the sides of a triangle with in Centre at the point D . If the focus of the parabola $y^2 = 4ax$ passing through D is $(\alpha + \beta\sqrt{2}, 0)$, where α and β are rational numbers, then $\frac{\alpha}{\beta^2}$ is equal to

- a) 6 b) 8 c) 12 d) 9

Q68 Let $P(a_1, b_1)$ and $Q(a_2, b_2)$ be two distinct points on a circle with center $C(\sqrt{2}, \sqrt{3})$. Let O be the origin and OC be perpendicular to both CP and CQ . If the area of the triangle OCP is $\frac{\sqrt{35}}{2}$, then $a_1^2 + a_2^2 + b_1^2 + b_2^2$ is equal to _____.

- a) 26 b) 28 c) 12 d) 24

Q69

Let $A = \begin{bmatrix} 1 & 1 \\ 0 & 51 \end{bmatrix}$. If $B = \begin{bmatrix} 1 & 2 \\ -1 & -1 \end{bmatrix} A \begin{bmatrix} -1 & -2 \\ 1 & 1 \end{bmatrix}$, then the sum of all the elements of the matrix

$\sum_{n=1}^{50} B^n$ is equal to -

- a) 100 b) 50 c) 75 d) 125

Answer Key

Que.	1	2	3	4	5	6	7	8	9	10
Ans.	A	D	B	D	A	D	A	A	C	C
Que.	11	12	13	14	15	16	17	18	19	20
Ans.	C	A	C	B	A	C	D	A	C	D
Que.	21	22	23	24	25	26	27	28	29	30
Ans.	23	3	9	600	2	B	D	D	A	A
Que.	31	32	33	34	35	36	37	38	39	40
Ans.	D	A	A	D	C	D	D	D	B	A
Que.	41	42	43	44	45	46	47	48	49	50
Ans.	A	D	A	C	A	75	10	6	4	28
Que.	51	52	53	54	55	56	57	58	59	60
Ans.	B	D	A	A	B	A	C	C	D	C
Que.	61	62	63	64	65	66	67	68	69	70
Ans.	B	C	B	C	A	A	B	D	A	C
Que.	71	72	73	74	75					
Ans.	4	3	5	46	13					