Competishun

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

Date: 02/12/2024

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

UTS-I_MT-6 (24-25)

Physics

Single Choice Question

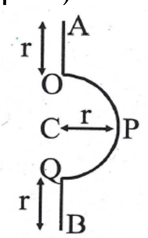
Q1 A wave is represented by the equation $y = 7\sin\left(7\pi t - 0.04\pi x + \frac{\pi}{3}\right)$ x is in meters and t is in seconds. The speed of the wave is –

a) 175 m/sec b) 49π m/sec c) $75/\pi$ m/sec d) 0.28π m/sec

Q2 If force $= \frac{\alpha}{\beta^3 + \text{density}}$ then dimensions of $\frac{\sqrt{\alpha}}{\beta}$ are

a) $M^{1/3}L^{-1}$ b) $M^2L^2T^{-2}$ c) $M^{2/3}T^{-1}$ d) can't be determined

Q3 A wire frame AOPQB, lying in the horizontal plane, is free to rotate about a vertical axis passing through center C of the same circle and ⊥ to plane of AOPQB. The mass M of the frame is uniformly distributed over its whole length. The moment of inertia of the frame about this axis, is (OA = QB = r and CP = r the radius of semicircular part)

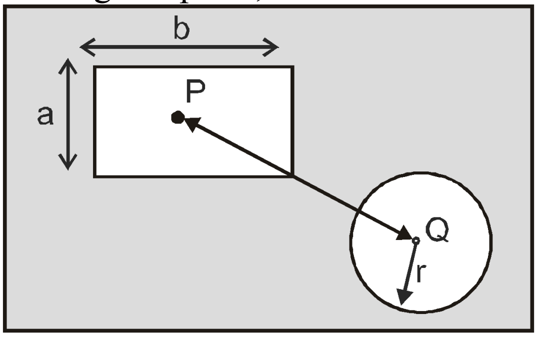


a) $Mr^2\left(\frac{14+3\pi}{3\pi+6}\right)$ b) $Mr^2\left(\frac{\pi+r}{\pi+2r}\right)$ c) $Mr^2\left(\frac{3}{4}\pi\right)$ d) $\frac{1}{2}Mr^2$

Q4 A rock explodes breaking into three pieces. Two pieces fly off perpendicular to one another. One piece of mass 1 kg has velocity 12 m/s and the second of mass 2 kg has velocity 8 m/s. If the third mass flies off at a velocity of 40 m/s. What is its mass?

a) 2 kg b) 1 kg c) 1/2 kg d) 3 kg

Q5 There is a rectangular metal plate in which two cavities in the shape of rectangle and circle are made, as shown with dimensions. P and Q are centres of these cavities. On heating the plate, which of the following quantities increase?



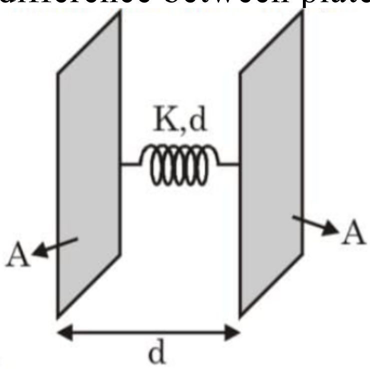
a) area (πr^2) of circular cavity

b) area (ab) of rectangular cavity

c) Distance (PQ) between centre of both cavities

d) All of the above

Q6 Consider the figure below, initially distance between plates is 'd' and 'A' is area of plates. In this state spring is at its natural length. Now, charges + Q & –Q are given to plates and system is allowed to reach mechanical equilibrium. Find potential difference between plates in this state of equilibrium.



a) $V = \frac{Qd}{A\varepsilon_0}\left(1 - \frac{Q^2}{2\varepsilon_0 \text{AKd}}\right)$

b) $V = \frac{Qd}{2A\varepsilon_0}\left(1 - \frac{Q^2}{2\varepsilon_0 AKd}\right)$

c) $V = \frac{Qd}{A\varepsilon_0}\left(1 - \frac{Q^2}{4\varepsilon_0 AKd}\right)$

d) $V = \frac{Qd}{A\varepsilon_0}\left(1 - \frac{Q^2}{\varepsilon_0 AKd}\right)$

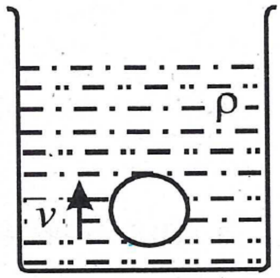
Q7 A galvanometer of resistance 50Ω is connected to a battery of 3V along with a resistance of 2950Ω in series. A full scale deflection of 30 divisions is obtained in the galvanometer. In order to reduce this deflection to 20 division, the resistance in series should be :-

a) 6050Ω **b)** 4450Ω **c)** 5050Ω **d)** 5550Ω

Q8 An LCR series circuit with 100Ω resistance is connected to an ac source of 400 V and angular frequency 300 rad/s. When only the capacitance is removed, the current lags behind the voltage by 60°. When only the inductance is removed, the current leads the voltage by 60°. The current and power dissipated in the LCR circuit is :-

a) 400 W, 2 A **b)** 800 W, 4 A **c)** 800 W, 2 A **d)** 1600 W, 4 A

Q9 An air bubble of radius r rises steadily through a liquid of density ρ at the rate of v. Neglecting density of air, the coefficient of viscosity of liquid is



a) $\frac{2}{9}\frac{r^2\rho g}{v}$ b) $\frac{1}{3}\frac{r^2\rho g}{v}$ c) $\frac{1}{9}\cdot\frac{r^2\rho g}{v}$ d) None of these

Q10 In a uniform magnetic field of $\vec{B} = 3\hat{i} + 2\hat{j} + 6\hat{k}$ Tesla, a charged particle of charge to mass ratio $2\times10^2\,\text{C/Kg}$ enters with velocity $\vec{V} = 4\hat{i} + 2\hat{j} - \hat{k}\ \text{m/s}$. Choose the correct option. (Neglect gravity)

a) Frequency of revolution of the particle is $\frac{5}{\pi}\times10^2$ cycles/s

b) Frequency of revolution of the particle is $\frac{3}{\pi}\times10^2$ cycles/s

c) Pitch of the helical path of particle is $\frac{5\pi}{49}$cm

d) Pitch of the helical path of particle is $\frac{10\pi}{49}$cm

Q11 The angle of polarisation for any medium is 60° what will be the criticle angle for the medium at air interface :-

a) $\sin^{-1}\left(\frac{1}{\sqrt{3}}\right)$ b) $\sin^{-1}\left(\sqrt{3}\right)$ c) $\cos^{-1}\left(\sqrt{3}\right)$ d) $\cos^{-1}\left(\frac{1}{\sqrt{3}}\right)$

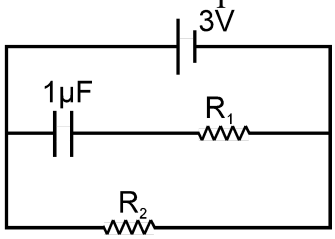
Q12 Vertical displacement of a plank with a body of mass 'm' on it is varying according to law $y = \sin\omega t + \sqrt{3}\cos\omega t$. The minimum value of ω for which the mass just breaks off the plank and the moment it occurs first after t = 0 are given by: (y is positive vertically upwards)

a) $\sqrt{\frac{g}{2}}, \frac{\sqrt{2}}{6}\frac{\pi}{\sqrt{g}}$ b) $\frac{g}{\sqrt{2}}, \frac{2}{3}\sqrt{\frac{\pi}{g}}$ c) $\sqrt{\frac{g}{2}}, \frac{\pi}{3}\sqrt{\frac{2}{g}}$ d) $\sqrt{2g}, \sqrt{\frac{2\pi}{3g}}$

Q13 A particle of charge q and mass m is projected from a large distance towards another identical charged particle at rest with velocity v_0. The distance of closest approach will be (Assume negligible gravitational attraction)

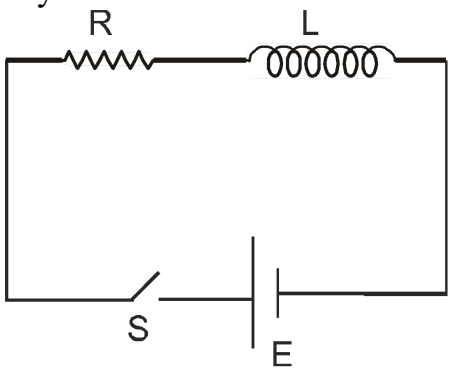
a) $\frac{q^2}{2\pi\varepsilon_0 m v_0^2}$ b) $\frac{q^2}{\pi\varepsilon_0 m v_0^2}$ c) $\frac{2q^2}{\pi\varepsilon_0 m v_0^2}$ d) $\frac{q^2}{4\pi\varepsilon_0 m v_0^2}$

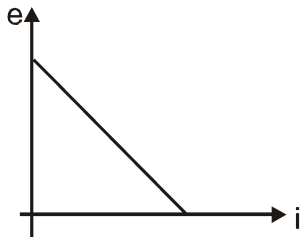
Q14 A 1 μF capacitor is connected in the circuit shown below. The e.m.f. of the cell is 3 volts and internal resistance is 0.5 ohms. The resistors R_1 and R_2 have values 4 ohms and 1 ohm respectively. The charge on the capacitor in steady state must be :

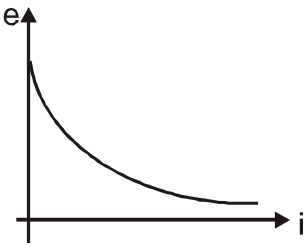


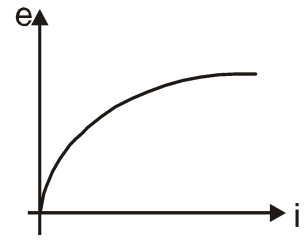
a) 2 μ C **b)** 1 μ C **c)** 1.33 μ C **d)** zero

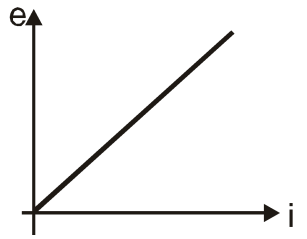
Q15 In an L-R circuit connected to a battery of constant e.m.f. E switch S is closed at time t = 0. If e denotes the induced e.m.f. across inductor and i the current in the circuit at any time t. Then which of the following graphs shows the variation of e with i ?



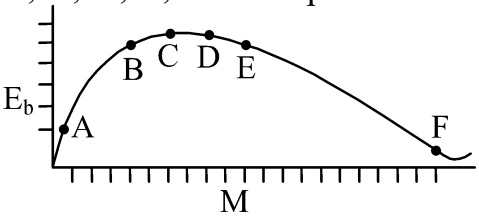
a)


b)


c)


d)


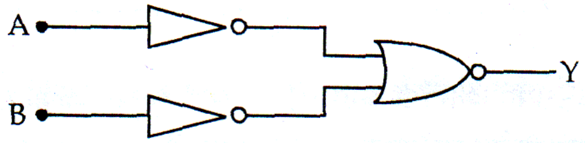
Q16 The below is a plot of binding energy per nucleon E_b, against the nuclear mass M; A, B, C, D, E, F correspond to different nuclei. Consider four reactions.

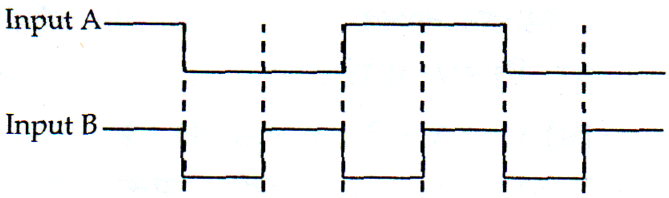


(i) $A + B \rightarrow C + \varepsilon$ (ii) $C \rightarrow A + B + \varepsilon$
(iii) $D + E \rightarrow F + \varepsilon$ and (iv) $F \rightarrow D + E + \varepsilon$
Where ε is the energy released? In which reactions is ε positive -

a) (i) and (iv) **b)** (i) and (iii) **c)** (ii) and (iv) **d)** (ii) and (iii)

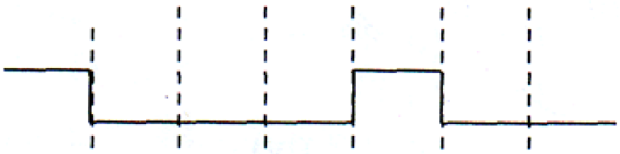
Q17 The logic circuit shown below has the input waveforms 'A' and 'B' as shown. Pick out the correct output waveform.



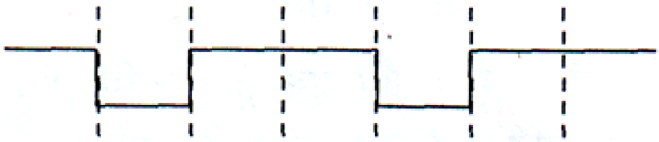


Output is :

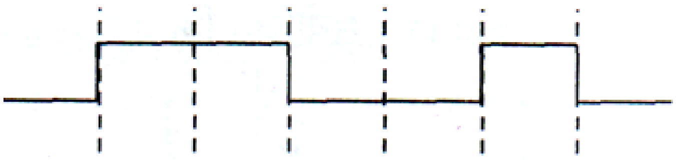
a)



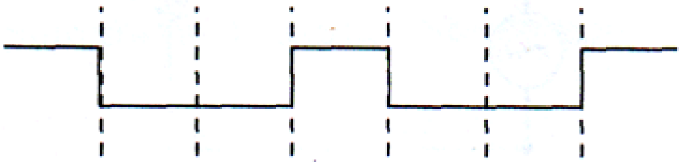
b)



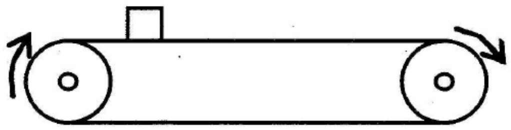
c)



d)



Q18 A block of mass 2 kg is kept gently on a moving tape of a machine in which the rotating cylinders have angular speed of 20 rad/sec and there radius is 20 cm. If coefficient of friction between the tape and block is 0.5 and there is no slipping between tape and cylinder. Then (take $g = 10\ m/s^2$)



a) The distance travelled by the block before relative motion with tape ceases is 1.6 m

b) Work done by friction on the block is 8 J

c) Work done by friction on the block is –16 J

d) Linear velocity of tape is 40 m/s

Q19 A particle is moving with a speed of 2 m/s, is decelerated at a rate given by $\frac{dv}{dt} = -\frac{3}{\sqrt{v}}$ where v is the instantaneous speed. The time taken by the particle to come at rest is

a) $\frac{2\sqrt{2}}{9}$ sec

b) $\frac{2\sqrt{2}}{3}$ sec

c) $\frac{4\sqrt{3}}{9}$ sec

d) $\frac{4\sqrt{2}}{9}$ sec

Q20 A neutron collides elastically with initially stationary deuteron. The fraction of kinetic energy lost by neutron is : (assume head on collision)

a) $\frac{8}{9}$

b) 1

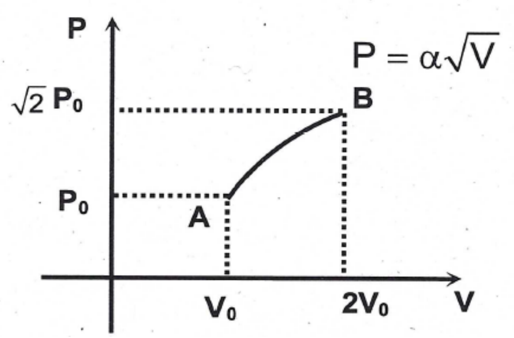
c) $\frac{2}{3}$

d) $\frac{1}{2}$

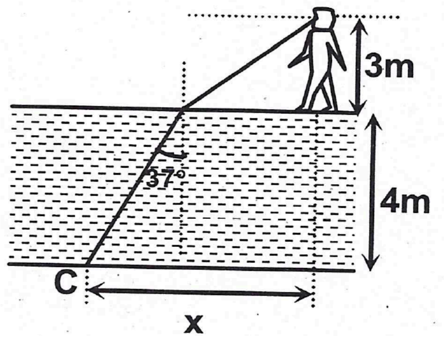
Numerical

Q21 A particle of mass 200 MeV/c^2 collides with a hydrogen atom at rest. Soon after the collision the particle comes to rest, and the atom recoils and goes to its first excited state. The initial kinetic energy of the particle (in eV) is $\frac{N}{4}$. The value of N is (Given the mass of the hydrogen atom to be 1 GeV/c^2) _______ .

Q22 An ideal diatomic gas is expanded from volume V_0 to $2V_0$ in the process $P = \alpha\sqrt{V}$ (where α is a constant) as shown. Then the molar heat capacity of the gas in the given process is $\frac{19R}{n}$. Find the value of n.



Q23 A man is standing at the edge of 4 m deep swimming pool, completely filled with water of refractive index $\mu = (4/3)$. The eyes of the man are 3 m above the edge of the swimming pool. A coin is located at the bottom of the pool. The ray coming from the coin 'C' at an angle 37º from the normal to the water-air interface reaches the eye of the man. Then find the horizontal distance in meter (represented by x in the figure) of the coin from the eye of the man is



Q24 Two bulbs one of 200 volt, 80 watt & the other of 200 volt, 100 watt are connected in series to a 200 volt supply. The power consumed is ___ watt.

Q25 A concave mirror for face viewing has focal length of 0.4 m. The distance at which you hold the mirror from your face in order to see your image upright with a magnification of 5 is $\frac{x}{25}$ meter. Find the value of x.

Chemistry

Single Choice Question

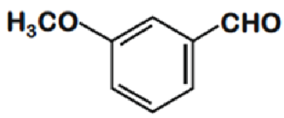
Q26 The value of spin only magnetic moment for one of the following configurations is 2.84 B.M.
Which of the following is correct ?

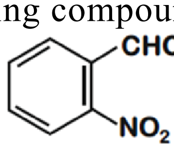
a) d^6 (in strong field ligand) **b)** d^2 (in weak field ligand)
c) d^3 (in weak as well as in strong field ligand) **d)** d^5 (in strong field ligand)

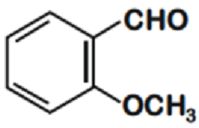
Q27 What is the correct order of 2nd ionisation energy ?

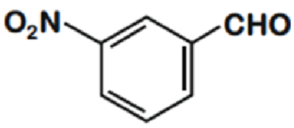
a) F < N < C < O **b)** N < C < F < O **c)** C < N < F < O **d)** O < C < F < N

Q28 The increasing order of the following compounds towards HCN addition is

(i) 

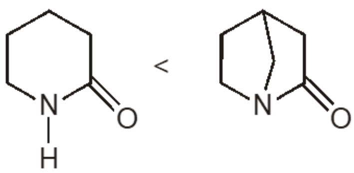
(ii) 

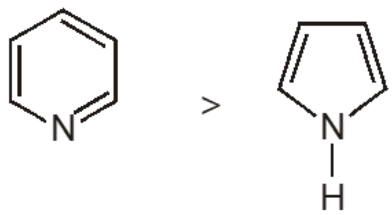
(iii) 

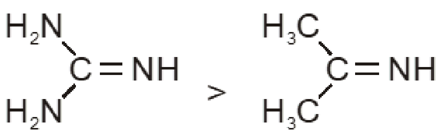
(iv) 

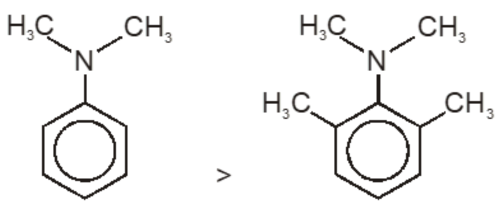
a) (iii) < (iv) < (ii) < (i) **b)** (iii) < (i) < (iv) < (ii) **c)** (iii) < (iv) < (i) < (ii)
d) (i) < (iii) < (iv) < (ii)

Q29 Which of the following order of basicity is incorrect?

a) 

b) 

c) 

d) 

Q30 Decomposition of nitrogen pentoxide is known to be a first order reaction 75 percent of the oxide had decomposed in the first 24 minutes. At the end of an hour, after the start of the reaction, the amount of oxide left will be

a) Nil **b)** About 1% **c)** About 2% **d)** About 3%

Q31 In a sample of hydrogen atoms all electrons are in a particular excited state n, when all electrons returned to ground state, photons with 6 different wavelengths are emitted. Which of the following is correct ?

a) Out of 6 different photons only 2 photons have speed eq ual to that of visible light.

b) If highest energy photon emitted from above sample is incident on the metal plate having work function 8 eV, K.E. of liberated photo-electron may be equal to or less than 4.75 eV.

c) Total number of radial nodes in all the orbital of n^{th} shell is 1.

d) Total number of angular nodes in all the orbital in $(n-1)^{th}$ shell is 13.

Q32 10 litre of a non linear polyatomic ideal gas at 127°C and 2 atm pressure is suddenly released to 1 atm pressure and the gas expanded adiabatically against constant external pressure, the final temperature and volume of the gas respectively are :

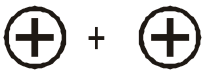
a) T = 350K; V = 17.5 L **b)** T = 300K; V = 15L **c)** T = 250 K; V =12.5 L

d) None of these

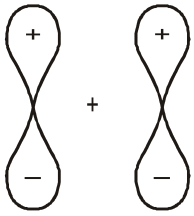
Q33 Which of the following species have bond order less than two

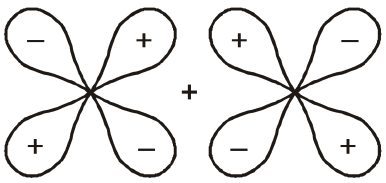
a) CO^+ **b)** N_2^+ **c)** NO **d)** C_2^+

Q34 Which of the following orbital overlap will result gerade molecular orbital

a) 

b) 

c) 

d) 

Q35 Isobutene can be prepared from tert-butanol by

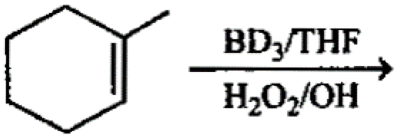
S1 : Heating it in the presence of conc. H_2SO_4.

S2 : Treating it with anhydrous $ZnCl_2$/Conc. HCl follwed by reaction with alc. KOH/ Δ.

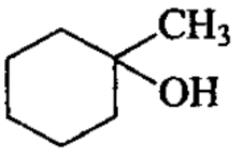
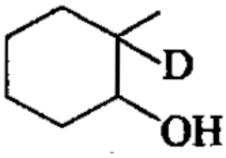
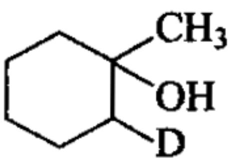
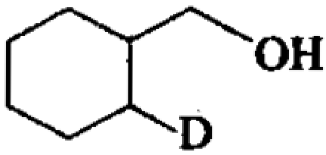
S3 : Treating it with p-tosylchloride followed by reaction with $tBu\overline{\ddot{O}}^{\oplus}K/\Delta$.

S4 : Heating it with Al_2O_3.

a) TTTT **b)** TFTT **c)** FTFT **d)** TTFF

Q36 

. Product A, A is

a) 
b) 
c) 
d) 

Q37 Which of the following sets consists only of essential amino acids ?

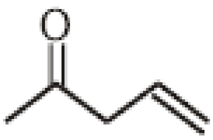
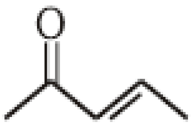
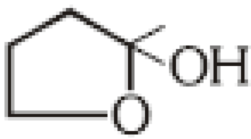
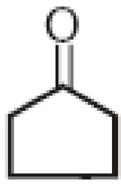
a) Alanine, tyrosine, cysteine
b) Leucine, lysine, tryptophan
c) Alanine, glutamine, lysine
d) Leucine, proline, glycines

Q38 Which of the following acids is monobasic?

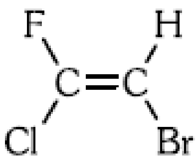
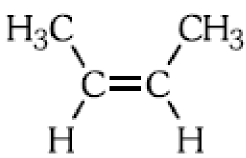
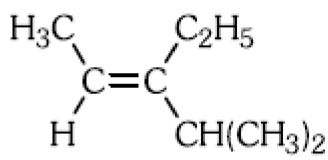
a) Hypophosphorous acid $\left(H_3PO_2\right)$
b) Orthophosphoric acid $\left(H_3PO_4\right)$
c) Pyrophosphoric acid $\left(H_4P_2O_7\right)$
d) Hypophosphoric acid $\left(H_4P_2O_6\right)$

Q39 

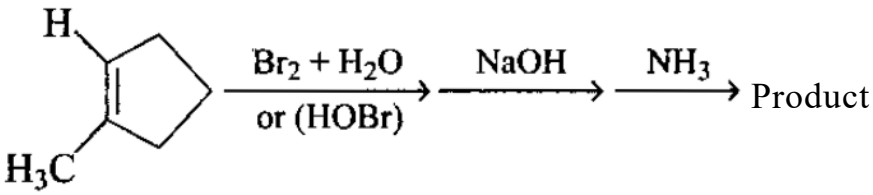
The major product of above reaction is :

a) 
b) 
c) 
d) 

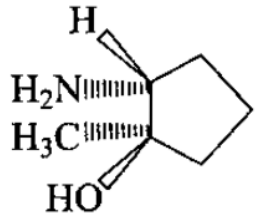
Q40 The 'E'-isomer is :

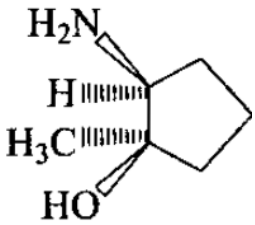
a) 
b) 
c) 
d) None of the above

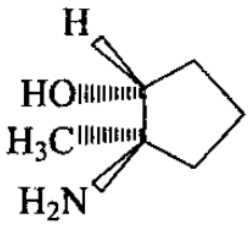
Q41

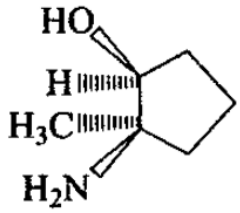


The product is:

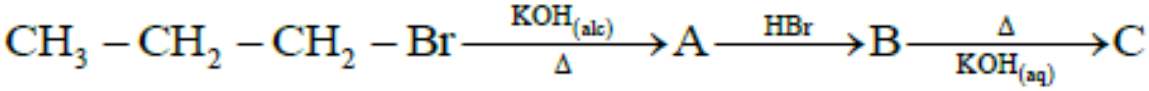
a) 

b) 

c) 

d) 

Q42 The product (C) in the below mentioned reaction is:



a) Propan-1-ol **b)** Propene **c)** Propyne **d)** Propan-2-ol

Q43 The basic strength of the hydrides of group 15 elements :

a) decreases on moving down the group **b)** increases on moving down the group

c) first decreases upto AsH_3 and then increases

d) first increases upto AsH_3 and then decreases

Q44 First IE of 5d series elements are generally higher than those of 3d and 4d series elements. This is due to :

a) Bigger size of atoms of 5d-series elements than 3d-series elements.

b) Greater effective nuclear charge is experienced by valence electrons because of the weak shielding of the nucleus by $4f$-electrons in 5d series.

c) (A) and (B) both. **d)** None of these.

Q45 On reaction of Lead Sulphide with dilute nitric acid which of the following is not formed ?

a) Lead nitrate **b)** Sulphur **c)** Nitric oxide **d)** Nitrous oxide

Numerical

Q46 The elevation of boiling point of 0.10 m aqueous $CrCl_3.xNH_3$ solution is two times that of 0.05 m aqueous $CaCl_2$ solution. The value of x is _____.
[Assume 100% ionisation of the complex and $CaCl_2$, coordination number of Cr as 6, and that all NH_3 molecules are present inside the coordination sphere]

Q47 In an estimation of bromine by Carius method, 3.2 g of an organic compound gave 1.88 g of AgBr. The mass percentage of bromine in the compound is _____.
(Atomic mass, Ag=108, Br=80 g mol^{-1})

Q48 If the solubility product of AB_2 is 25.6×10^{-11} M^3, then the solubility of AB_2 in pure water is _____ $\times 10^{-4}$ mol L^{-1}. [Assuming that neither kind of ion reacts with water]

Q49 Solid ammonium carbamate (NH_2COONH_4) is heated to a temperature of 2T Kelvin in a closed container initially containing NH_3 at a pressure of 0.005 atm and temperature T Kelvin, when dissociation equilibrium reaches, the pressure of reaction mixture becomes 0.04 atm. The equilibrium constant (K_P) for the carbamate at 2T Kelvin is X x 10^{-6} atm^3. What is the value of 'X' ?

Q50 I_2 (s)| I^- (1.0M) half cell is connected to $H^+_{aq} \mid H_2(1\ atm)$, Pt half cell and its cell potential is found to be 0.7714 V. If standard reduction potential of $I_{2(s)} \mid I^-$ is 0.535 V the pH of $H^+_{(aq)} \mid H_2$ half cell will be

Mathematics

Single Choice Question

Q51 The number of real roots of the equation $x|x|-5|x+2|+6=0$, is

a) 5 **b)** 3 **c)** 6 **d)** 4

Q52 If x_1, x_2, x_3, x_4 are roots of the equation $x^4 - x^3 \sin 2\beta + x^2 \cos 2\beta - x \cos \beta - \sin \beta = 0$ then $\sum_{i=1}^{4} tan^{-1} x_i$ is equal to

a) $\pi - \beta$ **b)** $\pi - 2\beta$ **c)** $\frac{\pi}{2} - \beta$ **d)** $\frac{\pi}{2} - 2\beta$

Q53 ABC is a triangle whose medians AD and BE are perpendicular to each other. If AD = p and BE = q then area of ΔABC is-

a) $\frac{2}{3}pq$ **b)** $\frac{3}{2}pq$ **c)** $\frac{4}{3}pq$ **d)** $\frac{3}{4}pq$

Q54 Let A be a 3 × 3 real matrix such that $A\begin{pmatrix}1\\1\\0\end{pmatrix}=\begin{pmatrix}1\\1\\0\end{pmatrix}; A\begin{pmatrix}1\\0\\1\end{pmatrix}=\begin{pmatrix}-1\\0\\1\end{pmatrix}$ and $A\begin{pmatrix}0\\0\\1\end{pmatrix}=\begin{pmatrix}1\\1\\2\end{pmatrix}$. If $X = (x_1, x_2, x_3)^T$ and I is an identity matrix of order 3, then the system $(A - 2I)X = \begin{pmatrix}4\\1\\1\end{pmatrix}$ has

a) no solution **b)** infinitely many solutions **c)** unique solution

d) exactly two solutions

Q55 If $-\frac{\pi}{2} < \alpha_1 < \alpha_2 < \alpha_3 < \frac{\pi}{2}$, then number of values of $\theta \in \left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$ satisfying $(\tan\theta - \tan\alpha_1)(\tan\theta - \tan\alpha_2)(\tan\theta - \tan\alpha_3) - (\tan\theta - \tan\alpha_1) - (\tan\theta - \tan\alpha_2) - (\tan\theta - \tan\alpha_3) = 0$

a) 0 **b)** 1 **c)** 2 **d)** 3

Q56 The value of $\cot\frac{\pi}{24}$ is :

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

Q57 The value of 'a' for which one root of quadratic equation $(a^2 - 5a + 3)x^2 + (3a - 1)x + 2 = 0$ is twice as large as other is :

a) 2/3 **b)** –2/3 **c)** 1/3 **d)** –1/3

Q58 The number of ways in which a pack of 52 cards of four different suits can be distributed equally among four players so that each player gets the Ace, King, Queen and Knave of the same suit is

a) $\frac{36!4!}{(9!)^4}$ **b)** $\frac{36!}{(9!)^4(4!)}$ **c)** $\frac{52!4!}{(9!)^4}$ **d)** None of these

Q59 If $A=\left\{(x,y);x^2-y^2=\frac{x}{x^2+y^2},x,y\in R\right\}$, $B=\left\{(x,y);2xy+\frac{y}{x^2+y^2}=3,x,y\in R\right\}$, $C=\left\{(x,y);x^3-3xy^2+3y=1,x,y\in R\right\}$, $D=\left\{(x,y);3x^2y-3x-y^3=0,x,y\in R\right\}$ then which of the following is true

a) $A\cap C=B\cap D$ b) $A\cap B=C\cap D$ c) $A\cap D=B\cap C$ d) $A\cap B\cap C\cap D=\phi$

Q60 $\lim_{n\to\infty}\left(\frac{1}{n}\right)^{\tan 1/n}=$

a) 0 b) 2 c) 1 d) 4

Q61 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) $\frac{x^2}{k^2}+\frac{y^2}{h^2}=1$ b) $\frac{x^2}{k^2}+\frac{y^2}{k^2-h^2}=1$ c) $\frac{x^2}{k^2}-\frac{y^2}{k^2-h^2}=1$ d) $\frac{x^2}{k^2}+\frac{y^2}{k^2+h^2}=1$

Q62 Let e_1 and e_2 be the eccentricities of the ellipse, $\frac{x^2}{25}+\frac{y^2}{b^2}=1\,(b<5)$ and the hyperbola, $\frac{x^2}{16}-\frac{y^2}{b^2}=1$ respectively satisfying $e_1e_2=1$. If α and β are the distances between the foci of the ellipse and the foci of the hyperbola respectively, then the ordered pair (α, β) is equal to :

a) (8, 10) b) $\left(\frac{24}{5},10\right)$ c) $\left(\frac{20}{3},12\right)$ d) (8, 12)

Q63 If $y = x + e^x$, then the value of $\frac{d^2x}{dy^2}$ at x = 1, will be-

a) e b) $\frac{-e}{(1+e)^3}$ c) $\frac{-e}{(1+e)}$ d) $\frac{-e}{(1+e)^2}$

Q64 Let $f(x)=\int_1^x (2(x-1)(x-2)^3+3(x-1)^2(x-2)^2)$, then-

a) f has exactly 4 critical points b) f has maximum at x = 2

c) $x=\frac{7}{5}$ is minima & x = 1 is maxima d) none of these

Q65 The area (in sq. units) of the region $\{(x,y)\in\mathbb{R}^2 : x^2\le y\le 3-2x\}$, is

a) $\frac{31}{3}$ b) $\frac{29}{3}$ c) $\frac{34}{3}$ d) $\frac{32}{3}$

Q66 The value of $\int_1^{\frac{1+\sqrt{5}}{2}}\frac{(x^2+1)}{(x^4-x^2+1)}\log\left(1+x-\frac{1}{x}\right)dx$ is

a) $\frac{\pi}{8}\log_e 2$ b) $\frac{\pi}{2}\log_e 2$ c) $-\frac{\pi}{2}\log_e 2$ d) None of these

Q67 A wire of length 22 m is to be cut into two pieces. One of the pieces is to be made into a square and the other into an equilateral triangle. Then, the length of the side of the equilateral triangle, so that the combined area of the square and the equilateral triangle is minimum, is :

a) $\frac{22}{9+4\sqrt{3}}$ **b)** $\frac{66}{9+4\sqrt{3}}$ **c)** $\frac{22}{4+9\sqrt{3}}$ **d)** $\frac{66}{4+9\sqrt{3}}$

Q68 The solution of the differential equation $\frac{dy}{dx} = \frac{siny+x}{sin2y - xcosy}$ is

a) $\sin^2 y = x \sin y + \frac{x^2}{2} + c$ **b)** $\sin^2 y = x \sin y - \frac{x^2}{2} + c$ **c)** $\sin^2 y = x + \sin y + \frac{x^2}{2} + c$

d) $\sin^2 y = x - \sin y + \frac{x^2}{2} + c$

Q69 The probability that a particular day in the month of July is a rainy day is $\frac{3}{4}$. Two person whose credibility are $\frac{4}{5}$ and $\frac{2}{3}$ respectively claim that 15th July was a rainy day. The probability that it was real a rainy day.

a) $\frac{3}{4}$ **b)** $\frac{24}{25}$ **c)** $\frac{8}{9}$ **d)** none of these

Q70 If $(x+a)^{100} = t_0 + t_1 + \ldots + t_{100}$, where $t_r = {}^n C_r x^{n-r} a^r$, then

$$\int \frac{2xdx}{\left(\sum_{r=0}^{50}(-1)^r t_{2r}\right)^2 + \left(\sum_{r=0}^{49}(-1)^r t_{2r+1}\right)^2} =$$

a) $C - \frac{1}{101\left(x^2+a^2\right)^{101}}$ **b)** $C - \frac{1}{99\left(x^2+a^2\right)^{99}}$ **c)** $C - 99\left(a^2+x^2\right)^{99}$

d) $C + 99\left(a^2+x^2\right)^{100}$

Numerical

Q71 If the mean and variance of eight numbers 3, 7, 9, 12, 13, 20, x and y be 10 and 25 respectively, then x.y is equal to _____.

Q72 If the function f defined on $\left(-\frac{1}{3}, \frac{1}{3}\right)$ by f(x) $\begin{cases} \frac{1}{x} log_e \left(\frac{1+3x}{1-2x}\right), & when\ x \neq 0 \\ k, & when\ x = 0 \end{cases}$ is continuous, then k is equal to _____.

Q73 If the sum of the coefficients of all even powers of x in the product $(1 + x + x^2 + \ldots\ldots + x^{2n})\ (1 - x + x^2 - x^3 + \ldots + x^{2n})$ Is 61, then n is equal to _____.

Q74 Let vector $\vec{a} = \hat{\imath} + 5\hat{\jmath} + \alpha\hat{k}$, vector $\vec{b} = \hat{\imath} + 3\hat{\jmath} + \beta\hat{k}$ and vector $\vec{c} = \hat{\imath} + 2\hat{\jmath} - 3\hat{k}$ be three vectors such that, $|\vec{b} \times \vec{c}| = 5\sqrt{3}$ and vector $\vec{a}$ is perpendicular to vector $\vec{b}$. Then the greatest amongst the values of $|\beta|^2$ is______

Q75 Let f : R → R be such that for all x∈R $(2^{1+x} + 2^{1-x})$, f(x) and $(3^x + 3^{-x})$ are in A.P., then the minimum value of f(x) is

Answer Key

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