

Competishun

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

Date: 26/12/2024

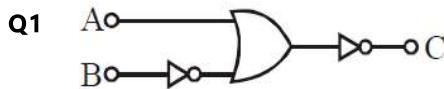
Time: 3 hours

Max. Marks: 300

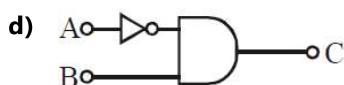
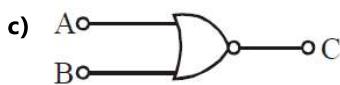
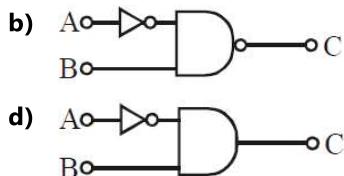
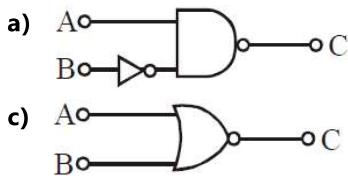
UTS-2_MT-11 (24-25)

Physics

Single Choice Question



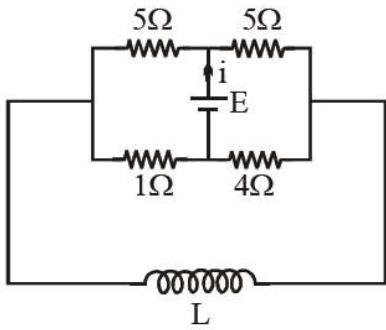
The logic circuit shown above is equivalent to :



- Q2** A ball of mass m approaches a wall of mass $M (>> m)$ with speed 4m/s along the normal to the wall. The speed of wall is 1 m/s towards the ball. The speed of the ball after an elastic collision with the wall is-

- a) 5 m/s away from the wall b) 9 m/s away from the wall
 c) 3 m/s away from the wall d) 6 m/s away from the wall

- Q3** The current (i) at time $t = 0$ and $t = \infty$ respectively for the given circuit is :



- a) $\frac{18E}{55}, \frac{5E}{18}$ b) $\frac{10E}{33}, \frac{5E}{18}$ c) $\frac{5E}{18}, \frac{18E}{55}$ d) $\frac{5E}{18}, \frac{10E}{33}$

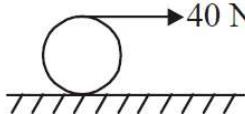
- Q4** Two coherent light sources having intensity in the ratio $2x$ produce an interference pattern.

The ratio $\frac{I_{max} - I_{min}}{I_{max} + I_{min}}$ will be:

- a) $\frac{2\sqrt{2x}}{x+1}$ b) $\frac{\sqrt{2x}}{2x+1}$ c) $\frac{\sqrt{2x}}{x+1}$ d) $\frac{2\sqrt{2x}}{2x+1}$

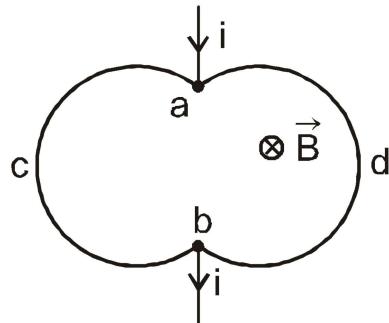
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- Q5** A string is wound around a hollow cylinder of mass 5 kg and radius 0.5 m. If the string is now pulled with a horizontal force of 40 N, and the cylinder is rolling without slipping on a horizontal surface (see figure), then the angular acceleration of the cylinder will be (Neglect the mass and thickness of the string)



- a) 20 rad/s^2 b) 16 rad/s^2 c) 12 rad/s^2 d) 10 rad/s^2

- Q6** The figure shows a conducting loop abcda placed in plane perpendicular to a constant magnetic field \vec{B} . The two parts acb and adb are circular arcs of radius a . The separation between the points a and b is l . The point a and b are connected to a battery which sends a current i . The magnetic force on the loop due to the field \vec{B} is :



- a) $i\ell B$ b) $2i\ell B$ c) zero d) $2ia B$

- Q7** The electric field inside a sphere which carries a charge density proportional to the distance from the origin $\rho = \alpha r$ (α is a constant) is:

- a) $\frac{xr^3}{4\epsilon_0}$ b) $\frac{\alpha r^2}{4\epsilon_0}$ c) $\frac{\alpha r^2}{3\epsilon_0}$ d) None of these

- Q8** Light is incident from a medium into air at two possible angles of incidence (A) 20° and (B) 40° .

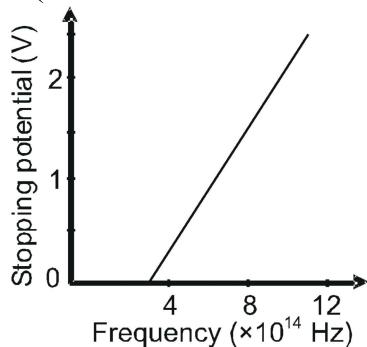
In the medium light travels 3.0 cm in 0.2 ns. The ray will :

- a) suffer total internal reflection in both cases (A) and (B)
- b) suffer total internal reflection in case (B) only
- c) have partial reflection and partial transmission in case (B)
- d) have 100% transmission in case (A)

- Q9** A hydrogen atom is initially at rest and free to move is in the second excited state. It comes to ground state by emitting a photon, then the momentum of hydrogen atom will be approximately : (in kg-m/s)

- a) 12.1×10^{-27} b) 6.45×10^{-27} c) 3×10^{-27} d) 1.5×10^{-27}

- Q10** In an experimental observation of the photoelectric effect, the stopping potential was plotted versus the light frequency, as shown in the figure below. The best straight line was fitted to the experimental points. Which of the following gives the slope of the line? (Work function of the metal is ϕ and symbols have their usual meaning.)



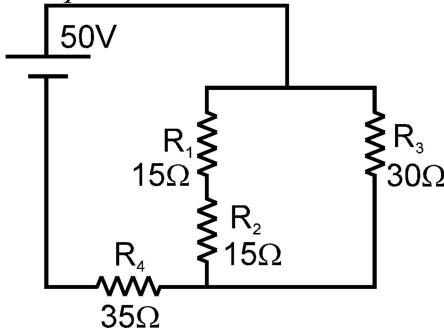
a) $\frac{h}{\phi}$

b) $\frac{h}{e}$

c) $\frac{e}{h}$

d) $\frac{\phi}{e}$

- Q11** The potential difference in volts, across the resistance R_2 in the circuit given is:



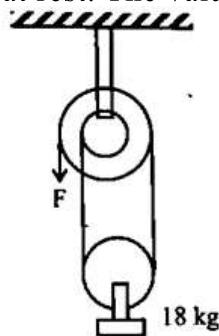
a) 5

b) 7.5

c) 10

d) 15

- Q12** In the figure at the free end a force F is applied to keep the suspended mass of 18 kg at rest. The value of F is-



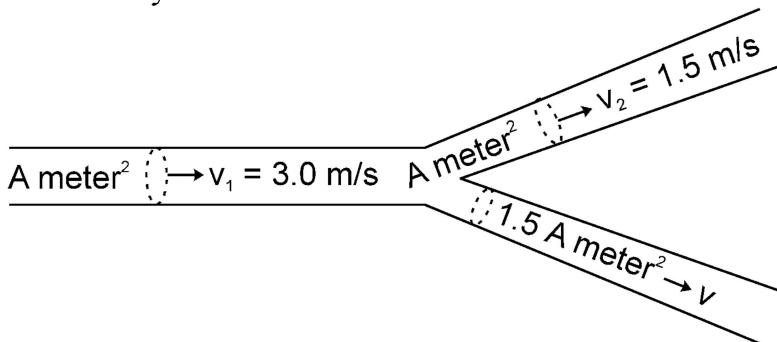
a) 180 N

b) 90 N

c) 60 N

d) 30 N

Q13 An incompressible liquid flows through a horizontal tube as shown in the figure. Then the velocity 'v' of the fluid is :

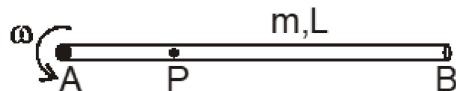


- a) 3.0 m/s b) 1.5 m/s c) 1.0 m/s d) 2.25 m/s

Q14 In a process the density of a gas remains constant. If the temperature is doubled, then the change in the pressure will be:

- a) 100 % b) 200 % c) 50 % d) 25 %

Q15 A uniform thin, rod AB of length L and mass m is undergoing fixed axis rotation about end A, such that end A remains stationary as shown. The kinetic energy of section AP of rod is equal to kinetic energy of section BP of rod at an instant. Then the ratio of length AP and length AB, that is, $\frac{AP}{AB}$ is equal to



- a) $\frac{1}{2}$ b) $\frac{1}{2^{1/3}}$ c) $\frac{1}{\sqrt{2}}$ d) $\frac{1}{2\sqrt{2}}$

Q16 $Y = A \sin(\omega t + \phi_0)$ is the time-displacement equation of a SHM. At $t = 0$ the displacement of the particle is $Y = \frac{A}{2}$ and it is moving along negative x-direction.

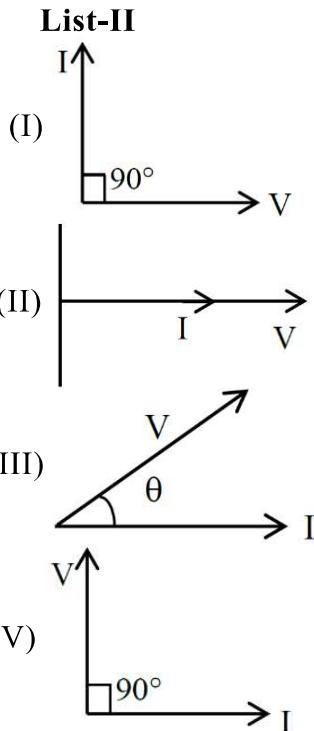
Then the initial phase angle ϕ_0 will be :

- a) $\frac{\pi}{6}$ b) $\frac{\pi}{3}$ c) $\frac{5\pi}{6}$ d) $\frac{2\pi}{3}$

Q17 Match List I with List II

List-I

(A) Purely capacitive circuit



(B) Purely inductive circuit

(C) LCR series at resonance

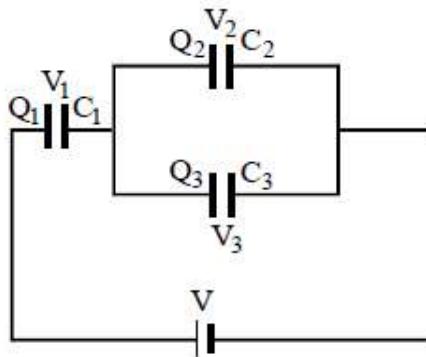
(D) LCR series circuit

Choose the correct answer from the options given below :

- a) A-I, B-IV, C-III, D-II
 c) A-IV, B-I, C-II, D-III

- b) A-IV, B-I, C-III, D-II
 d) A-I, B-IV, C-II, D-III

Q18 Three capacitors C_1 , C_2 and C_3 are connected to a battery as shown. With symbols having their usual meanings, the correct conditions are



- a) $Q_1 = Q_2 = Q_3$ and $V_1 = V_2 = V$
 b) $V_1 = V_2 = V_3 = V$
 c) $Q_1 = Q_2 + Q_3$ and $V = V_1 + V_2$
 d) $Q_2 = Q_3$ and $V = V_2 + V_3$

Q19 A longitudinal wave is represented by $x = 10 \sin 2\pi \left(nt - \frac{x}{\lambda} \right)$ cm. The maximum particle velocity will be four times the wave velocity if the determined value of wavelength is equal to :

- a) 2π
 b) 5π
 c) π
 d) $\frac{5\pi}{2}$

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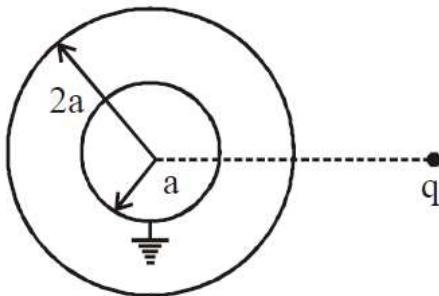
Q20 A man is moving with 10 m/s towards west on a horizontal ground. He observed that the rainfall is falling vertically downwards. Now he increases his speed to 15 m/s and find that now the rainfall is falling at an angle of 45° towards him. The speed of the rain with respect to ground is :

- a) $10\sqrt{5} \text{ m/s}$ b) 10 m/s c) $5\sqrt{5} \text{ m/s}$ d) None of these

Numerical

Q21 A solid conducting sphere of radius a is surrounded by a thin uncharged concentric conducting shell of radius $2a$. A point charge q is placed at a distance $4a$ from common centre of conducting sphere and shell. The inner sphere is then grounded.

The charge on solid sphere is $\frac{q}{x}$. Find the value of x .



Q22 The initial velocity v_i required to project a body vertically upward from the surface of the earth to reach a height of $10R$, where R is the radius of the earth, may be

described in terms of escape velocity v_e such that $v_i = \sqrt{\frac{x}{y}} \times v_e$. The value of x will be _____.

Q23 A copper wire is stretched to make it 0.5% longer. The percentage change in its electrical resistance if its volume remains unchanged is:

Q24 The emissivity of tungsten is approximately 0.35. A tungsten sphere 1 cm in radius is suspended within a large evacuated enclosure whose walls are at 300 K. What power input is required to maintain the sphere at a temperature of 3000 K if heat conduction along the supports is neglected? Express your answer in kW after rounding off the integer. Take $\sigma = \frac{17}{3} \times 10^{-8}$ S.I. units and $\pi = \frac{213}{68}$

Q25 The magnetic field of a plane electromagnetic wave is given by:

$$\vec{B} = B_0 \hat{i} [\cos(kz - \omega t)] + B_1 \hat{j} \cos(kz + \omega t)$$

Where $B_0 = 3 \times 10^{-5}$ T and $B_1 = 2 \times 10^{-6}$ T.

The rms value of the force (in newton) experienced by a stationary charge $Q = 10^{-4}$ C

at $z = 0$ is $\frac{x}{\sqrt{2}} \times 10^{-1}$, find value of x:

Chemistry

Single Choice Question

Q26 An ore contains 2.296% of the mineral argentite, Ag_2S , by mass. How many grams of this ore would have to be processed in order to obtain 1.00 g of pure solid silver? ($\text{Ag} = 108$)

- a) 1.148 g b) 0.026 g c) 50 g d) 2.296 g

Q27 Which of the following order is correct?

- a) $\text{B} < \text{Al} < \text{Ga} < \text{In} < \text{Tl}$ (Atomic radius)
 b) $\text{B}^{+3} < \text{Al}^{+3} < \text{Ga}^{+3} < \text{In}^{+3} < \text{Tl}^{+3}$ (Ionic radius)
 c) $\text{B} > \text{Ga} > \text{Al} > \text{In} > \text{Tl}$ (Ionization energy)
 d) $\text{B} > \text{Al} > \text{Ga} > \text{In} > \text{Tl}$ (Electronegativity)

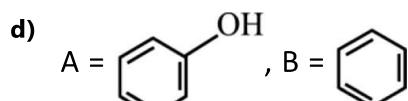
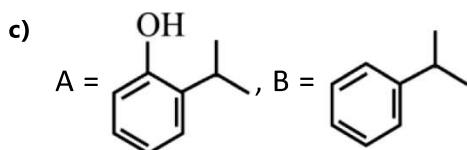
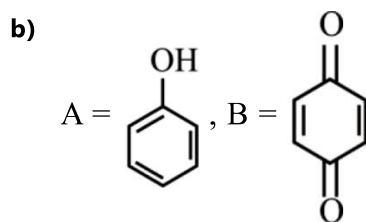
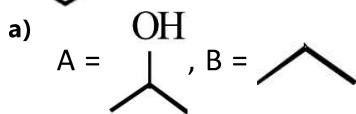
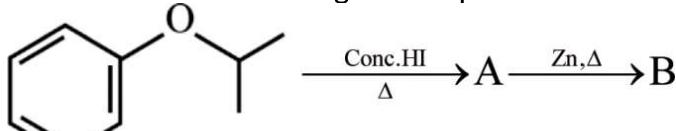
Q28 The minimum work which must be done to compress 16 g of oxygen isothermally at 300 K from a pressure of $1.01325 \times 10^3 \text{ N/m}^2$ to $1.01325 \times 10^5 \text{ N/m}^2$ is ($\ln 100 = 4.6$, $R = 8.3 \text{ J/K-mol}$)

- a) 5727 J b) 11.454 kJ c) 123.255 kJ d) 1232.55 J

Q29 Which of the following reagent can not be used for the distinction between Fe^{+2} & Fe^{+3} .

- a) Addition of KSCN b) Addition of NH_4OH
 c) Addition of dil. HCl d) Addition of $\text{K}_4[\text{Fe}(\text{CN})_6]$

Q30 Compound I is heated with Conc. HI to give a hydroxy compound A which is further heated with Zn dust to give compound B. Identify A and B.



Q31 In which of the following reactions, the concentration of product is higher than the concentration of reactant at equilibrium? (K = equilibrium constant)

- a) $\text{A} \rightleftharpoons \text{B}; K = 0.001$ b) $\text{M} \rightleftharpoons \text{N}; K = 10$
 c) $\text{X} \rightleftharpoons \text{Y}; K = 0.005$ d) $\text{R} \rightleftharpoons \text{P}; K = 0.01$

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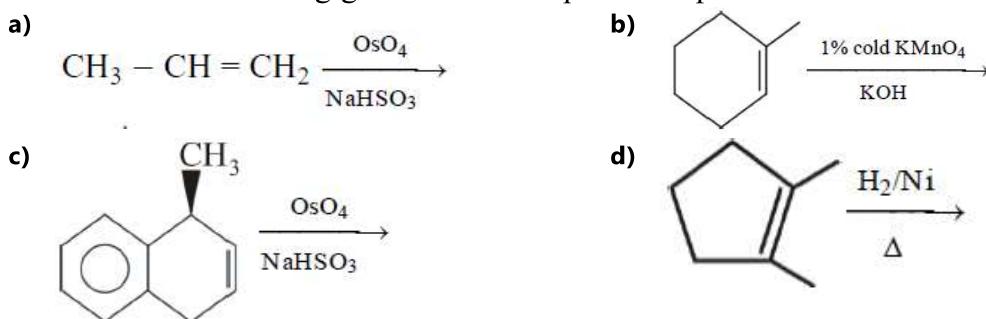
Q32 Complex X of composition $\text{Cr}(\text{H}_2\text{O})_6\text{Cl}_n$ has a spin only magnetic moment of 3.83 BM. It reacts with AgNO_3 and shows geometrical isomerism. The IUPAC nomenclature of X is

- a) Tetraaquadichlorido chromium(III) chloride dihydrate
- b) Hexaaqua chromium(III) chloride
- c) Tetraaquadichlorido chromium(IV) Chloride dihydrate
- d) Dichloridotetraqua chromium(IV) chloride dihydrate

Q33 What volume of 0.2 N KMnO_4 solution is needed for complete reaction with 6.64 g $\text{Fe}_{0.9}\text{O}_{1.0}$, in acidic medium ? ($\text{Fe} = 56$)

- a) 280 ml
- b) $\frac{280}{9}$ ml
- c) $\frac{350}{9}$ ml
- d) 350 ml

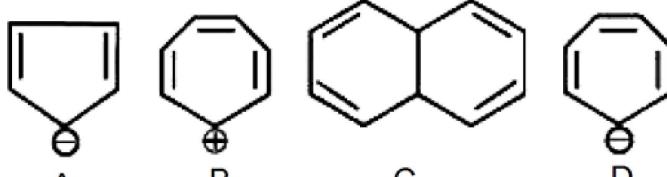
Q34 Which of the following gives meso compound as product?



Q35 Two solutions A and B are prepared by dissolving 1 g of non-volatile solutes X and Y, respectively in 1 kg of water. The ratio of depression in freezing points for A and B is found to be 1 : 4. The ratio of molar masses of X and Y is :

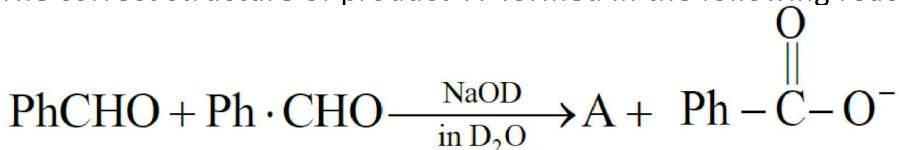
- a) 1 : 4
- b) 1 : 0.25
- c) 1 : 0.20
- d) 1 : 5

Q36 Which of the following structures are aromatic in nature?

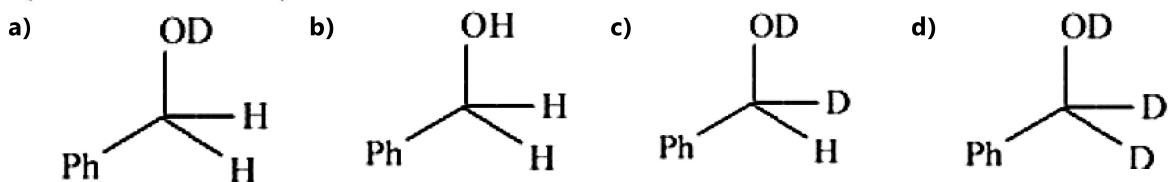


- a) A, B, C and D
- b) Only A and B
- c) Only A and C
- d) Only B, C and D

Q37 The correct structure of product 'A' formed in the following reaction.



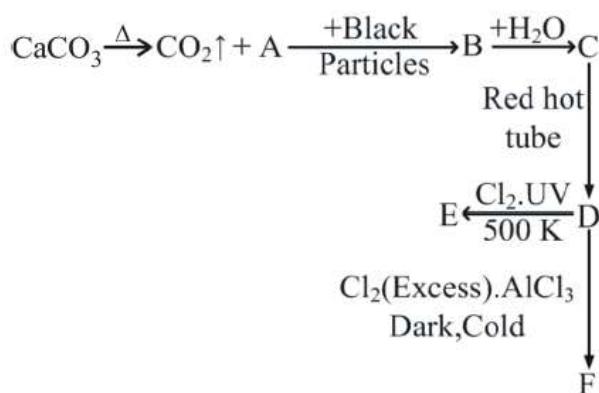
(Ph is C_6H_5)



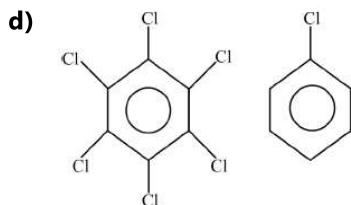
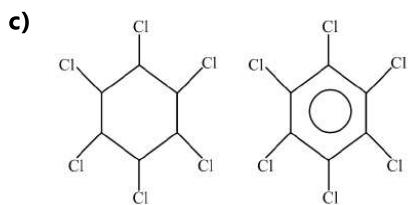
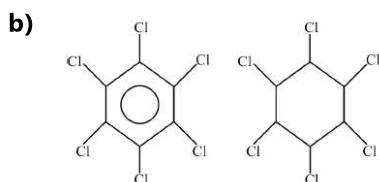
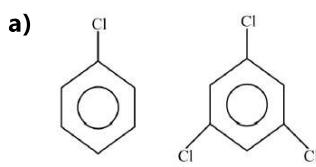
Q38 Stability of α - Helix structure of proteins depends upon

- a) dipolar interaction
- b) H-bonding interaction
- c) van der Waals forces
- d) π -stacking interaction

Q39

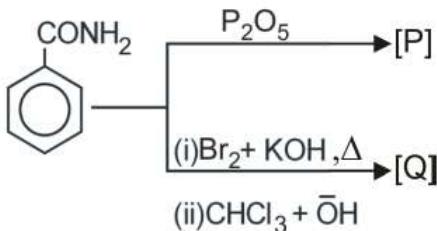


E and F respectively are



Q40 A primary aliphatic amine on reaction with nitrous acid in cold (273 K) and thereafter raising temperature of reaction mixture to room temperature (298 K) gives a/an

- a) nitrile
- b) alcohol
- c) diazonium salt
- d) secondary amine

Q41

Which statement is INCORRECT?

- a) Reduced product of P and Q will be metamers to each other. (Consider LiAlH_4 as a reducing agent)
- b) By dry distillation of hydrolysed product of P with $\text{Ca}(\text{OH})_2 / \Delta$ gives benzophenone.
- c) One of the hydrolysis product of Q reacts with $\text{NaNO}_2 + \text{HCl}$ followed by reaction with phenol in mild basic medium gives orange red dye.
- d) Electrophile involved in the formation of Q is dichlorocarbene

Q42 Hybridisation of (underlined atom) in given species is respectively:

- | | |
|--|---|
| (I) $[\underline{\text{Fe}}(\text{CO})_5]$ | (II) $[\underline{\text{Ni}}(\text{CO})_4]$ |
| (III) $\underline{\text{Br}}\text{F}_5$ | (IV) $\underline{\text{N}}(\text{SiH}_3)_3$ |

- | | |
|---|---|
| a) $\text{dsp}^3, \text{dsp}^2, \text{sp}^3 \text{d}, \text{sp}^3$
c) $\text{dsp}^3, \text{sp}^3, \text{sp}^3 \text{d}^2, \text{sp}^2$ | b) $\text{sp}^3 \text{d}, \text{sp}^3, \text{sp}^3 \text{d}^2, \text{sp}^2$
d) $\text{dsp}^3, \text{dsp}^2, \text{sp}^3 \text{d}^2, \text{sp}^3$ |
|---|---|

Q43 Identify correct statements from below:

- A. The chromate ion is square planar.
- B. Dichromates are generally prepared from chromates.
- C. The green manganate ion is diamagnetic.
- D. Dark green coloured K_2MnO_4 disproportionates in a neutral or acidic medium to give permanganate.
- E. With increasing oxidation number of transition metal, ionic character of the oxides decreases.

Choose the correct answer from the options given below:

- a) B, C, D only b) A, D, E only c) A, B, C only d) B, D, E only

Q44 To a solution of acetic acid, solid sodium acetate is gradually added. When 'x g' of the salt has been added, the pH has a certain value. When total 'y g' of the salt has been added, the pH has been further raised by 0.6 units. What is the ratio of $x : y$? ($\log 3.98 = 0.6$)

- a) 3.98 : 1 b) 1 : 3.98 c) 2 : 3.98 d) 3.98 : 2

Q45 Match List-I with List-II

List-I

- (A) Glucose + HI
- (B) Glucose + Br₂ water
- (C) Glucose + acetic anhydride
- (D) Glucose + HNO₃

List-II

- (I) Gluconic acid
- (II) Glucose pentacetate
- (III) Saccharic acid
- (IV) Hexane

Choose the correct answer from the options given below:

- a) (A)-(IV), (B)-(I), (C)-(II), (D)-(III)
- b) (A)-(IV), (B)-(III), (C)-(II), (D)-(I)
- c) (A)-(III), (B)-(I), (C)-(IV), (D)-(II)
- d) (A)-(I), (B)-(III), (C)-(IV), (D)-(II)

Numerical

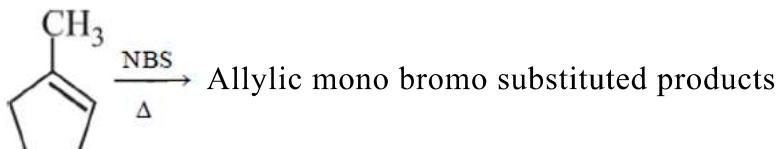
Q46 The energy (in KJ) required to excite 1 L of Hydrogen gas at 1 atm and 300 K to the first excited state of atomic hydrogen is :

(The energy for the dissociation of H – H Bond is 432KJmol⁻¹ and the ionization energy of Hydrogen is 1296KJmol⁻¹).

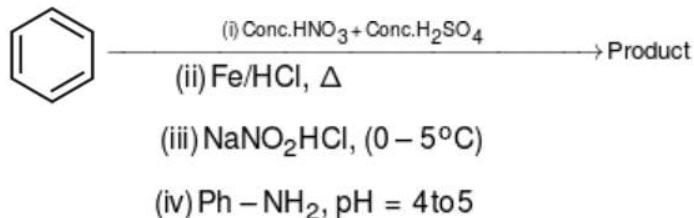
$$R = 0.08 \text{ Latm / K - mole}$$

Q47 For a particular reaction $A \longrightarrow$ product, graph of reciprocal of concentration of reactant (y-axis) versus time (x-axis) is a straight line having intercept 10 (on y - axis) and slope 0.1 . Calculate time (in min) required for 80% completion of reaction. [Time –min , concentration = molar]

Q48 How many total allylic monobromo substituted products are formed with following compound when it react with N-bromo succinamide.



Q49



Molecular weight of final organic product is ?

Q50 The solubility product of a sparingly soluble salt A_2X_3 is 1.1×10^{-23} . If specific conductance of the solution is $6 \times 10^{-5} \text{ S m}^{-1}$, the limiting molar conductivity of the solution is $x \times 10^{-3} \text{ S m}^2 \text{ mol}^{-1}$. The value of x is _____.

Mathematics

Single Choice Question

Q51 If the circle $x^2 + y^2 + 4x + 22y + c = 0$ bisects the circumference of the circle

$x^2 + y^2 - 2x + 8y + d = 0$, then $c - d$ is equal to

- a) 60
- b) 50
- c) 40
- d) 56

Q52 The value of $a(a > 0)$ for which the area bounded by the curves $y = \frac{x}{6} + \frac{1}{x^2}$, $x = a$, and $x = 2a$ has the least value is _____.
 a) 1 b) 2 c) 3 d) 4

Q53 If unity is double repeated root of $px^3 + q(x^2 + x) + r = 0$, then

- a) $p \cdot r < 0$
- b) $p \cdot q < 0$
- c) $p \cdot q \cdot r > 0$
- d) none of these

Q54 The number of integral values of k for which the equation $|x^2 - 5|x| + 6| = k$ has four solutions is

- a) 5
- b) 2
- c) 1
- d) none of these

Q55 $\int \frac{x^3 - 1}{x^4 \sqrt{6x^6 - 4x^3 + 2}} dx$ equals ($x > 0$)

- a) $\frac{\sqrt{6x^6 - 4x^3 + 2}}{12x^3} + c$
- b) $\frac{\sqrt{6x^6 - 4x^3 + 2}}{12x^2} + c$
- c) $\frac{\sqrt{6x^6 - 4x^3 + 2}}{6x^3} + c$
- d) $\frac{\sqrt{6x^6 - 4x^3 + 2}}{6x^2} + c$

Q56 Let $f(x) = \lim_{n \rightarrow \infty} \frac{(x^2 + 2x + 3 + \sin \pi x)^n - 1}{(x^2 + 2x + 3 + \sin \pi x)^n + 1}$. Then

- a) $f(x)$ is continuous and differentiable for all $x \in \mathbb{R}$
- b) $f(x)$ is continuous but not differentiable for all $x \in \mathbb{R}$
- c) $f(x)$ is discontinuous at infinite number of points
- d) none of these

Q57 If PQ is a double ordinate of the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ such that OPQ is an equilateral triangle, O being the centre of the hyperbola. Then the eccentricity e of the hyperbola satisfies

- a) $1 < e < \frac{2}{\sqrt{3}}$
- b) $e = \frac{2}{\sqrt{3}}$
- c) $e = \frac{\sqrt{3}}{2}$
- d) $e > \frac{2}{\sqrt{3}}$

- Q58** If PQ is focal chord of ellipse $\frac{x^2}{25} + \frac{y^2}{16} = 1$ which passes through $S = (3, 0)$ and $PS = 2$ then length of chord PQ is
a) 8 **b) 6** **c) 10** **d) 4**
- Q59** The term independent of a in the expansion of $\left(1 + \sqrt{a} + \frac{1}{\sqrt{a}-1}\right)^{-30}$ is
a) ${}^{30}C_{20}$ **b) 0** **c) ${}^{30}C_{10}$** **d) none of these**
- Q60** Let the function $f(x)$ be defined as follows:

$$f(x) = \begin{cases} x^3 + x^2 - 10x, & -1 \leq x < 0 \\ \cos x, & 0 \leq x < \pi/2 \\ 1 + \sin x, & \pi/2 \leq x \leq \pi \end{cases}$$
 Then $f(x)$ has
a) a local minimum at $x = \pi/2$ **b) a global maximum at $x = \pi/2$**
c) an absolute maximum at $x = -1$ **d) an absolute maximum at $x = \pi$**
- Q61** Let the six numbers $a_1, a_2, a_3, a_4, a_5, a_6$ be in A.P. and $a_1 + a_3 = 10$. If the mean of these six numbers is $\frac{19}{2}$ and their variance is σ^2 , then $8\sigma^2$ is equal to
a) 220 **b) 210** **c) 200** **d) 105**
- Q62** Let N be the set of natural numbers and a relation R on N be defined by $R = \{(x, y) \in N \times N : x^3 - 3x^2y - xy^2 + 3y^3 = 0\}$. Then the relation R is :
a) symmetric but neither reflexive nor transitive
b) reflexive but neither symmetric nor transitive
c) reflexive and symmetric, but not transitive
d) an equivalence relation
- Q63** Let $y = f(x)$ represent a parabola with focus $\left(-\frac{1}{2}, 0\right)$ and directrix $y = -\frac{1}{2}$. Then
 $S = \left\{x \in \mathbb{R} : \tan^{-1}(\sqrt{f(x)}) + \sin^{-1}(\sqrt{f(x)+1}) = \frac{\pi}{2}\right\}$
a) contains exactly two elements **b) contains exactly one element**
c) is an infinite set **d) is an empty set**
- Q64** If the orthocentre of the triangle, whose vertices are $(1, 2), (2, 3)$ and $(3, 1)$ is (α, β) , then the quadratic equation whose roots are $\alpha + 4\beta$ and $4\alpha + \beta$, is
a) $x^2 - 19x + 90 = 0$ **b) $x^2 - 18x + 80 = 0$**
c) $x^2 - 22x + 120 = 0$ **d) $x^2 - 20x + 99 = 0$**
- Q65** Let α be a root of the equation $x^2 + x + 1 = 0$ and the matrix $A = \frac{1}{\sqrt{3}} \begin{bmatrix} 1 & 1 & 1 \\ 1 & \alpha & \alpha^2 \\ 1 & \alpha^2 & \alpha^4 \end{bmatrix}$, then
the matrix A^{31} is equal to :
a) A^2 **b) A** **c) I_3** **d) A^3**

- Q66** Let $\vec{a} = \hat{i} + \hat{j} + \sqrt{2}\hat{k}$, $\vec{b} = b_1\hat{i} + b_2\hat{j} + \sqrt{2}\hat{k}$ and $\vec{c} = 5\hat{i} + \hat{j} + \sqrt{2}\hat{k}$ be three vectors such that the projection vector of \vec{b} on \vec{a} is \vec{a} . If $\vec{a} + \vec{b}$ is perpendicular to \vec{c} , then $|\vec{b}|$ is equal to :
a) $\sqrt{22}$ **b)** $\sqrt{32}$ **c)** 4 **d)** 6
- Q67** An unbiased cubic die marked with 1, 2, 2, 3, 3, 3 is rolled 3 times. The probability of getting a total score of 4 or 6 is
a) $16/216$ **b)** $50/216$ **c)** $60/216$ **d)** none of these
- Q68** Let f be a differentiable function on R and satisfying $f(x) = -(x^2 - x + 1)e^x + \int_0^x e^{x-y} f'(y) dy$. If $f(1) + f'(1) = ke$, where $k \in N$, then k is equal to _____
a) 2 **b)** 6 **c)** 4 **d)** 8
- Q69** "xyz" is a three digit number framed by decimal digits such that $y > x$ as well $y > z$ (repetition is allowed). Total number of xyz is equal to _____
a) 240 **b)** 245 **c)** 230 **d)** 248
- Q70** The coordinates of the foot of the perpendicular drawn from the origin to the line joining the points $(-9, 4, 5)$ and $(10, 0, -1)$ will be
a) $(-3, 2, 1)$ **b)** $(1, 2, 2)$ **c)** $(4, 5, 3)$ **d)** None of these

Numerical

- Q71** $\lim_{x \rightarrow 0} \frac{\sqrt[3]{1+\sin^2 x} - \sqrt[4]{1-2\tan x}}{\sin x + \tan^2 x}$ equals to A, then find the value of $12 \times A$
- Q72** Let $f: R \rightarrow R$ be continuous function satisfying $f(x) + f(x+1) = x^2 + 2x + 3$, then $\int_0^2 f(x) dx$ is equal to A, then find the value of [A] where [] is greatest integer.
- Q73** Let $A = \{1, 2, 3, 4, 5\}$ and $B = \{0, 1, 2, 3, 4, 5\}$, how many one-one function $f: A \rightarrow B$ can be defined so that $f(i) \neq i \forall i = 2, 3, 4, 5$ and $f(1) \neq 0$ or 1 .
- Q74** If the system of linear equations
 $x + y + z = 5$
 $x + 2y + 2z = 6$
 $x + 3y + \lambda z = \mu$, ($\lambda, \mu \in R$), has infinitely many solutions, then the value of $\lambda + \mu$ is :
- Q75** Let $f(x) = \begin{cases} x^3 + x^2 + 3x + \sin x \left(3 + \sin \frac{1}{x} \right), & x \neq 0 \\ 0, & x = 0 \end{cases}$. Then the number of points where $f(x)$ attains its minimum value is _____

Answer Key

Que.	1	2	3	4	5	6	7	8	9	10
Ans.	D	D	D	D	B	A	B	B	B	B
Que.	11	12	13	14	15	16	17	18	19	20
Ans.	B	B	C	A	B	C	D	C	B	C
Que.	21	22	23	24	25	26	27	28	29	30
Ans.	4	10	1	2	9	C	B	A	C	D
Que.	31	32	33	34	35	36	37	38	39	40
Ans.	B	A	D	D	B	B	A	B	C	B
Que.	41	42	43	44	45	46	47	48	49	50
Ans.	A	C	D	B	A	99	400	9	197	6
Que.	51	52	53	54	55	56	57	58	59	60
Ans.	B	A	B	D	C	A	D	C	B	C
Que.	61	62	63	64	65	66	67	68	69	70
Ans.	B	B	A	D	D	D	B	C	A	D
Que.	71	72	73	74	75					
Ans.	6	4	256	10	1					