TECHNO INDIA GROUP PUBLIC SCHOOL

Dt. 21-03-2025

JEE Main

Mock Test - 3 (2025)

Time Allowed: **3 hours** Maximum Marks: **300**

General Instructions:

1. There are three subjects in the question paper consisting of Physics (Q. no. 1 to 25), Chemistry (Q, no. 26 to 50), and Mathematics (Q. no. 51 to 75).
2. Each subject is divided into two sections. Section A consists of 20 multiple-choice questions & Section B consists of 5 numerical value-type questions.
3. There will be only one correct choice in the given four choices in Section A. For each question for Section A, 4 marks will be awarded for correct choice, 1 mark will be deducted for incorrect choice questions and zero marks will be awarded for not attempted questions.
4. For Section B questions (Integer type), 4 marks will be awarded for correct choice, 1 mark will be deducted for incorrect choice questions and zero marks will be awarded for not attempted questions.
5. Any textual, printed, or written material, mobile phones, calculator etc. is not allowed for the students appearing for the test.
6. All calculations/written work should be done in the rough sheet, provided with the Question Paper.

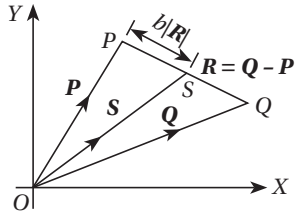
TECHNO INDIA GROUP

Physics

SECTION A

Section A consists of 20 questions of 4 mark each.

1. Three vectors $\boldsymbol{P}$, $\boldsymbol{Q}$ and $\boldsymbol{R}$ are shown in the figure. Let S be any point on the vector $\boldsymbol{R}$. The distance between the points P and S is $b\,\boldsymbol{R}$. The general relation among vectors $\boldsymbol{P}$. $\boldsymbol{Q}$ and $\boldsymbol{S}$ is [4]



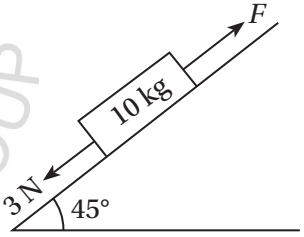
① $\boldsymbol{S} = (1 - b^2)\boldsymbol{P} + b\boldsymbol{Q}$ ② $\boldsymbol{S} = (b - 1)\boldsymbol{P} + b\boldsymbol{Q}$ ③ $\boldsymbol{S} = (1 - b)\boldsymbol{P} + b\boldsymbol{Q}$ ④ $\boldsymbol{S} = (1 - b)\boldsymbol{P} + b^2\boldsymbol{Q}$

2. A particle moves from the point $\left(2.0\hat{i} + 4.0\hat{j}\right)$ m at $t = 0$ with an initial velocity $\left(5.0\hat{i} + 4.0\hat{j}\right)$ ms^{-1}. [4]

It is acted upon by a constant force which produces a constant acceleration $\left(4.0\hat{i} + 4.0\hat{j}\right)$ ms^{-2}. What is the distance of the particle from the origin at time 2 s?

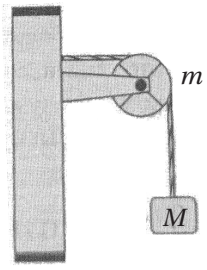
① 5 m ② $20\sqrt{2}$ m ③ $10\sqrt{2}$ m ④ 15 m

3. A block of mass 10 kg is kept on a rough inclined plane as shown in the figure. A force of 3 N is applied on the block. The coefficient of static friction between the plane and the block is 0.6. What should be the minimum value of force F, such that the block does not move downward? (Take g = 10 ms^{-2}) [4]



① 32 N ② 25 N
③ 23 N ④ 18 N

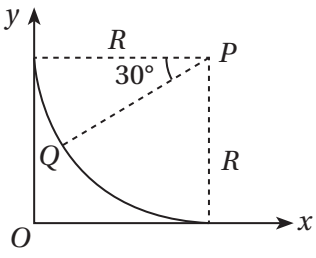
4. A string of negligible mass going over a clamped pulley of mass m supports a block of mass M as shown in the figure. The force on the pulley by the clamp is given by [4]



① $\sqrt{2}Mg$ ② $\sqrt{2}mg$

③ $g\sqrt{(M+m)^2 + m^2}$ ④ $g\sqrt{(M+m)^2 + M^2}$

5. A small block of mass 1 kg is released from rest at the top of a rough track. The track is a circular arc of radius 40 m. The block slides along the track without toppling and a frictional force acts on it in the direction opposite to the instantaneous velocity. The work done in overcoming the friction up to the point Q, as shown in the figure, is 150 J. (Take the acceleration due to gravity, g = 10 ms^{-2}) [4]



The speed of the block when it reaches the point Q is

① 5 ms^{-1} ② 10 ms^{-1}
③ $10\sqrt{3}$ ms^{-1} ④ 20 ms^{-1}

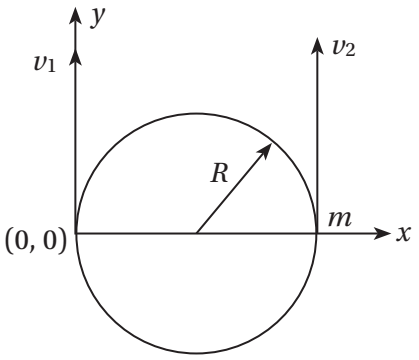
6. A particle of mass m moving in a circular path of radius R with a constant speed v_2 is located at point $(2R, 0)$ at time $t = 0$ and a man starts moving with a velocity v_1 along the positive y-axis from origin at time $t = 0$. The linear momentum of the particle w.r.t. man as a function of time is (consider mass of man is m) [4]

① $m\left[\left\{-v_2 \sin\left(\frac{v_2}{R}\right)t\right\}\hat{i} + \left\{v_2 \cos\left(\frac{v_2}{R}\right)t - v_1\right\}\hat{j}\right]$

② $m\left[\left\{v_2 \sin\left(\frac{v_2}{R}\right)t\right\}\hat{i} + \left\{v_2 \cos\left(\frac{v_2}{R}\right)t - v_1\right\}\hat{j}\right]$

③ $m\left[\left\{v_2 \sin\left(\frac{v_2}{R}\right)t\right\}\hat{i} + \left\{v_1 \cos\left(\frac{v_2}{R}\right)t + v_2\right\}\hat{j}\right]$

④ $m\left[\left\{v_1 \sin\left(\frac{v_1}{R}\right)t\right\}\hat{i} + \left\{v_2 \cos\left(\frac{v_2}{R}\right)t - v_2\right\}\hat{j}\right]$



7. An α-particle of mass m suffers one-dimensional elastic collision with a nucleus at rest of unknown mass. It is scattered directly backwards losing 64% of its initial kinetic energy. The mass of the nucleus is [4]

① 1.5 m ② 4 m ③ 3.5 m ④ 2 m

8. A homogeneous solid cylindrical roller of radius R and mass m is pulled on a cricket pitch by a horizontal force. Assuming rolling without slipping, angular acceleration of the cylinder is [4]

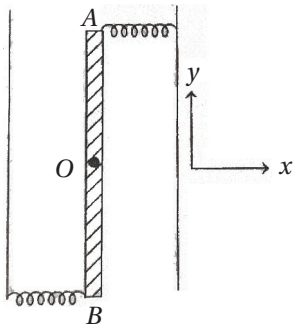
① $\frac{F}{2mR}$ ② $\frac{2F}{3mR}$ ③ $\frac{3F}{2mR}$ ④ $\frac{F}{3mR}$

9. A solid sphere of mass M and radius a is surrounded by a uniform concentric spherical shell of thickness $2a$ and $2M$. The gravitational field at distance $3a$ from the centre will be [4]

① $\frac{GM}{9a^2}$ ② $\frac{2GM}{9a^2}$ ③ $\frac{GM}{3a^2}$ ④ $\frac{2GM}{3a^2}$

10. Two light identical springs of spring constant k are attached horizontally at the two ends of an uniform horizontal rod AB of length l and mass m. The rod is pivoted at its centre 'O' and can rotate freely in horizontal plane. The other ends of the two springs are fixed to rigid supports as shown in figure. [4]

The rod is gently pushed through a small angle and released. The frequency of resulting oscillation is



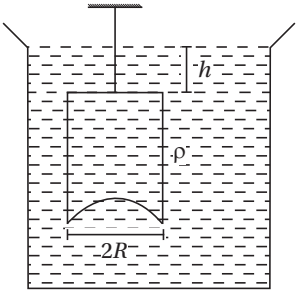
① $\frac{1}{2\pi}\sqrt{\frac{2k}{m}}$ ② $\frac{1}{2\pi}\sqrt{\frac{3k}{m}}$

③ $\frac{1}{2\pi}\sqrt{\frac{6k}{m}}$ ④ $\frac{1}{2\pi}\sqrt{\frac{k}{m}}$

11. A liquid of density ρ is coming out of a hose pipe of radius a with horizontal speed v and hits a mesh. 50% of the liquid passes through the mesh unaffected, 25% losses all of its momentum and, 25% comes back with the same speed. The resultant pressure on the mesh will be [4]

① ρv^2 ② $\frac{1}{2}\rho v^2$ ③ $\frac{1}{4}\rho v^2$ ④ $\frac{3}{4}\rho v^2$

12. A hemispherical portion of radius R is removed from the bottom of a cylinder of radius R. The volume of the remaining cylinder is V and mass M. It is suspended by a string in a liquid of density ρ, where it stays vertical. The upper surface of the cylinder is at a depth h below the liquid surface. The force on the bottom of cylinder by the liquid is [4]



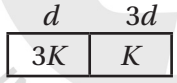
① Mg ② $Mg - V\rho g$

③ $Mg + \pi R^2 h\rho g$ ④ $\rho g(V + \pi R^2 h)$

13. A resonance tube is old and has jagged end. It is still used in the laboratory to determine velocity of sound in air. A tuning fork of frequency 512 Hz produces first resonance when the tube is filled with water to a mark 11 cm below a reference mark near the open end of the tube. The experiment is repeated with another fork of frequency 256 Hz which produces first resonance when water reaches a mark 27 cm below the reference mark. The velocity of sound in air, obtained in the experiment is close to [4]

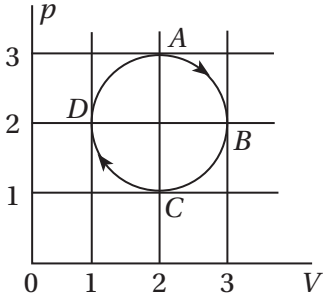
① 328 ms^{-1} ② 341 ms^{-1} ③ 322 ms^{-1} ④ 335 ms^{-1}

14. Two materials having coefficients of thermal conductivity '$3K$' and 'K' and thickness 'd' and '$3d$' respectively, are joined to form a slab as shown in the figure. The temperatures of the outer surfaces are 'θ_2' and 'θ_1' respectively, ($\theta_2 > \theta_1$). The temperature at the interface is [4]



① $\frac{\theta_2 + \theta_1}{2}$ ② $\frac{\theta_1}{3} + \frac{2\theta_2}{3}$ ③ $\frac{\theta_1}{6} + \frac{5\theta_2}{6}$ ④ $\frac{\theta_1}{10} + \frac{9\theta_2}{10}$

15. The figure shows the p–V plot an ideal gas taken through a cycle $ABCDA$. The part ABC is a semi-circle and CDA is half of an ellipse. Then, [4]



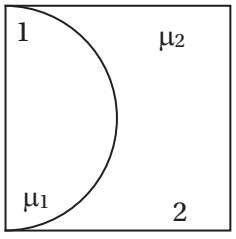
① the process during the path $A \to B$ is isothermal

② heat flows out of the gas during the path $B \to C \to D$

③ work done during the path $A \to B \to C$ is zero

④ –ve work is done by the gas in the cycle $ABCDA$

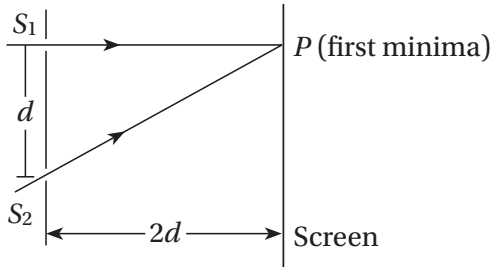
16. One plano-convex and one plano-concave lens of same radius of curvature R but of different materials are joined side by side as shown in the figure. If the refractive index of the material of 1 is μ_1 and that of 2 is μ_2, then the focal length of the combination is [4]



① $\frac{2R}{\mu_1 - \mu_2}$ ② $\frac{R}{2-(\mu_1 - \mu_2)}$

③ $\frac{R}{2(\mu_1 - \mu_2)}$ ④ $\frac{R}{(\mu_1 - \mu_2)}$

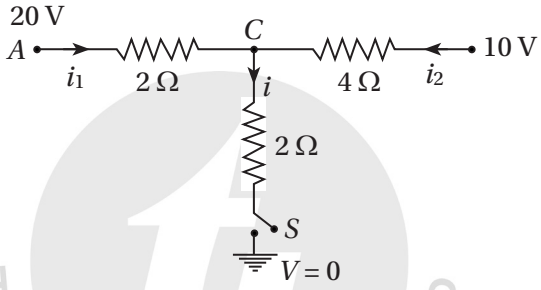
17. Consider a Young's double slit experiment as shown in figure. [4]



What should be the slit separation d in terms of wavelength λ such that the first minima occurs directly infront of the slit (S_1)?

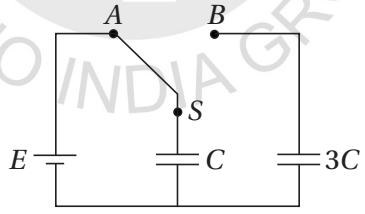
① $\frac{\lambda}{2\left(5-\sqrt{2}\right)}$ ② $\frac{\lambda}{\left(5-\sqrt{2}\right)}$ ③ $\frac{\lambda}{2\left(\sqrt{5}-2\right)}$ ④ $\frac{\lambda}{\left(\sqrt{5}-2\right)}$

18. When the switch S in the circuit shown is closed, then the value of current i will be [4]



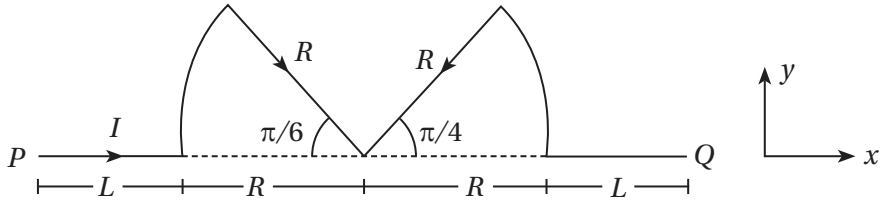
① 4 A ② 3 A ③ 2 A ④ 5 A

19. In the figure shown, after the switch 'S' is turned from position 'A' to position 'B', the energy dissipated in the circuit in terms of capacitance 'C' and total charge 'Q' is [4]



① $\frac{Q^2}{4C}$ ② $\frac{5Q^2}{8C}$ ③ $\frac{Q^2}{8C}$ ④ $\frac{3Q^2}{8C}$

20. A conductor (shown in the figure) carrying constant current I is kept in the x–y plane in a uniform magnetic field B. If F is the magnitude of the total magnetic force acting on the conductor, then select the incorrect statement [4]

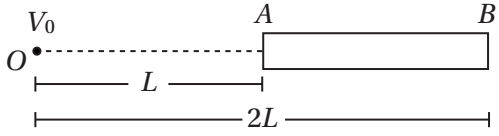
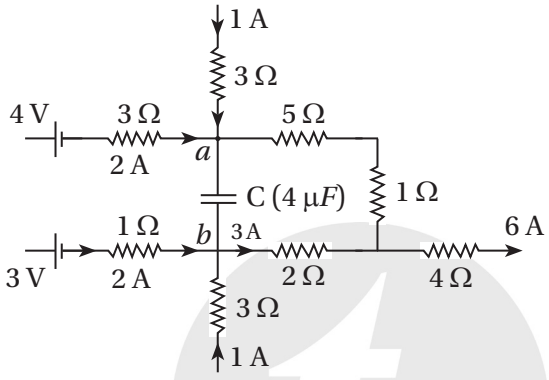
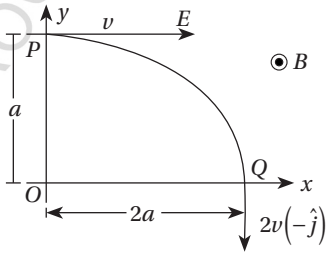
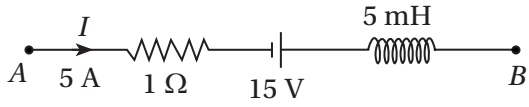
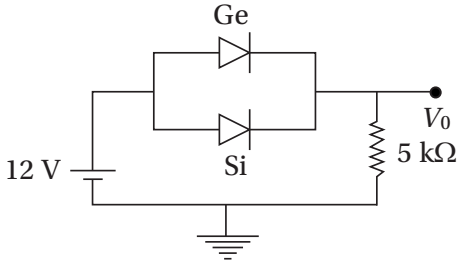


① If $\vec{B}$ is along $\hat{z}$, $F \propto (L+R)$ ② If $\vec{B}$ is along $\hat{x}$, $F = 0$

③ If $\vec{B}$ is along $\hat{y}$, $F \propto (L+R)$ ④ If $\vec{B}$ is along $\hat{z}$, $F = 0$

SECTION B

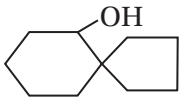
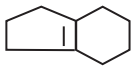
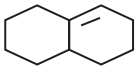
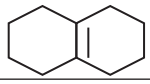
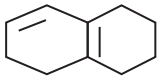
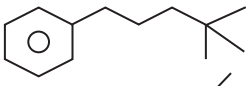
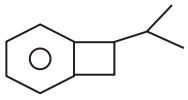
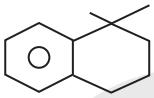
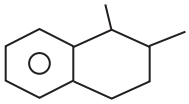
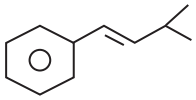
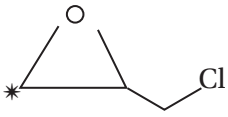
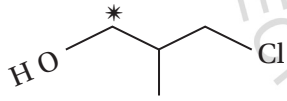
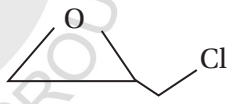
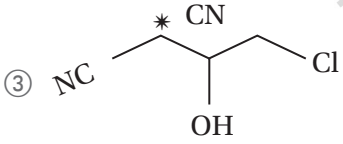
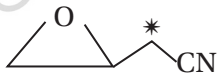
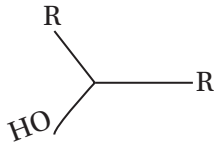
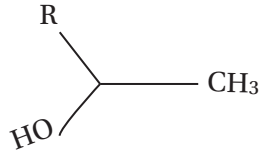
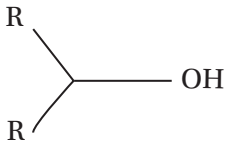
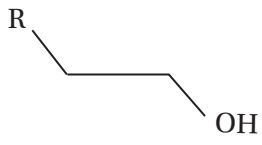
Section B consists of 5 questions of 4 marks each.

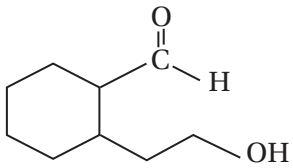
21.	A charge Q is uniformly distributed over a long rod AB of length L as shown in the figure. The electric potential at the point O lying at distance L from the end A is V_0. Then $V_0 \times \frac{L}{Q\ln 2} \times 10^{-9}$ is equal to _____. 	[4]
22.	 The $V_{ab} = V_a - V_b$ (Volt) = n Volt. Then n is (Volt) _____.	[4]
23.	A particle of charge $+q$ and mass m moving under the influence of a uniform electric field $E\hat{i}$ and uniform magnetic field $B\hat{k}$ follows a trajectory from P to Q as shown in figure. The velocities at P and Q are $v\hat{i}$ and $-2v\hat{j}$. Then $\left[\frac{4E\,qa}{mv^2}\right]$ is _____. 	[4]
24.	The network shown in figure is part of a complete circuit. If at certain instant the current (I) is 5 A and is decreasing at a rate of 10^3 A/s, then $V_B - V_A$ is _____. 	[4]
25.	At 0.3 V and 0.7 V, the diodes Ge and Si become conductor respectively. In given figure, if ends of diode Ge overturned, the change in potential $\Delta V_0 \times 10$ is _____. 	[4]

Chemistry

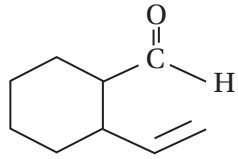
SECTION A

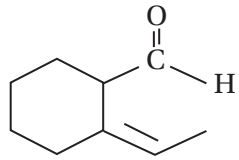
Section A consists of 20 questions of 4 mark each.

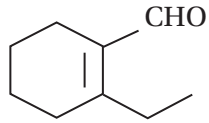
26.	 $\xrightarrow{H_2SO_4/\Delta}$ 'A' (Major). Major product 'A' is : ①  ②  ③  ④ 	[4]
27.	Give the major product of the following reaction :  $\xrightarrow{AlCl_3}$ Major product (P), then 'P' is : ①  ②  ③  ④ 	[4]
28.	If the following $\overset{*}{C}$ labelled. Compound undergo the following reactions which product would be obtained ?  $\xrightarrow[Et\text{-}OH]{KCN\ (1\ eq)}$ product (P) . ①  ②  ③  ④ 	[4]
29.	The reaction of  with RMgX followed by hydrolysis leads to the formation of : ①  ②  ③  ④ 	[4]
30.	The correct I. U. P. A. C. name of the compound : $CH_2 = CH - \underset{\displaystyle CH_3}{\underset{|}{CH}} - C \equiv CH$ is ① 3–methyl pent –1 – yne – 4 – ene ② 3–methyl pent – 3 – yne –1 – ene ③ 3–methyl pent –1 – en – 4 – yne ④ 3–methyl pent – 3 – ene –1 – yne	[4]

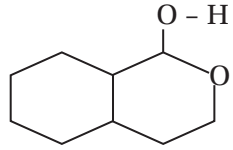
31.  $\xrightarrow{H^+}$ Major product (P) . [4]

'P' is :

① 

② 

③ 

④ 

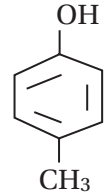
32. Among the following compounds, which is the most basic ? [4]

① Acetanilide ② Aniline ③ Benzylamine ④ Benzanilide

33. Arrange in order of decreasing acidic strength : [4]

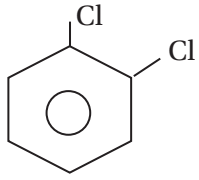
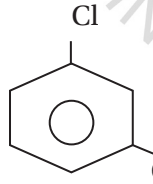
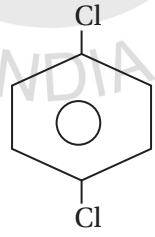

A


B


C

① A > C > B ② B > A > C ③ A > B > C ④ B > C > A

34. [4]

A =  ; B =  ; C = 

Which of the following is incorrect for 'A' , B and 'C' ?

① BP : A > B > C ② MP : A > B > C

③ MP : C > A > B ④ Dipole moment : A > B > C .

35. Which of the following is swarts reaction ? [4]

① $CH_3Br + AgF \longrightarrow CH_3F + AgBr$

② $CH_3Br + NaI \xrightarrow{CH_3-\overset{\overset{O}{|}}{C}-CH_3} CH_3I + NaBr$

③ $C_6H_5N_2^+Cl^- + KI \xrightarrow{\Delta} C_6H_5I + N_2$

④ $R-OH + SOCl_2 \xrightarrow{C_5H_5N} R-Cl + SO_2 + HCl$

36. Ⓐ CH_3F Ⓑ CH_3Cl Ⓒ CH_3Br Ⓓ CH_3J

the correct order of bond enthalpy and dipole moment.

	Bond enthalpy	Dipole moment
①	A > B > C > D	A > B > C > D
②	A < B < C < D	B > A > C > D
③	A > B > C > D	B > A > C > D
④	B > C > A > D	B > C > A > D

37. An electron moving near an atomic nucleus has a velocity of $5 \times 10^6 \pm 2\%$ (m/s). What is the uncertainty in its position ? [4]

① 5.8×10^{-8} m ② 5.8×10^{-10} m ③ 5.8×10^{-10} cm ④ 5.8×10^{-16} m

38. In the reaction : [4]

$NaOH + H_3PO_4 \longrightarrow NaH_2PO_4 + H_2O$

the equivalent weight of phosphoric acid (H_3PO_4) is :

① 49 ② 98 ③ 25 ④ 59

39. Total vapour pressure of mixture of 1 mol A (P^0_A = 150 torr) and 2 mol B (P^0_B = 240 torr) is 200 torr. In this case : [4]

① There is positive deviation from Raoult's Law

② There is negative deviation from Raoult's Law

③ There is no deviation from Raoult's Law

④ Molecular mass of A and B are also required for Calculating the deviation

40. Which of the following gives the maximum number of isomers ? [4]

① $[Co(NH_3)_4 I_2]$ ② $[Ni(en)(NH_3)_4]^{2+}$ ③ $[Ni(C_2O_4)(en)_2]$ ④ $[Cr(SCN)_2(NH_3)_4]^{2+}$

41. The magnetic moment of a complex ion is 2.83 BM. The complex ion is : [4]

① $[Cr(H_2O)_6]^{3+}$ ② $[Cu(CN)_4]^{3-}$ ③ $[V(H_2O)_6]^{3+}$ ④ $[MnCl_4]^{2-}$

42. Which compound does not dissolve in hot diluted nitric acid ? [4]

① PbS ② CdS ③ CuS ④ HgS

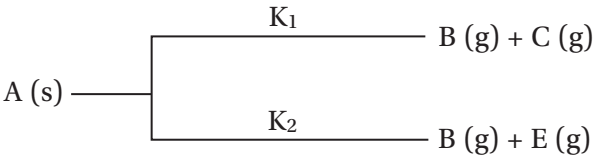
43. If a salt-solution gives colourless suffocating gas with H_2SO_4 which gives white turbidity with lime water and the turbidity disappears when excess amount of gas is passed salt contains : [4]

① SO_3^{2-} ion only ② CO_3^{2-} ion only

③ Neither CO_3^{2-} nor SO_3^{2-} ④ May be CO_3^{2-} or SO_3^{2-}

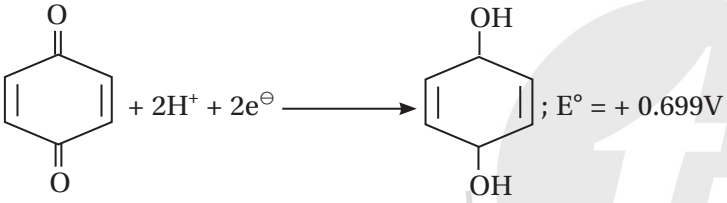
44. 96.5 A current is passed for 10 sec through 1 litre solution of 0.1 M aqueous $CuSO_4$. After 10 sec. the pH of solution is : [4]

① 1 ② 3 ③ 2 ④ 4

45.	A reactant A(s) shows two parallel path reactions as :  The more % of 'B' in gaseous phase is ① $\frac{K_2}{(K_1+K_2)}\times 100$ ② $\frac{K_1}{(K_1+K_2)}\times 50$ ③ $\frac{K_1}{(K_1+K_2)}\times 100$ ④ $\frac{K_2}{(K_1+K_2)}\times 50$	[4]

SECTION B

Section B: consists of 5 questions of 4 marks each.

46.	A quinhydrone electrode in contact with H^+ ion is coupled with standard calomel electrode :  ; E° = + 0.699V $\frac{1}{2}\ Hg_2Cl_2\ (s) + e^{\ominus} \longrightarrow Hg(l) + Cl^{\ominus}$; E° = 0.280V If e. m. f. of cell $Pt\left\vert Q, Q_{H_2}\right\vert H^+\left\vert\right\vert 1MHCl\left\vert Hg_2Cl_2(s)\right\vert Hg$; Pt is -0.124 V , then pH of solution is _____ .	[4]
47.	The pk_{a_1} & pk_{a_2} of an amino acid are 2.3 and 9.7 respectively. The isoelectric point of amino acid is _____ .	[4]
48.	pH of 0.1 M weak mono protic acid solution having degree of dissociation 0.01 is _____ .	[4]
49.	0.2 mole of an ideal monoatomic gas requires 6 cal to raise its temperature by 15°C at constant volume. Calculate the molar heat capacity of gas at constant volume _____ .	[4]
50.	Total number of geometrical isomers for (Cl) — CH = CH — CH = CH — CH = CH — (Br) are _____ .	[4]

Mathematics

SECTION A

Section A: consists of 20 questions of 4 mark each.

51.	The equation of the parabola whose focus is the point (0,0) and the tangent at the vertex is $x - y + 1 = 0$ is ① $x^2 + y^2 - 2xy - 4x - 4y - 4 = 0$ ② $x^2 + y^2 - 2xy + 4x - 4y - 4 = 0$ ③ $x^2 + y^2 + 2xy - 4x + 4y - 4 = 0$ ④ $x^2 + y^2 + 2xy - 4x - 4y + 4 = 0$	[4]

52. $(-6,0)$, $(0,6)$ and $(-7,7)$ are the vertices of a ΔABC. The in circle of the triangle has the equation. [4]

① $x^2+y^2-9x-9y+36=0$ ② $x^2+y^2+9x-9y+36=0$

③ $x^2+y^2+9x+9y-36=0$ ④ $x^2+y^2+18x-18y+36=0$

53. A curve is represented by $C=3(x-3y+2)^2+2(3x+y-1)^2=180$. Eccentricity of the curve is [4]

① $\frac{1}{3}$ ② $\frac{1}{\sqrt{3}}$ ③ $\frac{2}{3}$ ④ $\frac{2}{\sqrt{5}}$

54. Let $f(x)=\left[\frac{1}{\cos\{x\}}\right]$ where ([ ] → G.I.E and {} → F.P.F) and $g(x) = k^2x^2 - 11kx + 24$. If $g(f(x))<0 \quad \forall \quad x\in R$ then number of integral values of k is [4]

① 3 ② 4 ③ 5 ④ 6

55. Set A contains 6 elements and set B contains 3 elements. Number of mappings which can be defined $A \to B$ such that each element of set B has exactly two pre images is [4]

① 540 ② 270 ③ 90 ④ 360

56. $\lim\limits_{x\to 0+} x^{\left(x^x-1\right)}=p$ and $\lim\limits_{x\to 0+} x^{x^x}-1=q$, then $p-q$ is equal to [4]

① 2 ② 4 ③ 0 ④ can't be determined

57. The total number of odd natural numbers of six digits that can be formed using the digits 1,3,5,7 if each digit is to appear in every number atleast one? [4]

① 1560 ② 1080 ③ 2040 ④ 840

58. If $p=\left[a_{ij}\right]_{n\times n}$ be any matrix and it is non singular matrix. If $|P| = |Q| = 1$ and adj $B = A$, then adj $(Q^{-1}BP^{-1})$ is [4]

① QAP ② PAQ ③ AQB ④ PQA

59. If $x\in[-1,0)$ then $\cos^{-1}\left(2x^2-1\right)-2\sin^{-1}x$ is equal to [4]

① $-\frac{\pi}{2}$ ② π ③ $\frac{3\pi}{2}$ ④ -2π

60. $\int\limits_{\frac{1}{2}}^{2}\left(1-\frac{1}{x^2}\right)\log\left(\frac{1-x+x^2}{1+x+x^2}\right)dx$ is equal to [4]

① 0 ② $2\log_e 2$ ③ $\log_e 2$ ④ $\log_e 3$

61. If all the roots of $z^3 + az^2 + bz + c = 0$ are of unit modulus, then [4]

① $|3-4i+b|>8$ ② $|c|\geq 3$ ③ $|3-4i+a|\leq 8$ ④ $|3-4i+a|>8$

62. Let, $A=\left\{x\in R:\frac{x-1}{x}>1\right\}$ and $B=\left\{x\in R:\ln\left(x^2-4x+4\right)\geq 0\right\}$ then $A\cap B$ equals [4]

① $(-\infty,0)$ ② $(0,\infty)$ ③ $(-3,0)$ ④ $(1,\infty)$

63. If $\int x^5\left(1+x^3\right)^{2/3}dx=A\left(1+x^3\right)^{8/3}+B\left(1+x^3\right)^{5/3}+c$ then [4]

① $A=\frac{1}{4},B=\frac{1}{5}$ ② $A=\frac{1}{8},B=-\frac{1}{5}$ ③ $A=-\frac{1}{8},B=\frac{1}{5}$ ④ $A=-\frac{1}{4},B=-\frac{1}{5}$

64. If $\sum_{j=1}^{21}a_j=693$ where $a_1, a_2, \ldots, a_{21}$ are in A.P. then $\sum_{i=0}^{10}a_{2i+1}$ is [4]

① 361 ② 396 ③ 363 ④ 365

65. If $A=\int_0^{\pi}\frac{\cos x}{(x+2)^2}dx$ then $\int_0^{\pi/2}\frac{\sin 2x}{(x+1)}dx$ is equal to [4]

① $A-\frac{1}{2}-\frac{1}{\pi+2}$ ② $\frac{1}{2}+\frac{1}{\pi+2}-A$ ③ $\frac{1}{\pi+2}-A$ ④ $1+\frac{1}{\pi+2}-A$

66. The set of real values of 'k' for which the lines $x + 3y + 1 = 0$, $kx + 2y - 2 = 0$ and $2x - y + 3 = 0$ form a triangle is [4]

① $R-\left\{-4,\frac{2}{3}\right\}$ ② $R-\left\{-4,\frac{2}{3},\frac{-6}{5}\right\}$ ③ $R-\left\{\frac{2}{3},4\right\}$ ④ R

67. A curve is given by $x=\sec^2\theta$, $y=\cot\theta$. If the tangent at P where $\theta=\frac{\pi}{4}$ meets the curve again at Q, then PQ equal to [4]

① $\frac{3\sqrt{3}}{2}$ ② $\frac{5\sqrt{3}}{2}$ ③ $\frac{3\sqrt{5}}{2}$ ④ $\frac{5\sqrt{5}}{2}$

68. If $\vec{b},\vec{c},\vec{d}$ are non-coplanar vectors, then $\left(\vec{a}\times\vec{b}\right)\times\left(\vec{c}\times\vec{d}\right)+\left(\vec{a}\times\vec{c}\right)\times\left(\vec{d}\times\vec{b}\right)+\left(\vec{a}\times\vec{d}\right)\times\left(\vec{b}\times\vec{c}\right)$ is parallel to [4]

① $\vec{b}$ ② $\vec{c}$ ③ $\vec{d}$ ④ $\vec{a}$

69. The negation of compound proposition $\rho\vee(\sim\rho\vee q)$ [4]

① $(\rho\wedge\sim q)\vee\sim p$ ② $(p\wedge\sim p)\wedge\sim q$ ③ $(p\wedge\sim q)\vee\sim p$ ④ $(p\wedge\sim q)\vee\sim p$

70. Solution of differential equation $\left(x\frac{dy}{dx}+y\right)=e^{xy-\ln x^2}\left(x\frac{dy}{dx}-y\right)$ [4]

① $\frac{y}{x}-e^{-xy}=c$ ② $\frac{x}{y}+e^{-xy}=c$ ③ $\frac{y}{x}+e^{-xy}=c$ ④ $\frac{-x}{y}+e^{-xy}=c$

SECTION B

Section B: consists of 5 questions of 4 marks each.

71.	Area enclosed by $x^2 = xy$ and $y = \frac{8}{x^2+4}$ is equal to k, then $[k]$ equals to, where $[\cdot]$ denotes greatest integer function.	[4]
72.	If A is a square matrix of order 3 such that $A^3 = I$ and $(A + I)^3 + (A - I)^3 = 6A + B$ where I is the identity matrix of order 3, then $\lvert B \rvert$ is equal to,	[4]
73.	There are 6 red balls and 8 green balls in a bag. 5 balls are drawn at random and placed in a red box, the remaining 9 balls are put in a green box. The probability that the number of red balls in the green box plus the number of green balls in the red box is not a prime number is $\frac{p}{q}$, where p and q are coprime, then $(q - p)$ is equal to,	[4]
74.	Let $g : [-2, 2] \to R$ where $g(x) = x^{2015} + sgn(x) + \left[\frac{x^2+1}{p}\right]$ be an odd function for all $x \in [-2, 2]$, then the smallest integral values of p is equal to, (where$[\cdot]$ denotes G.I.F).	[4]
75.	The highest degree of x in the expansion of $\left(\frac{x+1}{x^{2/3}-x^{1/3}+1} - \frac{x-1}{x-x^{1/2}} + \frac{x-1}{x^{3/2}-x^{1/2}}\right)^9$.	[4]