TECHNO INDIA GROUP PUBLIC SCHOOL

Dt. 19-03-2025

JEE Mock Test (Series-II)

Mock Paper Part-2 (2025)

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

General Instructions:

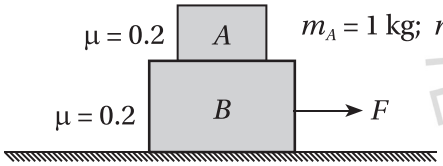
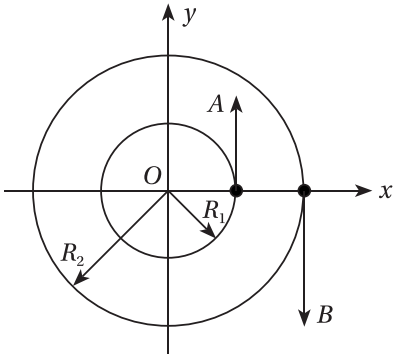
1. There are three subjects in the question paper consisting of Physics (Q. no. 1 to 25), Chemistry (Q, no. 26 to 50), and Mathematics (Q. no. 51 to 75).
2. Each subject is divided into two sections. Section A consists of 20 multiple-choice questions & Section B consists of 5 numerical value-type questions.
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, 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

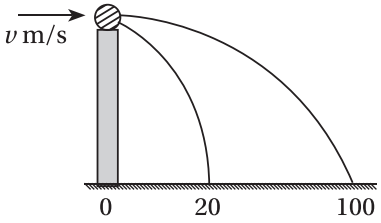
Section A: consists of 20 questions of 4 mark each.

1.	Consider an expanding sphere of instantaneous radius R whose total mass remains constant. The expansion is such that the instantaneous density ρ remains uniform throughout the volume. The rate of fractional change in density $\left(\frac{1}{\rho}\frac{d\rho}{dt}\right)$ is constant. The velocity v of any point of the expanding sphere is proportional to ① R ② $\frac{1}{R}$ ③ R^3 ④ $(R)^{2/3}$	[4]
2.	In three dimensional system, the position co-ordinates of a particle (in motion) are given below $x = a\cos\omega t$; $y = a\sin\omega t$; $z = a\omega t$. The velocity of particle will be ① $\sqrt{2}a\omega$ ② $2a\omega$ ③ $a\omega$ ④ $\sqrt{3}a\omega$	[4]
3.	A mass of 10 kg is suspended by a rope from the roof. When a horizontal force is applied on the mass, the rope deviated at an angle of 45° at the roof point. If the suspended mass is at equilibrium, the magnitude of the force applied is (Take, g = 10 m/s^2) ① 70 N ② 200 N ③ 100 N ④ 140 N	[4]
4.	 The maximum force F that can be applied on B horizontally so that the block A does not slide over the block B is (g = 10 m/s^2) ① 12 N ② 16 N ③ 8 N ④ 40 N	[4]
5.	Two particles A and B are moving on two concentric circles of radii R_1 and R_2 with equal angular speed ω . At $t = 0$, their positions and direction of motion as shown in figure. The relative velocity $\vec{v_A} - \vec{v_B}$ at $t = \frac{\pi}{2\omega}$ is given by  ① $\omega(R_1 + R_2)\hat{i}$ ② $-\omega(R_1 + R_2)\hat{i}$ ③ $\omega(R_1 - R_2)\hat{i}$ ④ $\omega(R_2 - R_1)\hat{i}$	[4]

6. A wind-powered generator converts wind energy into electric energy. Assume that the generator converts a fixed fraction of the wind energy intercepted by its blades into electrical energy. For wind speed v, the electrical power output will be proportional to [4]

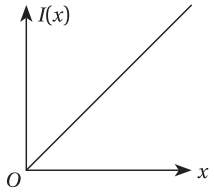
① v ② v^2 ③ v^3 ④ v^4

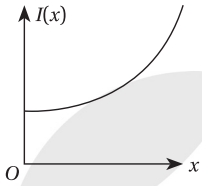
7. A ball of mass 0.2 kg rests on a vertical post of height 5 m. A bullet of mass 0.01 kg, travelling with a velocity v m/s in a horizontal direction, hits the centre of ball. After the collision, the ball and bullet travel independently. The ball hits the ground at a distance of 20 m and the bullet at a distance of 100 m from the foot of the post. The initial velocity v of the bullet is [4]

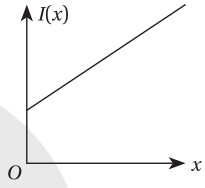


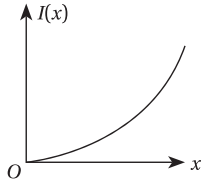
① 250 m/s ② $250\sqrt{2}$ m/s ③ 400 m/s ④ 500 m/s

8. The moment of inertia of a solid sphere, about an axis parallel to its diameter and at a distance of x from it is $I(x)$. Which one of the graphs represents the variation of $I(x)$ with x correctly. [4]

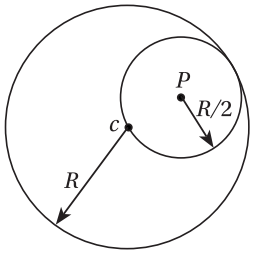
① 

② 

③ 

④ 

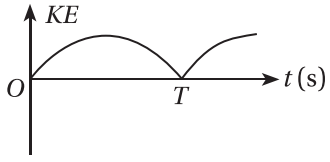
9. From a solid sphere of mass M and radius R, a spherical portion of radius $(R/2)$ is removed as shown in figure. Taking gravitational potential $V = 0$ at $r = \infty$, the potential at the centre of cavity thus formed is (G = gravitational constant) [4]

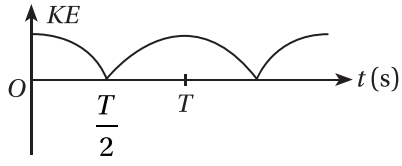


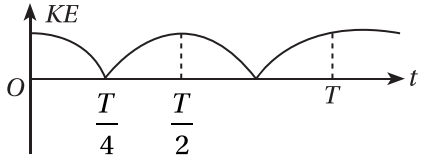
① $-\frac{GM}{R}$ ② $-\frac{GM}{2R}$

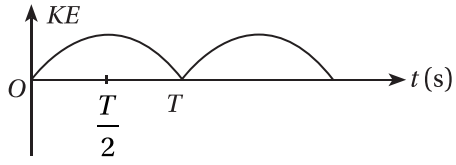
③ $-\frac{2GM}{3R}$ ④ $-\frac{2GM}{R}$

10. A particle is executing simple harmonic motion with a time period T. At time $t = 0$ s, it is at its position of equilibrium. The kinetic energy–time graph of the particle will look like [4]

① 

② 

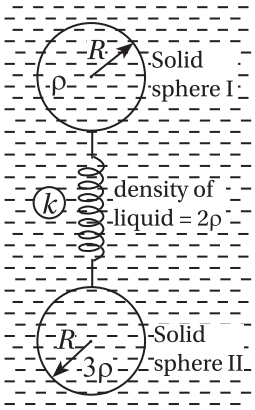
③ 

④ 

11. A solid sphere of Radius R acquires a terminal velocity v_1 when falling (due to gravity) through a viscous fluid having co-efficient of viscosity η. The sphere is broken into 27 identical solid spheres. Each of these spheres acquires a terminal velocity, v_2 when falling through the same fluid. The ratio (v_1/v_2) equals [4]

① 9 ② 1/27 ③ 1/9 ④ 27

12. The arrangement is placed in a liquid of density 2ρ and is allowed to reach equilibrium. The elongation of spring is [4]



① $\frac{4\pi R^3\rho g}{3k}$ ② $\frac{8\pi R^3\rho g}{3k}$ ③ $\frac{2\pi R^3\rho g}{3k}$ ④ $\frac{3\pi R^3\rho g}{2k}$

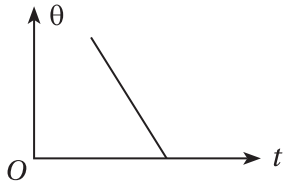
13. A small speaker delivers 2 w of audio output. A what distance from the speaker will one detect 120 dB intensity of sound? [Take the reference intensity of sound as 10^{-12} w/m^2] [4]

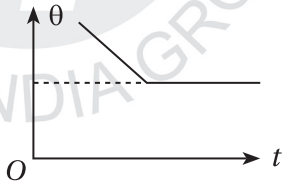
① 40 cm ② 20 cm ③ 10 cm ④ 30 cm

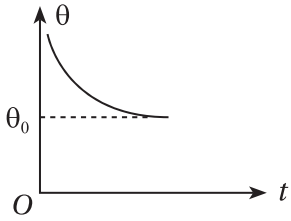
14. Half-mole of an ideal monoatomic gas is heated at constant pressure of 1 atm from 20°C to 90°C. Work done by gas is close to (take, gas constant R = 8.31 J/mol-k) [4]

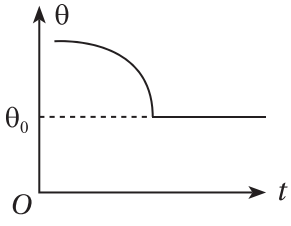
① 291 J ② 581 J ③ 146 J ④ 73 J

15. If a piece of metal is heated to temperature is at temperature θ and then allowed to cool in a room which is at θ_0. The graph between the temperature θ of the metal and time t will be closed to [4]

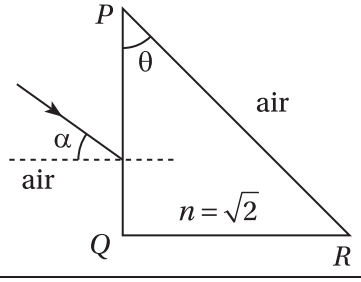
① 

② 

③ 

④ 

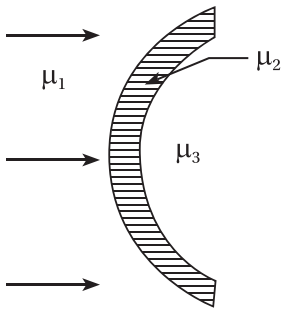
16. A parallel beam of light is incident from air at an angle α on the side PQ of a right angled triangular prism of refractive index $n = \sqrt{2}$. Light undergoes total internal reflection in the prism at the face PR when α has a minimum value of 45°. The angle θ of the prism is [4]



① 15° ② 22.5°

③ 30° ④ 45°

17. In the figure, light is incident on a thin lens as shown. The radius of curvature for both the surfaces is R. The focal length is [4]



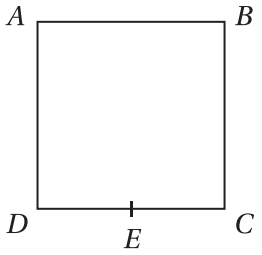
① $\left(\frac{\mu_2}{\mu_3-\mu_1}\right)R$ ② $\left(\frac{\mu_3}{\mu_3-\mu_1}\right)R$

③ $\left(\frac{\mu_3-\mu_2}{\mu_3+1}\right)R$ ④ $\frac{\mu_3}{\mu_3+\mu_1}\cdot R$

18. In the ideal double slit experiment, when a glass-plate ($r \cdot i$ = 1.5) of thickness t is introduced in the path of one of the interfering beams (wavelength λ), the intensity at the position where the central maximum occurred previously remains unchanged. The minimum thickness of the glass-plate is [4]

① 2λ ② $\frac{2\lambda}{3}$ ③ $\frac{\lambda}{3}$ ④ λ

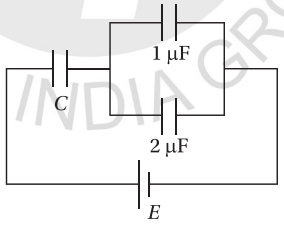
19. A wire of resistance R is bent to form square $ABCD$ as shown in the figure. The effective resistance between E and C is [E is mid point of arm CD] [4]

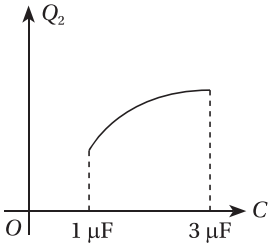


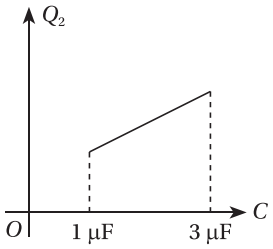
① $\frac{7}{64}R$ ② $\frac{3}{4}R$

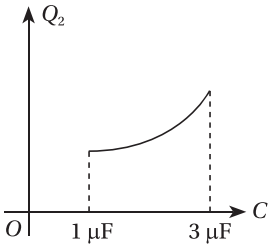
③ R ④ $\frac{R}{16}$

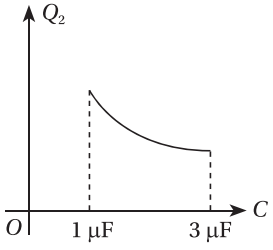
20. In the given circuit, charge Q_2, on the 2 μF capacitor changes as C is varied from 1 μF to 3 μF. Q_2 as a function of C is given properly by (figures are drawn schematically and are not in scale) [4]



① 

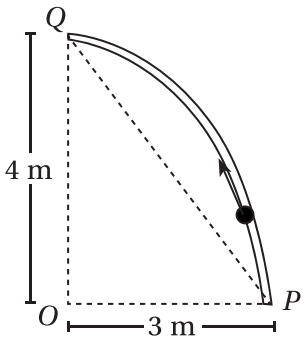
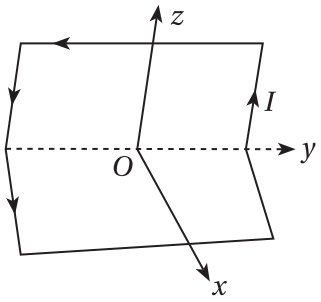
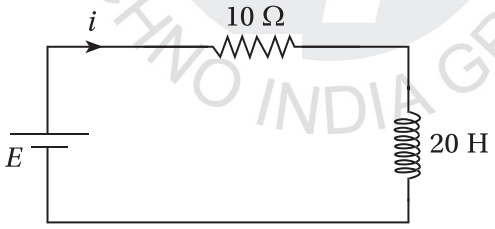
② 

③ 

④ 

SECTION B

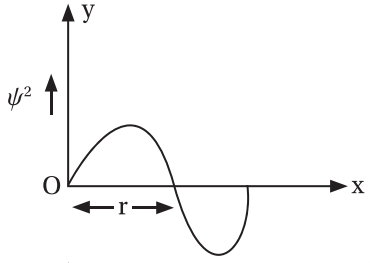
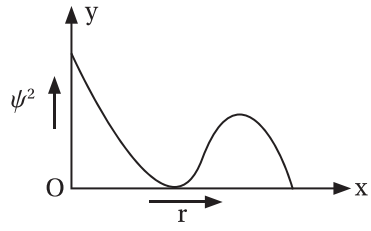
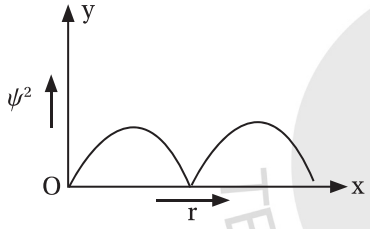
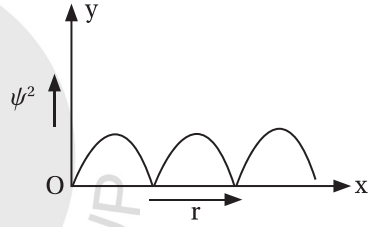
Section B consists of 10 questions of 4 marks each.

21.	Consider an elliptically shaped rail PQ in the vertical plane with $OP = 3$ m and $OQ = 4$ m. A block of mass 1 kg is pulled along the rail from P to Q with a force of 18 N, which is always parallel to line PQ (see figure). Assuming no frictional losses, the kinetic energy of the block when it reaches Q is $(n \times 10)$ J. The value of n _____. (Take $g = 10$ m/s^2) 	[4]
22.	A non-planar loop of conducting wire carrying a current I is placed as shown in the figure. Each of the straight sections of the loop is $2a$. The magnetic field due to this loop at the point $P(a,0,a)$ points in the direction $\frac{(\hat{i}+\hat{k})}{n}$. Then n^2 is _____ 	[4]
23.	't' is the time at which rate of dissipation of energy (Joule's heat) across resistance is equal to the rate at which magnetic energy is stored in the inductor. Then $\frac{t}{\ln 2}$ is equal to _____. 	[4]
24.	A particle A of mass m and initial velocity v collides with a particle B of mass $\frac{m}{2}$ which is at rest. The collision is held on and elastic. The ratio of the de-Broglie wavelengths λ_A to λ_B after the collision is _____.	[4]
25.	Let m_p be the mass of proton, m_n the mass of neutron, M_1 be the mass of $^{20}_{10}$Ne nucleus and M_2, the mass of $^{40}_{20}$Ca nucleus then $\frac{M_2}{M_1} < n$, $n =$ _____	[4]

Chemistry

SECTION A

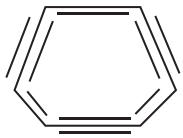
Section A: consists of 20 questions of 4 mark each.

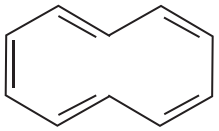
26.	Magnetic momentum of an ion M^{3+} is $\sqrt{35}$ BM. Then, number of electron in 'd' orbital of M element will be: ① 5 ② 10 ③ 2 ④ 3	4
27.	Which of the following graph is correct for 3P? ①  ②  ③  ④ 	4
28.	The normality of a solution obtained by mixing 100 ml of 0.2(M) H_2SO_4 with 100 ml of 0.2(M) NaOH is: ① 0.1 ② 0.2 ③ 0.5 ④ 0.3	4
29.	Mole fraction of urea in its aqueous solution is 0.2, then molality of the solution will be: ① 1.38 ② 8.31 ③ 3.81 ④ 13.8	4
30.	The species having bond order different from that in CO is: ① NO^- ② NO^+ ③ $CN^{\ominus}$ ④ N_2	4
31.	The shape of XeO_2F_2 molecule is: ① Trigonal bipyramidal ② Square planar ③ Tetrahedral ④ See-Saw	4
32.	Calculate the pH of the following solutions; when 50 ml of 0.1 (M) CH_3COOH mixed with 100 ml of 0.1 (M) NaOH (pKa = 4.75) : ① 4.75 ② 8.72 ③ 9.25 ④ 12.52	4
33.	Calculate the solubility of AgCl in 0.1 (M) $AgNO_3$ solution. Given $(K_{SP})_{AgCl} = 2.8 \times 10^{-10}$ at 25°C. ① 2.8×10^{-10} ml/L ② 2.8×10^{-9} mol/L ③ 2.8×10^{-12} mol/L ④ 2.8×10^{-16} mol/L	4

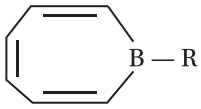
34. During nitrogen estimation of an organic compound by Kjeldahl's method, the ammonia evolved by 0.5 g of the compound neutralised 10 ml. of 1(M) H_2SO_4. Calculate the percentage of nitrogen in the compound. **4**

① 5.60% ② 28% ③ 56% ④ 65%

35. Aromatic species among the following is: **4**

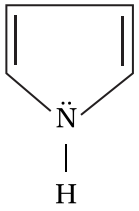
① 

② 

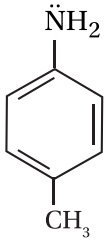
③ 

④ All of these

36. Which of the following is most basic due to +R effect of any substituent? **4**

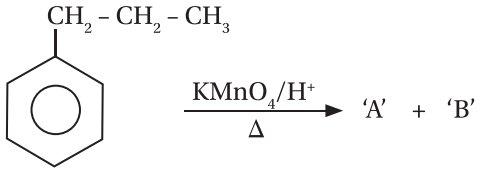
① 

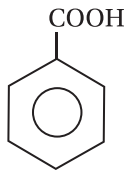
② 

③ 

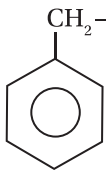
④ 

37. What will be product for reaction? **4**

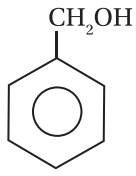


① 

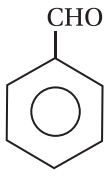
+ CH_3COOH

② 

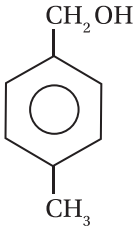
+ HCOOH

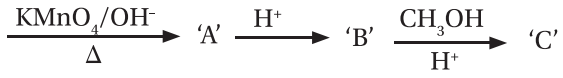
③ 

+ CH_3CH_2OH

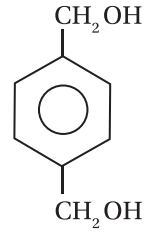
④ 

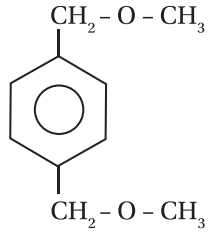
+ CH_3CHO

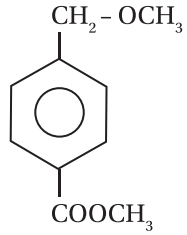
38.  4

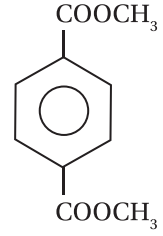


Product 'C' is:

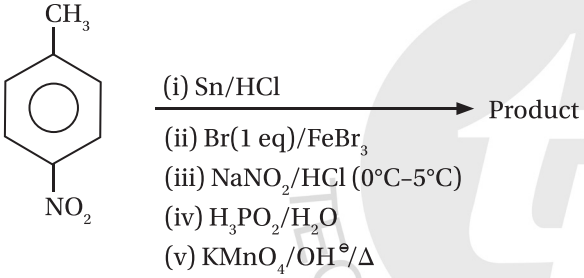
① 

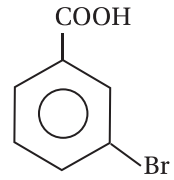
② 

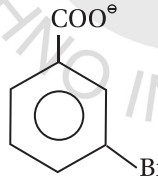
③ 

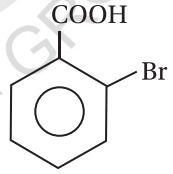
④ 

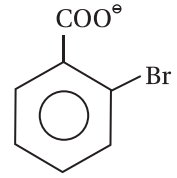
39. Identity the product in given reaction: 4

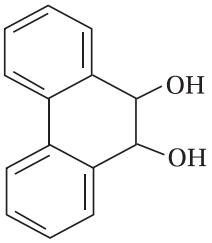


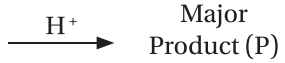
① 

② 

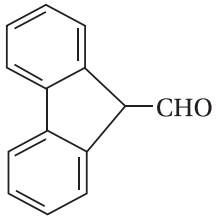
③ 

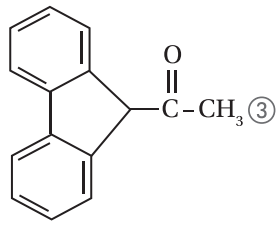
④ 

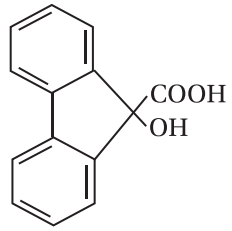
40.  4

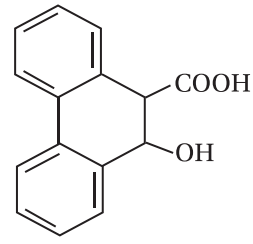


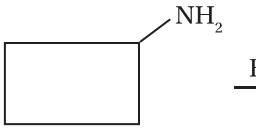
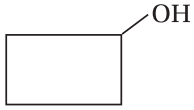
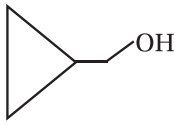
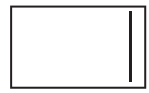
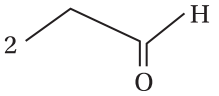
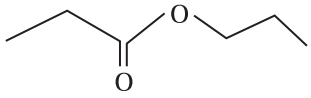
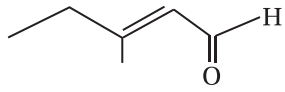
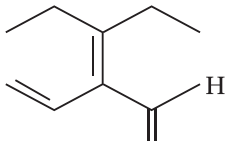
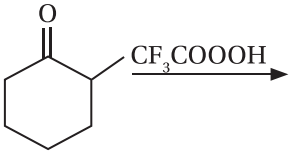
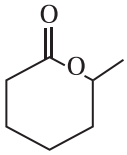
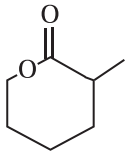
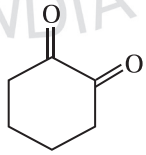
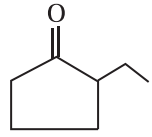
What will be the major product (P) formed in the above reaction?

① 

② 

③ 

④ 

41.	 Major product. Major is: ①  ②  ③  ④ 	4
42.	Ph–CHO and Ph – CHO can be distinguished by which of following reagent? ① Tollen's reagent ② Fehling's solution ③ Iodoform test ④ Lucas reagent	4
43.	 Product. Product is ①  ②  ③  ④ 	4
44.	Glucose does not react with: ① HNO_3 ② HI/Red ③ DNP ④ Fehling's solution	4
45.	 Major Product (P) ①  ②  ③  ④ 	4

SECTION B

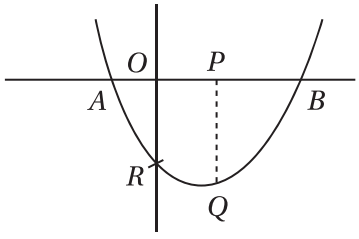
Section B consists of 5 questions of 4 marks each.

46.	How many Faradays of electricity is required to deposit 2 mol copper from $CuSO_4$ solution? _____	4
47.	Potassium ferrocyanide is 50% ionized in aqueous solution, its Van't Hoff factor will be equal to _____.	4
48.	At 300K, half-life of a gaseous reactant initially at 58KPa is 320 min. When the pressure is 29 KPa, the half-life is 160 min. The order of the reaction is _____.	4
49.	The oxidation number of Mn in the product of alkaline oxidative fusion of MnO_2 is _____.	4
50.	The spin only magnetic moment of the complex present in Fehling's reagent is _____ BM. (nearest integer)	4

Mathematics

SECTION A

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

51.	For any real x the value of $\sin x\cos 3x / \sin 3x\cos x$ do not lie in the interval ① $\left(\frac{1}{3},3\right]$ ② $\left[\frac{1}{3},3\right)$ ③ $\left[\frac{1}{3},3\right]$ ④ None of these	[4]
52.	A student scores the following marks in five tests : 50, 59, 46, 62, 48. His score is not known for the sixth test. If the mean score is 53 in the six tests, then the standard deviation of the marks in six tests is ① $\frac{100}{\sqrt{3}}$ ② $\frac{100}{3}$ ③ $\frac{10}{\sqrt{3}}$ ④ $\frac{10}{3}$	[4]
53.	The chords of the rectangular hyperbola $xy = c^2$, which are parallel to the line $y = x$, are the diameter of the circle. All such circles pass through two fixed points one of which has co-ordinates ① $(-c,-c)$ ② $(c,-c)$ ③ $(-c,5)$ ④ None of these	[4]
54.	Find the coefficient of x^{49} in the polynomial $\left(x+\frac{C_1}{C_0}\right)\left(x+2^2\frac{C_2}{C_1}\right)\left(x+3^2\frac{C_3}{C_2}\right)\cdots\left(x+50^2\frac{C_{50}}{C_{49}}\right)$ where $C_r = {}^{50}C_r$. ① 21675 ② 44200 ③ 22100 ④ None of these	[4]
55.	The least negative integral value of k such that $p(n)$: "$49^n + 16 + k$" is divisible by 64, $n \in N$, is ① –1 ② –2 ③ –3 ④ –4	[4]
56.	Consider the given graph of $y = ax^2 + bx + c$. Let $PQ = 9$ and $OR = 5$ and Q is the vertex of the parabola.  The area of the ΔOBQ is $\frac{45}{4}$ sq. units then length of AB is ① 3 ② 4 ③ 5 ④ None of these	[4]
57.	Tangents T_1 and T_2 are drawn to the circle $x^2 + y^2 = 1$ from the point (–2,0). Find the radius of the smaller circle touching the given circle and having T_1 and T_2 as tangent. ① $\frac{1}{3}$ ② $\frac{2}{3}$ ③ 1 ④ 3	[4]

58. If $f(x)=\dfrac{2-\sqrt{x+4}}{\sin(2x)}$, $x\neq 0$ is continuous function at $x = 0$, then the value of $f(0)$ is [4]

① –1/8 ② 1/2 ③ 1 ④ 0

59. The sum of first n geometric term is 160 and the sum of an infinite terms is 162. If the inverse of its common ratio is an integer, then the digit at unit place of the sum of all possible value of first term is [4]

① 4 ② 1 ③ 2 ④ 0

60. Find $\lim\limits_{x\to 0}\dfrac{(\cos x-1)\left(\cos x-e^{x}\right)}{x^{n}}$ if it is a finite non zero number. [4]

① $\dfrac{-1}{2}$ ② 2 ③ $\dfrac{1}{2}$ ④ 1

61. The system of equations $(p + a)x + by + cz = 0$, $ax + (q + b)y + cz = 0$, $ax + by + (r + c)z = 0$ has a non-trivial solution, where $p, q, r \neq 0$ then value of $\dfrac{p}{a}+\dfrac{q}{b}+\dfrac{r}{c}$ is [4]

① –1 ② 0 ③ 1 ④ 2

62. Assume the following two binary relations on the set $S = \{p, q, r\}$: [4]
$A = \{(r,p), (q,q), (p,r), (r,r), (q,r), (p,p)\}$ and $B = \{(p,q), (q,p), (r,r), (r,p), (p,p), (q,q), (p,r)\}$. Then

① A is not symmetric but it is transitive ② both A and B are transitive

③ B is symmetric but it is not transitive ④ both A and B are not symmetric

63. If $\cos A=\dfrac{3}{4}$, then $32\sin\left(\dfrac{A}{2}\right)\sin\left(\dfrac{5A}{2}\right)$ is [4]

① 11 ② 10 ③ –11 ④ 15

64. Three lines $ax + by + c = 0$, $bx + cy + a = 0$ and $cx + ay + b = 0$ are concurrent if [4]

① $a + b + c \neq 0$ ② $a^2 + b^2 + c^2 \neq ac + cb + ab$

③ $a^3 + b^3 + c^3 = 3abc$ ④ None of these

65. The curve satisfying the differential equation, $(x^2 - y^2)\,dx + 2xy\,dy = 0$ and passing through the point (1,1) also passes through the point [4]

① (0,0) ② (2,1) ③ (–1,–1) ④ (0,1)

66. Let f : [–3, 3] → R, where $f(x)=x^{3}+\sin x\cdot\cos x+\dfrac{x^{2}+5x+5}{\lambda}-\left\{\dfrac{x^{2}+5}{\lambda}\right\}$ be an odd function, then [4]
values of λ are (where {} represents fractional part function)

① less than 14 ② 14 ③ greater than 14 ④ None of these

67. The condition to the equation $x^2 + y^2 + 2hxy + 2gx + 2fy + c = 0$ to represents a circle, the circle passes through three quadrants only but not passing through the origin, is [4]

① $f^2 > c, h = 0, g^2 < c, c > 0$ ② $g^2 > c, h = 0, f^2 < c, c < 0$

③ $h = 0, f^2 > c, g^2 > c, c > 0$ ④ $h = 0, f^2 > c, g^2 > c$

68.	If it is possible to express the vector $\vec{b}=3\hat{j}+4\hat{k}$ as $\vec{b_1}+\vec{b_2}$, where $\vec{b_1}$ is parallel to $\left(\hat{i}+\hat{j}\right)$ and $\vec{b_2}$ is perpendicular to $\vec{b_1}$, then $\vec{b_2}$ is ① $\frac{3}{2}\left(\hat{i}+\hat{j}\right)$ ② $\frac{-3}{2}\hat{i}+\frac{3}{2}\hat{j}+4\hat{k}$ ③ $\frac{3}{2}\hat{i}+\frac{3}{2}\hat{j}+2\hat{k}$ ④ None of these	[4]
69.	Let $f(x) = 3 - x$ and $g(x) = 4 - x$. For which values of 'x', $\lvert f(x)\rvert+\lvert g(x)\rvert>\lvert f(x)-g(x)\rvert$ ① R ② $(4, \infty)$ ③ $[3, 4]$ ④ $R - [3, 4]$	[4]
70.	Let $f: R \to R$ be defined as $f(x) = 3x - 1$ and $g: R - \{1\} \to R$ be defined as $g(x)=\frac{x-\frac{1}{3}}{x-1}$. Then ① $f(g(x))$ is onto but not one-one ② $f(g(x))$ is neither one-one nor onto ③ $f(g(x))$ is one-one but not onto ④ $f(g(x))$ is both one-one and onto	[4]

SECTION B

Section B consists of 5 questions 4 marks each.

71.	Let $\vec{A}$, $\vec{B}$ be vectors such that $\vec{A}=\vec{a}-\vec{b}$ and $\vec{B}=\vec{a}+\vec{b}$. Such that $\lvert a\rvert=\lvert b\rvert=7$ If $\left\lvert\vec{A}\times\vec{B}\right\rvert=2\left\{\lambda-\left(\vec{a}\cdot\vec{b}\right)^2\right\}^{\frac{1}{2}}$, then value of λ is	[4]
72.	Let $f: R \to R$ be a differentiable function such that its derivative f' is continuous and $f(\pi) = -4$. If $F: [0, \pi] \to R$ be a defined by $F(x)=\int_0^x f(t)dt$, and if $\int_0^{\pi}(f'(x)+F(x))\cos x\,dx=4$, then the value of $f(0)$ is _____	[4]
73.	Let $P=\{n\in N: n \text{ is a } 3-\text{digit number}\}$, $Q=\{9k+2: k\in N\}$ and $R=\{9k+l: k\in N\}$ for some $l(0<l<9)$ If the sum of all the elements of the $P\cap(Q\cup R)$ is 109500 then l is equal to	[4]
74.	If $x^2 + (a - b)x + (1 - a - b) = 0$, where $a, b \in R$, then the least integral value of a for which the equation has unequal real roots for all values of b is _____	[4]
75.	If $A=\begin{bmatrix}2 & 3\\ 0 & -1\end{bmatrix}$, then the value of $\det\left(A^8\right)+\det\left(A^{10}-(\text{Adj}(2A))^{10}\right)$ is equal to	[4]