# TECHNO INDIA GROUP PUBLIC SCHOOL

Dt. 24-03-2025

# JEE Main

## Mock Test - 4 (2025)

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

**General Instructions:**

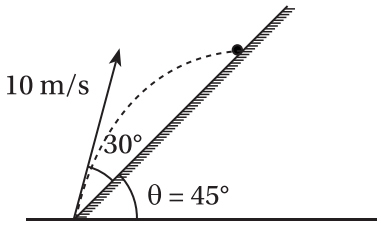
1. There are three subjects in the question paper consisting of Physics (Q. no. 1 to 25), Chemistry (Q, no. 26 to 50), and Mathematics (Q. no. 51 to 75).
2. Each subject is divided into two sections. Section A consists of 20 multiple-choice questions & Section B consists of 5 numerical value-type questions.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

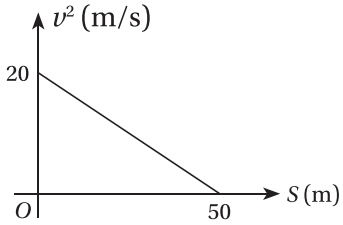
## SECTION-A

1. A particle is projected onto the inclined plane as shown in the figure. The time of flight is [4]




① $\sqrt{2}$ s ② $\frac{1}{\sqrt{2}}$

③ 1 s ④ 2 s

2. 

[4]

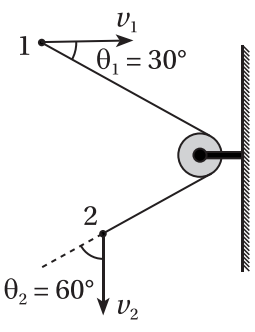
The acceleration of particle at $S = 0$

① $-8\ m/s^2$ ② $-0.2\ m/s^2$ ③ $2\ m/s^2$ ④ $-4\ m/s^2$

3. Pressure $P$ varies a $P=\left(\frac{\alpha}{\beta}\right)\left[e^{-\alpha z/k_B\theta}\right]$ where $z$ denotes distance, $k_B$ Boltzman constant, θ absolute temperature and α, β are constants. Then [β] = [4]

① $M^{-1}LT^{-2}$ ② $M^0L^0T^0$ ③ $M^0L^2T^0$ ④ $M^0L^{-1}T^{-2}$

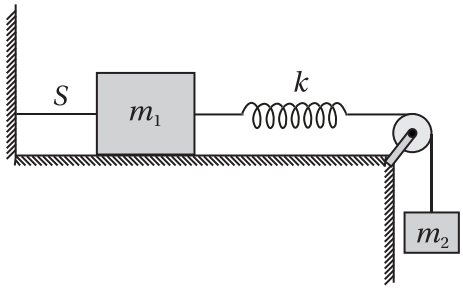
4. Let two particles 1 and 2 connected by an inextensible string. Their velocities are shown in the figure below. Then $\frac{v_1}{v_2}=$ [4]




① $\sqrt{3}$ ② $\frac{1}{\sqrt{3}}$

③ 2 ④ $\frac{1}{2}$

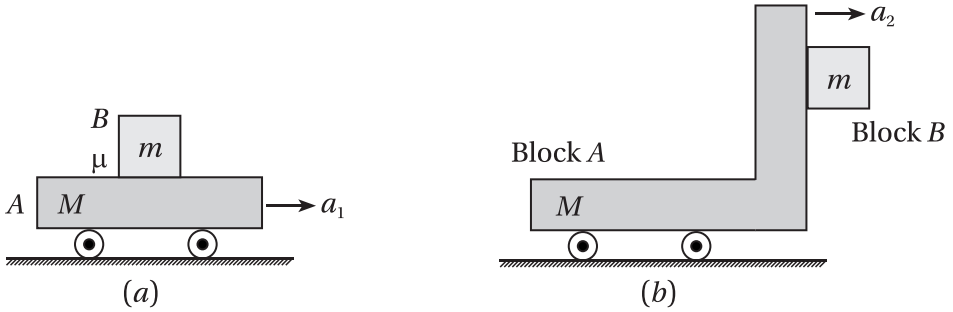
5. Two blocks of masses $m_1$ and $m_2$ are in equilibrium. The block $m_2$ hangs from a smooth pulley by an inextensible string that is fitted with a light spring of stiffness $k$ as shown in the figure. Neglecting friction and mass of the string, the acceleration of block of mass $m_1$ just after the string $S$ is cut [4]




① $g$ ② $\left(\frac{m_1}{m_2}\right)g$

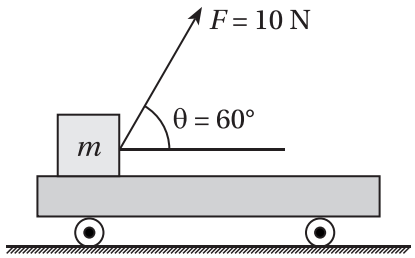
③ $\left(\frac{m_2}{m_1}\right)g$ ④ 0

6. In cases ($a$) and ($b$), the block $B$ of mass $m$ does not slide relative to block $A$. If $\mu$ = coefficient of static friction between the block $A$ and block $B$, the range of accelerations [4]



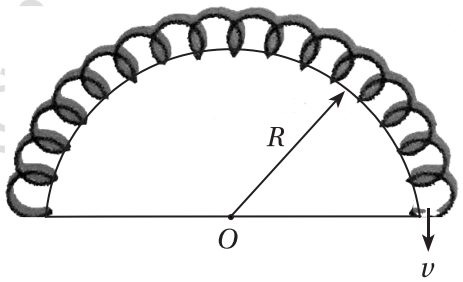

① $a_1 \le \mu g,\ a_2 \le \frac{g}{\mu}$ ② $a_1 \ge \mu g,\ a_2 \le \frac{g}{\mu}$ ③ $a_1 \le \mu g,\ a_2 \ge \frac{g}{\mu}$ ④ $a_1 \ge \mu g,\ a_2 \ge \frac{g}{\mu}$

7. The man is pulling the box with a force of 10 N at an angle $\theta = 60°$ with the horizontal. The box is kept on a trolley car which moves with a velocity of 0.5 m/s along $x$ axis. The man moves relative to the trolley car with a velocity of 0.25 m/s. Find the ratio of the work done by the man relative to ground and relative to the trolley car during $t$ = 20 s. $W_1 : W_2$ = [4]




① 5 : 1 ② 3 : 1
③ 4 : 3 ④ 5 : 3

8. A semicircular chain of mass $m$ slides with a speed $v$ over a smooth hemisphere. The linear momentum of the chain at the given position is [4]

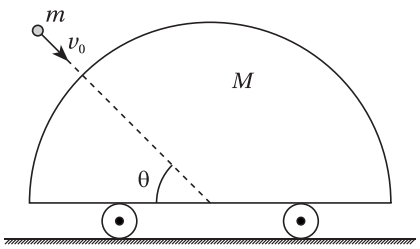



① $\frac{mv}{\pi}\hat{i}$ ② $\frac{mv}{2\pi}\hat{i}$
③ $\frac{2mv}{3\pi}\hat{i}$ ④ $\frac{2mv}{\pi}\hat{i}$

9. A ball of mass 1 kg is falling from a height 5 m from rest. If it bounces back to a height $\frac{4}{5}$ m, then net impulse of the ball during the collision with ground is [4]

① $14\hat{j}$ kgm/s ② $10\hat{j}$ kgm/s ③ $12\hat{j}$ kgm/s ④ $8\hat{j}$ kgm/s

10. A particle of mass m strikes a smooth stationary hemisphere of mass M with a velocity $v_0$, at an angle θ with the horizontal. If the collision is perfectly inelastic, then velocity of hemisphere after the collision is [4]




① $\frac{mv_0}{M+m}$ ② $\frac{mv_0\cos\theta}{M+m}$
③ $\frac{mv_0\cos\theta}{M}$ ④ $\frac{mv_0\sin\theta}{m}$

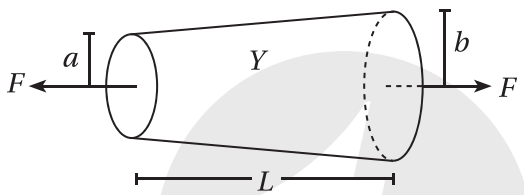
11. A planet is moving in circular orbit round the Sun with a period $T$. The time in which it would fall into Sun, if suddenly stopped [4]

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

12. A long horizontal gas filled tube closed at both ends is rotated about a vertical axis through its centre normal to its length with an angular velocity ω. If $p_0$ is the pressure at centre, $T$ the temperature on kelvin scale, $R$ the gas constant per unit molar mass, the pressure $p$ at a point distant $x$ from centre, then select the correct expression [4]

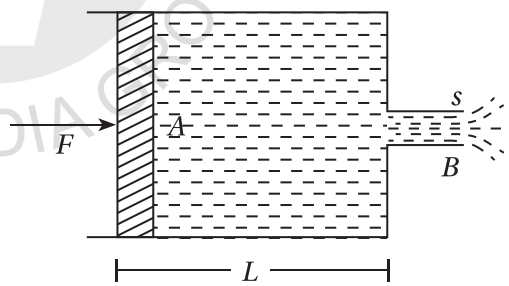
① $\log_e\left(\frac{p}{p_0}\right)=\frac{\omega^2x^2}{2RT}$ ② $\frac{p}{p_0}=\frac{\omega^2x^2}{T}$ ③ $p=p_0e^{\omega x/RT}$ ④ $\frac{p}{p_0}=\frac{\omega x}{RT}$

13. A slightly tapering wire of length $L$ and end radii $a$ and $b$ is subjected to stretching force $F$. If $Y$ is the Young's modulus, then the extension produced in the wire is [4]



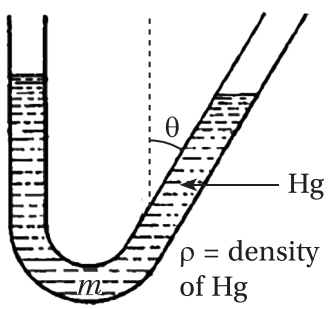

① $\frac{FLY}{\pi ab}$ ② $\frac{FL}{Y\pi ab}$ ③ $\frac{FY}{L\pi ab}$ ④ $\frac{FYb}{\pi L}$

14. What work should be done in order to squeeze all water from a horizontally located cylinder in the given figure during the time $t$ by means of a constant force acting on the piston? The volume of water in the cylinder is equal to $V$, the cross-sectional area of the orifice is $s$, with $s$ being considerably less than the piston area. The friction and viscosity are negligibly small. (ρ is the density of liquid). [4]




① $\frac{\rho V^3}{s^2t^2}$ ② $\frac{2\rho V^3}{s^2t^2}$ ③ $\frac{\rho V^3}{2s^2t^2}$ ④ $\frac{\rho V^2}{s^2t^2}$

15. The period of oscillations of mercury of mass $m$ poured into a bent tube whose right arm forms an angle θ with the vertical. The cross-sectional area of tube is $s$. The viscosity of mercury is to be neglected. [4]




① $2\pi\sqrt{\frac{m}{\rho gs\cos\theta}}$ ② $2\pi\sqrt{\frac{m}{(1-\cos\theta)\rho gs}}$

③ $2\pi\sqrt{\frac{m}{(1+\sin\theta)\rho gs}}$ ④ $2\pi\sqrt{\frac{m}{(1+\cos\theta)\rho gs}}$

16. The displacement y of a particle executing periodic motion is given by [4]

$$y = 4\cos^2\left(\frac{1}{2}t\right)\sin(1000t)$$

This expression may be considered to be a result of the super position of

① two ② three

③ four ④ five independent harmonic motion

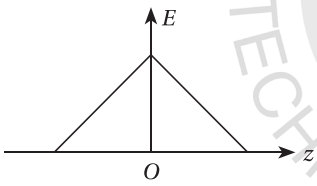
17. The minimum attainable pressure of ideal gas in the process $T = T_0 + \alpha V^2$, where $T_0$ and $\alpha$ are positive constants and $V$ is the volume of one mole of gas [4]

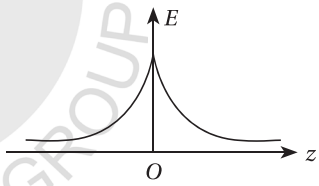
① $R\sqrt{\alpha T_0}$ ② $4R\sqrt{\alpha T_0}$ ③ $2R\sqrt{\alpha T_0}$ ④ $\frac{R}{2}\sqrt{\alpha T_0}$

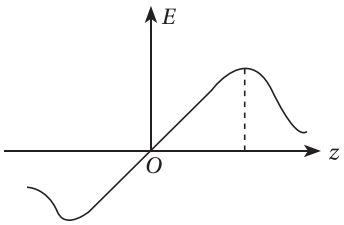
18. A point source of heat of power $p$ is placed at the centre of a spherical shell of mean radius $R$. The material of shell has thermal conductivity $k$. If the temperature between the outer and inner surface of the shell is not to exceed $T$, thickness of the shell should not be less than [4]

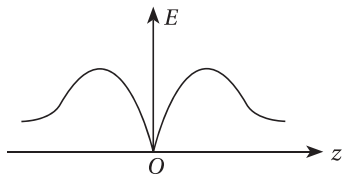
① $\frac{4\pi kTR^2}{p}$ ② $\frac{4\pi k^2TR}{p}$ ③ $\frac{4\pi kT^2R}{p}$ ④ $\frac{4\pi kTR}{p^2}$

19. A circular ring carries a uniformly distributed positive charge and lies in $x$–$y$ plane with centre at origin of co-ordinate system. If at (0, 0, $z$), the electric field is $E$, then which of the following graph is correct? [4]

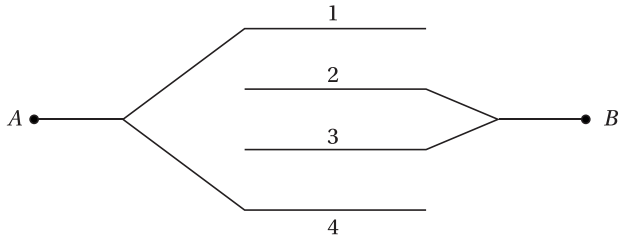
① 


② 


③ 


④ 

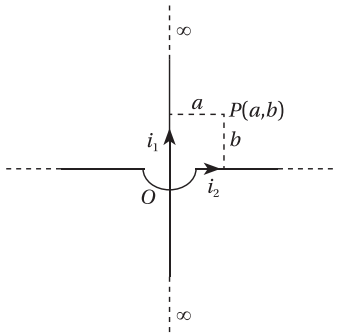
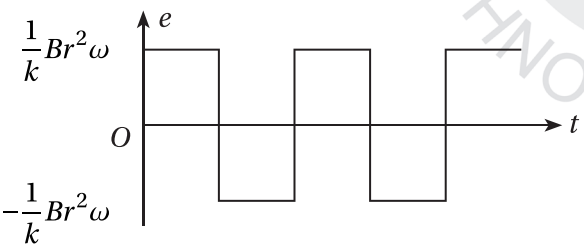
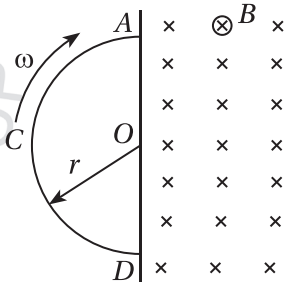
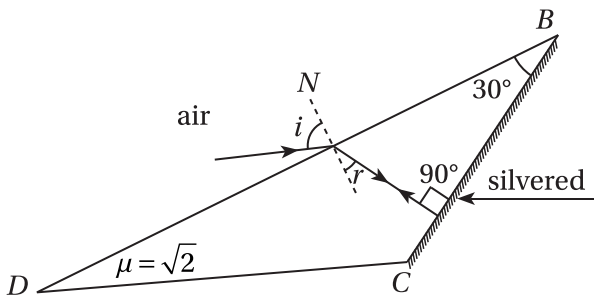

20. [4]




Four metallic plates, each with a surface area of one side $A$, are placed at a distance $d$ apart from each other. The two inner plates are connected to point $A$ and the other two plates to another point $B$. Then the capacitance of the system is

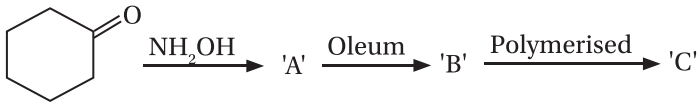
① $\frac{A\varepsilon_0}{d}$ ② $\frac{2A\varepsilon_0}{d}$ ③ $\frac{3A\varepsilon_0}{d}$ ④ $\frac{4A\varepsilon_0}{d}$

## SECTION-B

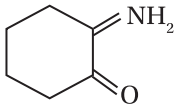
| | | |
|---|---|---|
| 21. | A heater boils 1 kg of water in time $t_1$ = 3 minute and another heater boils the same water in time $t_2$ = 6 minute. If both are connected in parallel, the combination will boil the same water in time (min) _____. | [4] |
| 22. | Two insulating infinitely long wires are lying mutually perpendicular to each other as shown. If the two wires carry currents $i_1$ and $i_2$ respectively such that net $B$ at $P(a,b)$ is zero, then $\frac{a}{b}$ = _____. (given $i_1 = i_2$)   | [4] |
| 23. | The magnetic field at a distance $d$ from a short bar magnet in longitudinal and transverse position are in the ratio _____. | [4] |
| 24. | $ACD$ is semicircular conducting loop of radius $r$ with centre at $O$. The loop is made to rotate with constant angular velocity ω about an axis passing through $O$ and perpendicular to the plane. The graph of induced emf $e$ versus time $t$ (s) is given.   Then $k$ = _____   | [4] |
| 25. | If one face of a prism of prism angle 30° and $\mu = \sqrt{2}$ is silvered, the incident ray retraces its initial path. The angle of incidence (in degree) is _____.   | [4] |

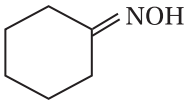
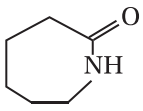
# Chemistry

## SECTION-A

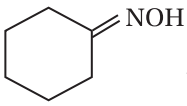
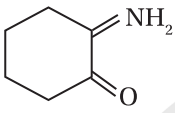
26.  [4]

'A' , 'B' and 'C' are:

① Cyclohexanone oxime,  , Urotropine

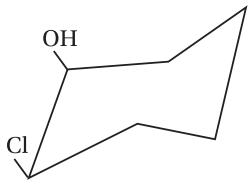
②  ,  , Nylon 6

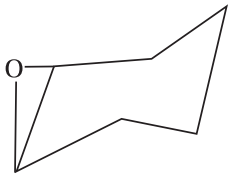
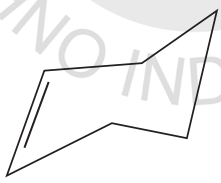
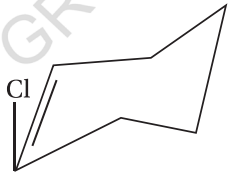
③ Cyclohexanone oxime, caprolactum, urotropine

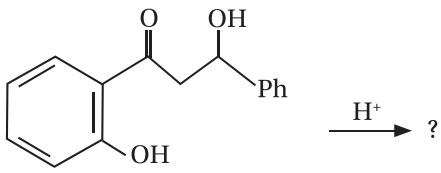
④  ,  , cyanuric triazide

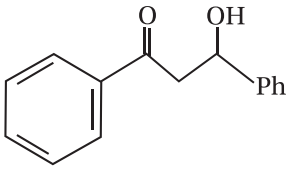
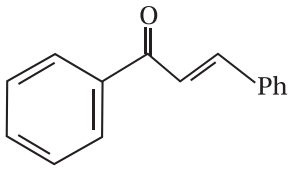
27. Hybridisation of 'N' in solid $N_2O_5$: [4]

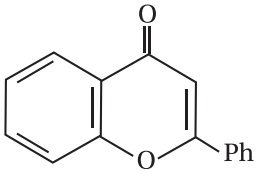
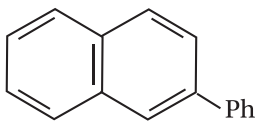
① $sp^2$ ② $sp^3$ ③ sp and $sp^2$ ④ sp and $sp^3$

28.  [4]

①  ②  ③  ④ None of these

29.  [4]

①  ② 

③  ④ 

30. $K(s)+H_2O(l)\longrightarrow KOH(aq)+\frac{1}{2}H_2(g);\ \Delta H=-48\ KCal$

$H_2(g)+\frac{1}{2}O_2(g)\longrightarrow H_2O(l);\ \Delta H=-68.4\ KCal$

$KOH(s)+H_2O\longrightarrow KOH(aq)OH=-14.0\ KCal$

Using above data calculate the heat of formation of KOH(s):

① –116.4 KCal ② –102.4 KCal ③ –62.0 KCal ④ –130.4 KCal [4]

31. $Na_2S_2O_3 . 5H_2O$ is titrated with $I_2$, which is liberated by addition of 10 ml $K_2Cr_2O_7$ solution into KI solution. If volume of $\frac{M}{25}$ sodium thiosulphate solution required to complete titration of $I_2$ is 3 ml. Then calculate molarity of $K_2Cr_2O_7$ solution. (molecular weight of $K_2Cr_2O_7$ = 294.18)

① $\frac{32}{25}$ ② $\frac{8}{375}$ ③ $\frac{16}{25}$ ④ $\frac{8}{500}$ [4]

32. $CH_3-C\equiv C-CH_3 \xrightarrow{NaNH_2}$ 'A'

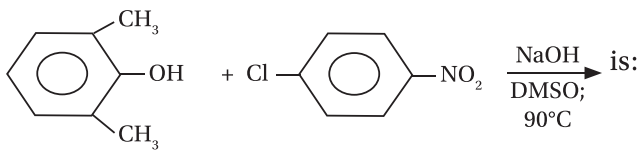
$\xrightarrow[\text{Lindlar's catalyst}]{Pd/H_2}$ 'B'

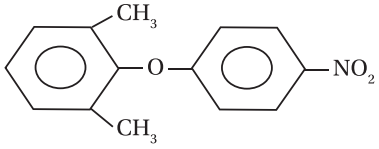
Choose the incorrect statement.

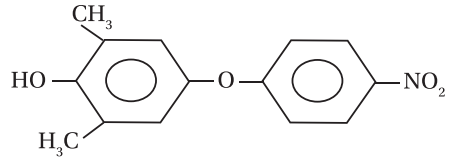
① 'A' is trans butene–2 and B is Cis butene–2
② 'A' has melting point more than 'B'
③ 'A' has zero dispole moment and 'B' is non-zero
④ 'A' has boiling point more than 'B' [4]

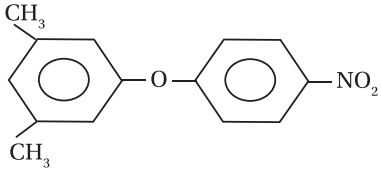
33. Regarding $SN_2$ reaction which of the following is/are correct?

① On increasing polarity of solvent there is decrease in rate and order of reactivity of alkyl halides 3° < 2° < 1°.
② Transition state is trigonal bipyramidal species
③ 100% inversion takes place
④ All of these are correct [4]

34. The major product of reaction,  is: [4]

① 

② 

③ 

④ None of these

35. What should be minimum concentration of $Cu^{2+}$ at which the cell reaction: [4]

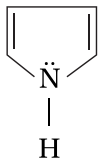
$Zn + Cu^{2+}(aq) \longrightarrow Zn^{2+}(aq) + Cu$

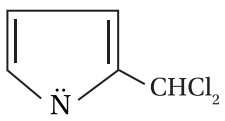
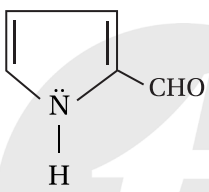
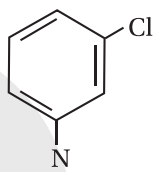
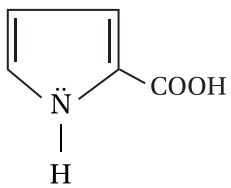
will be spontaneous, if $[Zn^{2+}] = 1M$? [Let $E^{o}_{cell} = 1.18V$ ]

① $10^{-40}M$ ② $10^{-23}M$ ③ $10^{-11.8}M$ ④ $1.18 \times 10^{-20}M$

36. A bulb is rated as 150 watt. If 10% of its energy is emitted as light then what will be the number of photoelectrons emitted per second by a metal surface whose work function as 1eV? Bulb emits light of wavelength 5000A. [4]

① $3 \times 10^{-19}$ ② $3.77 \times 10^{19}$ ③ $5 \times 10^{15}$ ④ $5 \times 10^{12}$

37. Which of the following is neither intermediate nor product of the reaction when  reacts with $CHCl_3$ and NaOH? [4]

① 
② 
③ 
④ 

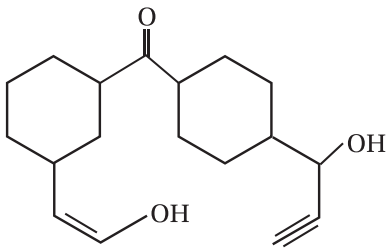
38. The specific conductance of saturated solution of silver chloride is $K(Ohm^{-1}Cm^{-1})$. The limiting ionic conductance of $Ag^{+}$ and $Cl^{-1}$ ions are x and y respectively. The solubility of AgCl and g/Litre is molar mass of AgCl = 143.5 g $(mole)^{-1}$ [4]

① $K\frac{1000}{x-y}$ ② $\frac{K}{(x+y)} \times 143.5$ ③ $\frac{K \times 100 \times 143.5}{x+y}$ ④ $\frac{K}{(x+y)} \times 146$

39. Rate constant for the reaction is $1.5 \times 10^{7}$ $sec^{-1}$ at 50°C and $4.5 \times 10^{7}$ $sec^{-1}$ at 100°C. What is the value of activation energy? [4]

① 220 $J(mole)^{-1}$ ② 2300 $J(mole)^{-1}$ ③ $2.2 \times 10^{3}$ $J(mole)^{-1}$ ④ $2.2 \times 10^{4}$ $J(mole)^{-1}$

40. [4]



Which of the following reagents will not react with above compound?

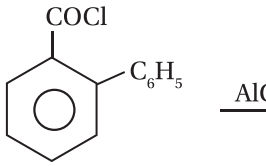
① Na metal ② $AgNO_3 + NH_4OH$ ③ $Cu_2Cl_2 + NH_4OH$ ④ $NaHCO_3$

41. Nitrogen dioxide cannot be obtained from [4]

① $Cu(NO_3)_2$ ② $Hg(NO_3)_2$ ③ $NaNO_3$ ④ $AgNO_3$

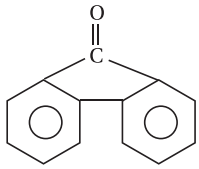
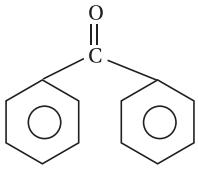
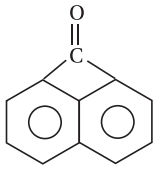
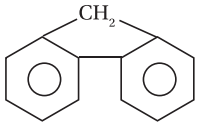
42. Dry air was passed through a solution of 5g solute in 80 g $H_2O$ and then through pure water. The loss in weight of solution was 2.5 g out that of pure $H_2O$ was 0.04 g. What is molecular weight of solute? [4]

① 58.6 ② 75 ③ 36.8 ④ 70.3

43. 

[4]

The product 'p' is

① 
② 
③ 
④ 

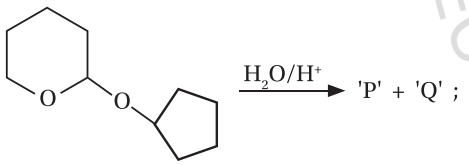

44. What is equilibrium constant for the reaction [4]

$Ni(s) + Cu^{++}(aq) \longrightarrow Cu(s) + Ni^{++}(aq)$

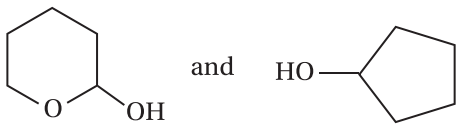
Given that $E^{o}_{Ni \rightarrow Ni^{++}}$ and $E^{o}_{Cu \rightarrow Cu^{++}}$ are +0.25V and –0.34V respectively.

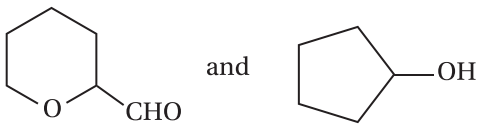
① $1 \times 10^{20}$ ② $2.5 \times 10^{34}$ ③ $3.4 \times 10^{25}$ ④ $2 \times 10^{-25}$

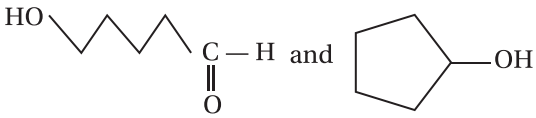
45. In the given reaction: [4]




Identify P and Q:

① 

② 

③ 

④ All of these

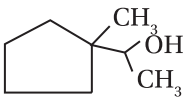


## SECTION-B

46. Let the wave function $\psi$ for 2S orbital is given by: [4]

$$\psi_{2S} = \frac{1}{\sqrt{y\pi}}\left[\frac{x}{a_0}\right]^{3/2}\left[2 - \frac{r}{3a_0}\right]e^{-\frac{r}{2a_0}}$$

where 'x' and 'y' are constant. If at $r = r_0$ radial node is formed, and value of $r_0$ in terms of $a_0$ is $na_0$. What is the value of 'n' _____.

| | | |
|---|---|---|
| 47. | Number of moles of electrons are needed to convert one mole of nitrate ion into hydrazine are _____. | [4] |
| 48. | If total number of monochloro derivative of $C_4H_8$ is x. x – 5 = –? | [4] |
| 49. |   what will be the sum of number of atoms involved in ring (i.e. x membered ring) and number of $\pi$-bond (y). x + y = –? | [4] |
| 50. | In a reaction, the time required to complete half of the reaction was found to increase 16 times when the initial concentration of the reactant was reduced to $\frac{1}{4}$th. What is the order of the reaction? _____. | [4] |

# Mathematics

## SECTION-A

| | | |
|---|---|---|
| 51. | Number of points where the function $f(x) = \sin 3x + 3\cos^2 x + 2$ has local extremum points in $x \in [0, 2\pi]$ is<br>① 3 ② 4 ③ 5 ④ 6 | [4] |
| 52. | If $\vec{a}, \vec{b}, \vec{c}, \vec{d}$ are such that $\lvert\vec{a}\rvert = 1, \lvert\vec{b}\rvert = 2, \lvert\vec{c}\rvert = 4$, & $\lvert\vec{d}\rvert = \sqrt{2}$, and $\vec{a} + \vec{b} + \vec{c} + \vec{d} = 0$ then $\vec{a}\cdot\vec{b} + \vec{b}\cdot\vec{c} + \vec{c}\cdot\vec{a}$ is<br>① 19 ② $\frac{-19}{2}$ ③ $\frac{19}{3}$ ④ 38 | [4] |
| 53. | If the equation $(p^2 - 3p + 2)x^2 + (p-1)^2x + (p^2 - 4p + 3) = 0$ is satisfied for more than two different values of x, then p is equal to<br>① 1 ② 2 ③ 1, 2, 3 ④ 2, 3 | [4] |
| 54. | $\int_0^{\pi/6} \frac{\sqrt{\cos 3x}}{\sqrt{\sin 3x} + \sqrt{\cos 3x}}\,dx$ is equal to<br>① $\frac{\pi}{4}$ ② $\frac{\pi}{3}$ ③ $\frac{\pi}{12}$ ④ $\frac{\pi}{2}$ | [4] |
| 55. | The number of lines L passing through origin, such that area bounded by the curve $y = x - x^2$ and L is $\frac{9}{2}$ square units, is<br>① 0 ② 1 ③ 2 ④ 3 | [4] |
| 56. | If $\int_0^{y^2} e^x dt - \int_0^x \tan t\,dt = \ln x + 5, x \in \left(0, \frac{\pi}{4}\right)$, then $\frac{dy}{dx}$ equals<br>① $\left(\frac{x\tan x + 1}{2xy}\right)e^{-y^2}$ ② $\left(\frac{x\tan x + y}{2x}\right)e^{y^2}$ ③ $\left(\frac{x\tan x + 1}{2y}\right)e^{y^2}$ ④ $\left(\frac{x\tan x - 1}{2xy}\right)e^{-y^2}$ | [4] |

57. If rate of change of perimeter of a circle is $\pi$ cm/min, then rate of change of perimeter of an equilateral triangle, inscribed in the circle is (in cm/min). [4]

① $\frac{3\sqrt{3}}{4}$ ② $3\sqrt{3}$ ③ $\frac{3\sqrt{3}}{2}$ ④ $6\sqrt{3}$

58. If the length of the major axis of an ellipse is 100 and ecentricity $=\frac{1}{2}$, then the area of the rectangle formed by joining the vertices of latus rectum of the ellipse is equal to— [4]

① 2500 ② 3750 ③ 5000 ④ 6250

59. If $\begin{bmatrix} \sin y & \cos y & -\sqrt{\frac{13}{72}} \\ -3 & \sin x & \cos x \\ 0 & -4 & 1 \end{bmatrix}$ is a non invertible matrix, then value of cos x (15 cos x + 8 sin x) is [4]

① 12 ② 16 ③ 9 ④ 6

60. The coefficient of $x^7$ in $(1) + (1 + x) + (1 + x)^2 + \ldots\ldots\ldots + (1 + x)^{100}$ is [4]

① ${}^{101}C_{93}$ ② ${}^{100}C_{93}$ ③ ${}^{100}C_7$ ④ 0

61. Let f be a continuous odd function defined on R such that f(1) = –2, f(3) = 3, and f(–5) = 4. Minimum number of real roots of f(x) = 0 in R will be [4]

① 5 ② 4 ③ 3 ④ 2

62. In a certain town, only 3 newspaper A, B & C are published. There are 1000 people are living in that town and each person reads atleast one news paper. 30% of town population read only A, 25% read both B & C and 10% read all A, B & C. If 50% read A, then number of people who read exactly two newspapers is – [4]

① 200 ② 250 ③ 300 ④ 450

63. Which of the following is Incorrect ? [4]

① Orthogonal matrices are always invertible
② Skew symmetric matrices of order $(2n + 1)$ are always non invertible $\{n \in N\}$
③ Idempotent matrices are always invertible.
④ Involuntary matrices are always invertible

64. Pair of tangents are drawn from each point of line $x + y = 5$ to circle $x^2 + y^2 = 2$, then point of concurrency of their chords of contact, is – [4]

① $\left(\frac{2}{5}, \frac{2}{5}\right)$ ② (1, 1) ③ (-1,–1) ④ $\left(\frac{5}{2}, \frac{5}{2}\right)$

65. The area bounded by the curve $y = (x + 1)^2$, $y = (x - 1)^2$ and the line $y = 0$ is [4]

① $\frac{1}{6}$ ② $\frac{2}{3}$ ③ $\frac{1}{4}$ ④ $\frac{1}{3}$

66. If $T_n$ and $t_n$ represents $n$-th terms of 2 different arithmetic progressions respectively such that $\frac{T_n}{t_n} = \frac{n+1}{3n-2}$, then ratio of their sum of first 5 terms is equal to [4]

① $\frac{3}{4}$ ② $\frac{4}{7}$ ③ $\frac{5}{8}$ ④ $\frac{6}{11}$

| | | |
|---|---|---|
| 67. | Let $x_1, x_2, x_3, x_4, \ldots\ldots\ldots, x_n$ be n observations and let $\bar{x}$ be their arithmetic mean and $\sigma^2$ be their variance.<br>Statement 1 : Variance of observations $2x_1, 2x_2, 2x_3, \ldots, 2x_n$ is $4\sigma^2$<br>Statement 2 : Arithmetic mean of $2x_1, 2x_2, 2x_3, \ldots, 2x_n$ is $4\bar{x}$<br>① Statement-1 is true, statement 2 is true and statement-2 is not the correct explanation for statement-1.<br>② Statement-1 is true, statement-2 is false<br>③ Statement-1 is false, statement-2 is true<br>④ Statement-1 is true,<br>Statement-2 is true and statement-2 is correct explanation for statement-1. | [4] |
| 68. | The solution of $\frac{y+\sin x\cos^2(xy)}{\cos^2(xy)}dx+\frac{x}{\cos^2(xy)}dy+\sin y\,dy=0$, is (where c is constant of integration)<br>① $\sin(xy) - \cos x - \cos y = c$ ② $\tan xy + \cos x + \cos y = c$<br>③ $\cos xy - \sin x - \sin y = c$ ④ $\tan xy - \cos x - \cos y = c$ | [4] |
| 69. | If the tangents at two different points on the parabola $y^2 = 16x$ meet at the point (9, b), where $b \in I$, then the minimum value of b is<br>① 11 ② 12 ③ 13 ④ 14 | [4] |
| 70. | The domain of function<br>$f(x)=\sqrt{x^2-2\lvert x\rvert}+\sin^{-1}\left(\frac{x}{4}\right)$ is equal to<br>① $(-\infty, -2] \cup [2, \infty)$ ② $[-4, 4]$ ③ $[-4, -2] \cup [2, 4] \cup \{0\}$ ④ none of these | [4] |

## SECTION-B

| | | |
|---|---|---|
| 71. | If minimum value of the sum of real numbers $x^2$, $2x^{-4}$, $x^3$, ax and b is 9, with $x > 0$ and $a, b \in N$ then the value of (a + b) is | [4] |
| 72. | If the ratio of length of conjugate axis & transverse axis is $\frac{1}{\sqrt{3}}$ for the hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$. Then the ecentricity of conjugate hyperbola is | [4] |
| 73. | If vector $\lambda\hat{i}+2\hat{j}+\hat{k}$ lies in the plane containing three points $\hat{i}+\hat{j}+\hat{k}$, $2\hat{i}+2\hat{j}+\hat{k}$ and $3\hat{i}-\hat{k}$, then $18\lambda$ is – | [4] |
| 74. | A box contains 6 cards. Three of the cards are black on both sides, one card is black on one side and red on the other and two of the cards are red on both sides. A card is randomly picked from box and one side is randomly seen. Given that the side seen was red, the probability that the other side is also red can be expressed as $\left(\frac{a}{b}\right)$ (where a and b are coprime), then (a + b) is ... | [4] |
| 75. | If the line passing through P (5, 1,$\alpha$) and Q (3, $\beta$, 1) crosses the yz-plane at $M\left(0,\frac{17}{2},\frac{-13}{2}\right)$ then ($\alpha - \beta$) is equal to – | [4] |