

JEE Main 2025 April 7 Shift 1 Question Paper

Time Allowed :3 Hours

Maximum Marks :300

Total Questions :75

General Instructions

Read the following instructions very carefully and strictly follow them:

1. The test is of 3 hours duration.
2. The question paper consists of 75 questions. The maximum marks are 300.
3. There are three parts in the question paper consisting of Physics, Chemistry and Mathematics having 25 questions in each part of equal weightage.
4. Each part (subject) has two sections.
 - (i) Section-A: This section contains 20 multiple choice questions which have only one correct answer. Each question carries 4 marks for correct answer and –1 mark for wrong answer.
 - (ii) Section-B: This section contains 5 questions. In Section-B, the answer to each of the questions is a numerical value. Each question carries 4 marks for correct answer and –1 mark for wrong answer. For Section-B, the answer should be rounded off to the nearest integer

MATHEMATICS

SECTION-A

1. Evaluate the following limit:

$$\lim_{x \rightarrow 0^+} \frac{\tan \left(5x^{\frac{1}{3}} \right) \log (1 + 3x^2)}{(\tan^{-1} (3\sqrt{x}))^2 (e^{5x^{\frac{4}{3}}} - 1)}$$

(1) $\frac{1}{15}$

(2) 1

(3) $\frac{1}{3}$

(4) $\frac{5}{3}$

2. If the shortest distance between the lines $\frac{x-1}{2} = \frac{y-2}{3} = \frac{z-3}{4}$ and $\frac{x}{1} = \frac{y}{\alpha} = \frac{z-5}{1}$ is $\frac{5}{\sqrt{6}}$, then the sum of all possible values of α is:

(1) $\frac{3}{2}$

(2) $\frac{-3}{2}$

(3) 3

(4) -3

3. Let $x = -1$ and $x = 2$ be the critical points of the function

$f(x) = x^3 + ax^2 + b \log |x| + 1$, where $x \neq 0$. Let m and M be the absolute minimum and maximum values of f in the interval $[-2, -\frac{1}{2}]$. Then, $|M + m|$ is equal to:

(1) 21.1

(2) 19.8

(3) 22.1

(4) 20.9

4. The remainder when $((64)^{64})^{64}$ is divided by 7 is equal to:

- (1) 4
 - (2) 1
 - (3) 3
 - (4) 6
-

5. Let P be the parabola, whose focus is $(-2, 1)$ and directrix is $2x + y + 2 = 0$. Then the sum of the ordinates of the points on P, whose abscissa is -2, is:

- (1) $\frac{3}{2}$
 - (2) $\frac{5}{2}$
 - (3) $\frac{1}{4}$
 - (4) $\frac{3}{4}$
-

6. Let $y = y(x)$ be the solution curve of the differential equation

$$x(x^2 + e^x) dy + (e^x(x - 2)y - x^3) dx = 0, \quad x > 0,$$

passing through the point $(1, 0)$. Then $y(2)$ is equal to:

- (1) $\frac{4}{4-e^2}$
 - (2) $\frac{2}{2+e^2}$
 - (3) $\frac{2}{2-e^2}$
 - (4) $\frac{4}{4+e^2}$
-

7. From a group of 7 batsmen and 6 bowlers, 10 players are to be chosen for a team, which should include at least 4 batsmen and at least 4 bowlers. One batsman and one bowler who are captain and vice-captain respectively of the team should be included. Then the total number of ways such a selection can be made, is:

- (1) 165
 - (2) 155
 - (3) 145
 - (4) 135
-

8. If for $\theta \in \left[-\frac{\pi}{3}, 0\right]$, the points

$$(x, y) = \left(3 \tan \left(\theta + \frac{\pi}{3}\right), 2 \tan \left(\theta + \frac{\pi}{6}\right)\right)$$

lie on $xy + \alpha x + \beta y + \gamma = 0$, then $\alpha^2 + \beta^2 + \gamma^2$ is equal to:

- (1) 80
 - (2) 72
 - (3) 96
 - (4) 75
-

9. Let C_1 be the circle in the third quadrant of radius 3, that touches both coordinate axes. Let C_2 be the circle with center $(1, 3)$ that touches C_1 externally at the point (α, β) .

If $(\beta - \alpha)^2 = \frac{m}{n}$, and $\gcd(m, n) = 1$, then $m + n$ is equal to:

- (1) 9
 - (2) 13
 - (3) 22
 - (4) 31
-

10. The integral

$$\int_0^{\pi} \frac{(x+3) \sin x}{1+3 \cos^2 x} dx$$

is equal to:

- (1) $\frac{\pi}{\sqrt{3}}(\pi + 1)$

- (2) $\frac{\pi}{\sqrt{3}}(\pi + 2)$
(3) $\frac{\pi}{3\sqrt{3}}(\pi + 6)$
(4) $\frac{\pi}{2\sqrt{3}}(\pi + 4)$
-

11. Among the statements:

(S1): The set $\{z \in \mathbb{C} - \{-i\} : |z| = 1 \text{ and } \frac{z-i}{z+i} \text{ is purely real}\}$ contains exactly two elements.

(S2): The set $\{z \in \mathbb{C} - \{-1\} : |z| = 1 \text{ and } \frac{z-1}{z+1} \text{ is purely imaginary}\}$ contains infinitely many elements.

Then, which of the following is correct?

- (1) both are incorrect
(2) only (S1) is correct
(3) only (S2) is correct
(4) both are correct
-

12. The mean and standard deviation of 100 observations are 40 and 5.1, respectively.

By mistake one observation is taken as 50 instead of 40. If the correct mean and the correct standard deviation are μ and σ respectively, then $10(\mu + \sigma)$ is equal to:

- (1) 445
(2) 451
(3) 447
(4) 449
-

13. Let x_1, x_2, x_3, x_4 be in a geometric progression. If 2, 7, 9, 5 are subtracted respectively from x_1, x_2, x_3, x_4 , then the resulting numbers are in an arithmetic progression. Then the value of $\frac{1}{24}(x_1 x_2 x_3 x_4)$ is:

- (1) 72

- (2) 18
- (3) 36
- (4) 216

14. Let the set of all values of $p \in \mathbb{R}$, for which both the roots of the equation $x^2 - (p+2)x + (2p+9) = 0$ are negative real numbers, be the interval (α, β) . Then $\beta - 2\alpha$ is equal to:

- (1) 0
- (2) 9
- (3) 5
- (4) 20

15. Let A be a 3×3 matrix such that

$$|\text{adj}(\text{adj}A)| = 81.$$

If

$$S = \left\{ n \in \mathbb{Z} : |\text{adj}(\text{adj}A)|^{\frac{(n-1)^2}{2}} = |A|^{(3n^2-5n-4)} \right\},$$

then the value of

$$\sum_{n \in S} |A|(n^2 + n)$$

is:

- (1) 866
- (2) 750
- (3) 820
- (4) 732

16. If the area of the region bounded by the curves $y = 4 - \frac{x^2}{4}$ and $y = \frac{x-4}{2}$ is equal to α , then 6α equals:

- (1) 250
 - (2) 210
 - (3) 240
 - (4) 220
-

17. Let the system of equations be:

$$2x + 3y + 5z = 9,$$

$$7x + 3y - 2z = 8,$$

$$12x + 3y - (4 + \lambda)z = 16 - \mu,$$

which has infinitely many solutions. Then the radius of the circle centered at (λ, μ) and touching the line $4x = 3y$ is:

- (1) $\frac{17}{5}$
 - (2) $\frac{7}{5}$
 - (3) 7
 - (4) $\frac{21}{5}$
-

18. Let the line L pass through $(1, 1, 1)$ and intersect the lines

$$\frac{x-1}{2} = \frac{y+1}{3} = \frac{z-1}{4}$$

and

$$\frac{x-3}{1} = \frac{y-4}{2} = \frac{z}{1}.$$

Then, which of the following points lies on the line L ?

- (1) $(4, 22, 7)$
- (2) $(5, 4, 3)$
- (3) $(10, -29, -50)$
- (4) $(7, 15, 13)$

19. Let the angle $\theta, 0 < \theta < \frac{\pi}{2}$ between two unit vectors $\hat{a}$ and $\hat{b}$ be $\sin^{-1}\left(\frac{\sqrt{65}}{9}\right)$. If the vector $\vec{c} = 3\hat{a} + 6\hat{b} + 9(\hat{a} \times \hat{b})$, then the value of $9(\vec{c} \cdot \hat{a}) - 3(\vec{c} \cdot \hat{b})$ is:

- (1) 31
 - (2) 27
 - (3) 29
 - (4) 24
-

20. Let ABC be the triangle such that the equations of lines AB and AC are:

$$3y - x = 2 \quad \text{and} \quad x + y = 2,$$

respectively, and the points B and C lie on the x-axis. If P is the orthocentre of the triangle ABC , then the area of the triangle PBC is equal to:

- (1) 4
 - (2) 10
 - (3) 8
 - (4) 6
-

SECTION-B

21. The number of points of discontinuity of the function

$$f(x) = \left\lfloor \frac{x^2}{2} \right\rfloor - \lfloor \sqrt{x} \rfloor, \quad x \in [0, 4],$$

where $\lfloor \cdot \rfloor$ denotes the greatest integer function, is:

22. The number of relations on the set $A = \{1, 2, 3\}$ containing at most 6 elements including $(1, 2)$, which are reflexive and transitive but not symmetric, is:

23. Consider the hyperbola

$$\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1,$$

having one of its foci at $P(-3, 0)$. If the latus rectum through its other focus subtends a right angle at P , and

$$a^2b^2 = \alpha\sqrt{2} - \beta, \quad \alpha, \beta \in \mathbb{N},$$

then find α and β .

24. The number of singular matrices of order 2, whose elements are from the set $\{2, 3, 6, 9\}$ is:

25. For $n \geq 2$, let S_n denote the set of all subsets of $\{1, 2, 3, \dots, n\}$ with no two consecutive numbers. For example, $\{1, 3, 5\} \in S_6$, but $\{1, 2, 4\} \notin S_6$. Then, find $n(S_5)$.

PHYSICS

SECTION-A

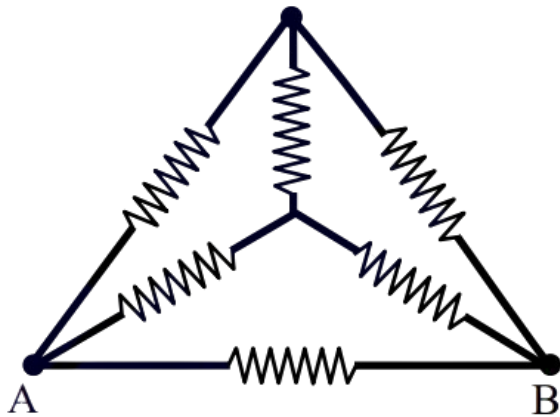
26. Two harmonic waves moving in the same direction superimpose to form a wave $x = a \cos(1.5t) \cos(50.5t)$ where t is in seconds. Find the period with which they beat (close to the nearest integer):

- (1) 6 s
- (2) 4 s
- (3) 1 s
- (4) 2 s

27. Two plane polarized light waves combine at a certain point whose electric field components are $E_1 = E_0 \sin(\omega t)$ $E_2 = E_0 \sin(\omega t + \frac{\pi}{3})$ Find the amplitude of the resultant wave.

- (1) $0.9E$
 - (2) E_0
 - (3) $1.7E_0$
 - (4) $3.4E_0$
-

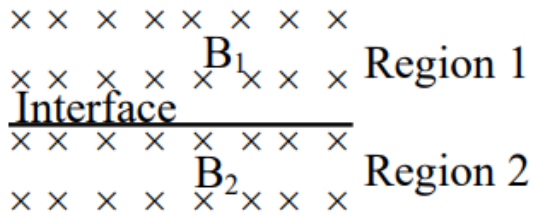
28. A wire of resistance R is bent into a triangular pyramid as shown in the figure, with each segment having the same length. The resistance between points A and B is $\frac{R}{n}$. The value of n is:



- (1) 16
 - (2) 14
 - (3) 10
 - (4) 12
-

29. Uniform magnetic fields of different strengths B_1 and B_2 , both normal to the plane of the paper, exist as shown in the figure. A charged particle of mass m and charge q , at

the interface at an instant, moves into region 2 with velocity v and returns to the interface. It continues to move into region 1 and finally reaches the interface. What is the displacement of the particle during this movement along the interface?



Consider the velocity of the particle to be normal to the magnetic field and $B_2 > B_1$.

- (1) $\frac{mv}{qB_1} \left(1 - \frac{B_2}{B_1}\right) \times 2$
- (2) $\frac{mv}{qB_1} \left(1 - \frac{B_1}{B_2}\right)$
- (3) $\frac{mv}{qB_1} \left(1 - \frac{B_2}{B_1}\right)$
- (4) $\frac{mv}{qB_1} \left(1 - \frac{B_1}{B_2}\right) \times 2$

30. If ϵ_0 denotes the permittivity of free space and Φ_E is the flux of the electric field through the area bounded by the closed surface, then the dimension of $\epsilon_0 \frac{d\Phi_E}{dt}$ are that of:

- (1) Electric field
- (2) Electric potential
- (3) Electric charge
- (4) Electric current

31. A rod of length $5L$ is bent at a right angle, keeping one side length as $2L$. The position of the centre of mass of the system (Consider $L = 10$ cm):

- (1) $2\hat{i} + 3\hat{j}$
- (2) $3\hat{i} + 7\hat{j}$
- (3) $5\hat{i} + 8\hat{j}$
- (4) $4\hat{i} + 9\hat{j}$

32. The percentage increase in magnetic field B when space within a current-carrying solenoid is filled with magnesium (magnetic susceptibility $\chi_{mg} = 1.2 \times 10^{-5}$) is:

- (1) $\frac{6}{5} \times 10^{-3}\%$
 - (2) $\frac{5}{6} \times 10^{-5}\%$
 - (3) $\frac{5}{6} \times 10^{-4}\%$
 - (4) $\frac{5}{3} \times 10^{-5}\%$
-

33. A lens having refractive index 1.6 has focal length of 12 cm, when it is in air. Find the focal length of the lens when it is placed in water. (Take refractive index of water as 1.28)

- (1) 355 mm
 - (2) 288 mm
 - (3) 555 mm
 - (4) 655 mm
-

34. An AC current is represented as:

$$i = 5\sqrt{2} + 10 \cos \left(650\pi t + \frac{\pi}{6} \right) \text{ Amp}$$

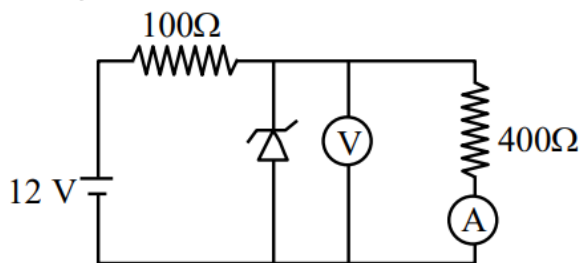
The RMS value of the current is:

- (1) 50 Amp
 - (2) 100 Amp
 - (3) 10 Amp
 - (4) $5\sqrt{2}$ Amp
-

35. Two thin convex lenses of focal lengths 30 cm and 10 cm are placed coaxially, 10 cm apart. The power of this combination is:

- (1) 5 D
 - (2) 1 D
 - (3) 20 D
 - (4) 10 D
-

36. In the following circuit, the reading of the ammeter will be: (Take Zener breakdown voltage = 4 V)



- (1) 24 mA
 - (2) 80 mA
 - (3) 10 mA
 - (4) 60 mA
-

37. Two projectiles are fired from the ground with the same initial speeds from the same point at angles $(45^\circ + \alpha)$ and $(45^\circ - \alpha)$ with the horizontal direction. The ratio of their times of flights is:

- (1) 1
 - (2) $\frac{1 - \tan \alpha}{1 + \tan \alpha}$
 - (3) $\frac{1 + \sin 2\alpha}{1 - \sin 2\alpha}$
 - (4) $\frac{1 + \tan \alpha}{1 - \tan \alpha}$
-

38. Match the List-I with List-II.

List-I	List-II
A. Triatomic rigid gas	I. $\frac{C_P}{C_V} = \frac{5}{3}$
B. Diatomic non-rigid gas	II. $\frac{C_P}{C_V} = \frac{7}{5}$
C. Monoatomic gas	III. $\frac{C_P}{C_V} = \frac{4}{3}$
D. Diatomic rigid gas	IV. $\frac{C_P}{C_V} = \frac{9}{7}$

Choose the correct answer from the options given below:

- (1) A-III, B-IV, C-I, D-II
 - (2) A-III, B-II, C-IV, D-I
 - (3) A-II, B-IV, C-I, D-III
 - (4) A-IV, B-II, C-III, D-I
-

39. A cubic block of mass m is sliding down on an inclined plane at 60° with an acceleration of $\frac{g}{2}$, the value of coefficient of kinetic friction is:

- (1) $\sqrt{3} - 1$
 - (2) $\frac{\sqrt{3}}{2}$
 - (3) $\frac{\sqrt{2}}{3}$
 - (4) $1 - \frac{\sqrt{3}}{2}$
-

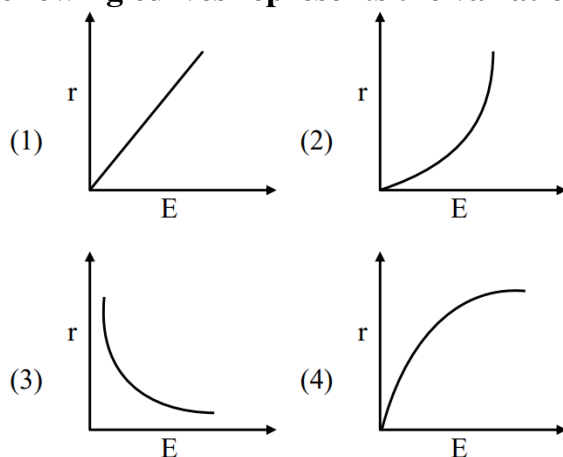
40. In a hydrogen-like ion, the energy difference between the 2nd excitation energy state and ground is 108.8 eV. The atomic number of the ion is:

- (1) 4
- (2) 2
- (3) 1
- (4) 3

41. For a hydrogen atom, the ratio of the largest wavelength of the Lyman series to that of the Balmer series is:

- (1) 5 : 36
 - (2) 5 : 27
 - (3) 3 : 4
 - (4) 27 : 5
-

42. A particle of charge q , mass m , and kinetic energy E enters in a magnetic field perpendicular to its velocity and undergoes a circular arc of radius r . Which of the following curves represents the variation of r with E ?



43. An object of mass 1000 g experiences a time-dependent force $\vec{F} = (2t\hat{i} + 3t^2\hat{j})$ N. The power generated by the force at time t is:

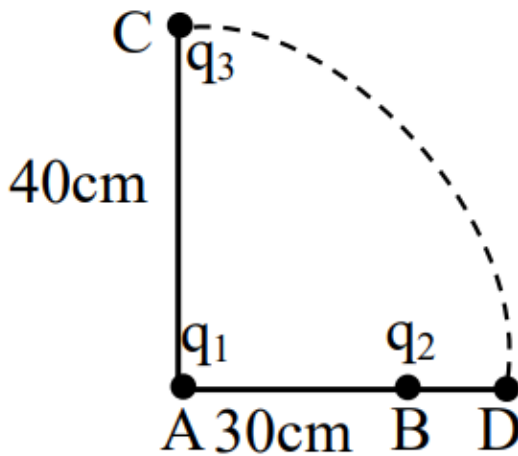
- (1) $(2t^2 + 3t^3)$ W
- (2) $(2t^2 + 18t^3)$ W
- (3) $(3t^3 + 5t^5)$ W
- (4) $(2t^3 + 3t^5)$ W

44. Two wires A and B are made of the same material, having the ratio of lengths

$\frac{L_A}{L_B} = \frac{1}{3}$ and their diameters ratio $\frac{d_A}{d_B} = 2$. If both the wires are stretched using the same force, what would be the ratio of their respective elongations?

- (1) 1 : 6
- (2) 1 : 12
- (3) 3 : 4
- (4) 1 : 3

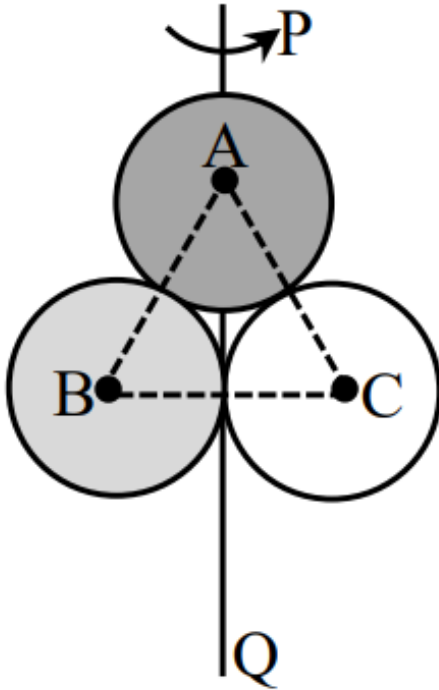
45. Two charges q_1 and q_2 are separated by a distance of 30 cm. A third charge q_3 initially at C as shown in the figure, is moved along the circular path of radius 40 cm from C to D. If the difference in potential energy due to the movement of q_3 from C to D is given by $\frac{q_3 K}{4\pi\epsilon_0}$, the value of K is:



- (1) $8q_2$
- (2) $6q_2$
- (3) $8q_1$
- (4) $6q_1$

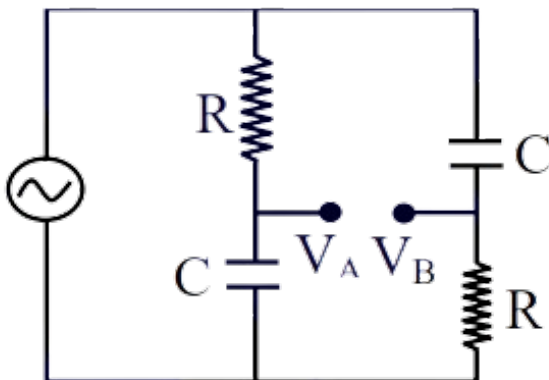
SECTION-B

46. A, B and C are disc, solid sphere and spherical shell respectively with the same radii and masses. These masses are placed as shown in the figure.



The moment of inertia of the given system about PQ is $\frac{x}{15}I$, where I is the moment of inertia of the disc about its diameter. The value of x is:

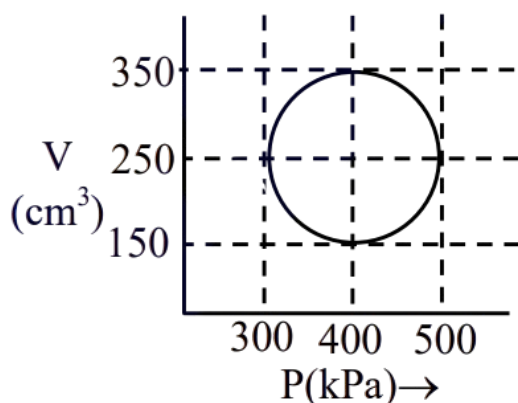
47. For the AC circuit shown in the figure, $R = 100 \text{ k}\Omega$ and $C = 100 \text{ pF}$, and the phase difference between V_{in} and $(V_B - V_A)$ is 90° . The input signal frequency is 10^x rad/sec , where x is:



48. A container contains a liquid with refractive index of 1.2 up to a height of 60 cm and another liquid having refractive index 1.6 is added to height H above the first liquid. If viewed from above, the apparent shift in the position of the bottom of the container is 40 cm. The value of H is ___ cm.

49. A wire of length 10 cm and diameter 0.5 mm is used in a bulb. The temperature of the wire is 1727°C and power radiated by the wire is 94.2 W. Its emissivity is $\frac{x}{8}$, where $x = \dots$

50. An ideal gas has undergone through the cyclic process as shown in the figure. Work done by the gas in the entire cycle is $\dots \times 10^{-1}$ J. (Take $\pi = 3.14$)



CHEMISTRY

SECTION A-A

51. Given below are two statements:

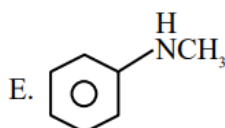
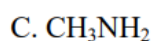
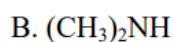
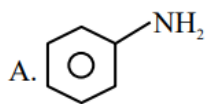
Statement I: Ozonolysis followed by treatment with Zn, H_2O of cis-2-butene gives ethanal.

Statement II: The product obtained by ozonolysis followed by treatment with Zn, H₂O of 3, 6-dimethyloct-4-ene has no chiral carbon atom.

In the light of the above statements, choose the correct answer from the options given below.

- (1) Both Statement I and Statement II are true
 - (2) Statement I is false but Statement II is true
 - (3) Statement I is true but Statement II is false
 - (4) Both Statement I and Statement II are false
-

52. Which of the following amine(s) show(s) positive carbamylamine test?



- (1) A and E Only
 - (2) C Only
 - (3) A and C Only
 - (4) B, C and D Only
-

53. Reaction $A(g) \rightarrow 2B(g) + C(g)$ is a first-order reaction. It was started with pure A.

The following table shows the pressure of the system at different times:

$t(\text{min})$	Pressure of system at time $t(\text{mm Hg})$
10	160
∞	240

Which of the following options is incorrect?

- (1) Initial pressure of A is 80 mm Hg
- (2) The reaction never goes to completion

- (3) Rate constant of the reaction is 1.693 min^{-1}
(4) Partial pressure of A after 10 minutes is 40 mm Hg
-

54. Total enthalpy change for freezing of 1 mol water at 10°C to ice at -10°C is -----

(Given: $\Delta_{\text{fus}}H = x \text{ kJ/mol}$, $C_p[\text{H}_2\text{O}(l)] = y \text{ J mol}^{-1}\text{K}^{-1}$, and $C_p[\text{H}_2\text{O}(s)] = z \text{ J mol}^{-1}\text{K}^{-1}$)

- (1) $-x - 10y - 10z$
(2) $-10(100x + y + z)$
(3) $10(100x + y + z)$
(4) $x - 10y - 10z$
-

55. An aqueous solution of HCl with pH 1.0 is diluted by adding equal volume of water (ignoring dissociation of water). The pH of HCl solution would be:

(Given $\log 2 = 0.30$)

- (1) reduce to 0.5
(2) increase to 1.3
(3) remain same
(4) increase to 2
-

56. Given below are two statements: Statement I: Dimethyl ether is completely soluble in water. However, diethyl ether is soluble in water to a very small extent.

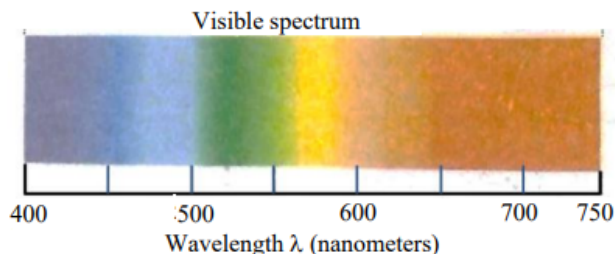
Statement II: Sodium metal can be used to dry diethyl ether and not ethyl alcohol.

In the light of the given statements, choose the correct answer from the options given below:

- (1) Statement I is false but Statement II is true
(2) Both Statement I and Statement II are false
(3) Statement I is true but Statement II is false

(4) Both Statement I and Statement II are true

57.



Which of the following statements are correct, if the threshold frequency of caesium is $5.16 \times 10^{14} \text{ Hz}$?

- (A) When Cs is placed inside a vacuum chamber with an ammeter connected to it and yellow light is focused on Cs, the ammeter shows the presence of current.
 - (B) When the brightness of the yellow light is dimmed, the value of the current in the ammeter is reduced.
 - (C) When a red light is used instead of the yellow light, the current produced is higher with respect to the yellow light.
 - (D) When a blue light is used, the ammeter shows the formation of current.
 - (E) When a white light is used, the ammeter shows formation of current.
-

58. Which of the following is the correct IUPAC name of the given organic compound (X)?

The structure of compound X is as follows:



- (1) 2-Bromo-2-methylbut-2-ene
- (2) 3-Bromo-3-methylprop-2-ene
- (3) 1-Bromo-2-methylbut-2-ene
- (4) 4-Bromo-3-methylbut-2-ene

59. At the sea level, the dry air mass percentage composition is given as nitrogen gas : 70.0, oxygen gas : 27.0, and argon gas : 3.0. If the total pressure is 1.15 atm, then calculate the ratio of the following respectively:

(i) Partial pressure of nitrogen gas to partial pressure of oxygen gas

(ii) Partial pressure of oxygen gas to partial pressure of argon gas

(Given: Molar mass of N, O, and Ar are 14, 16, and 40 g mol⁻¹ respectively)

(1) 4.26, 19.3

(2) 2.59, 11.85

(3) 5.46, 17.8

(4) 2.96, 11.2

60. Given below are two statements:

Statement I: Mohr's salt is composed of only three types of ions—ferrous, ammonium, and sulphate.

Statement II: If the molar conductance at infinite dilution of ferrous, ammonium, and sulphate ions are x_1 , x_2 , and x_3 S cm² mol⁻¹, respectively, then the molar conductance for Mohr's salt solution at infinite dilution would be given by $x_1 + x_2 + 2x_3$.

(1) Both statements I and Statement II are false

(2) Statement I is false but Statement II is true

(3) Statement I is true but Statement II is false

(4) Both statements I and Statement II are true

61. The number of valence electrons present in the metal among Cr, Co, Fe, and Ni which has the lowest enthalpy of atomisation is

(1) 8

- (2) 9
 - (3) 6
 - (4) 10
-

62. When a salt is treated with sodium hydroxide solution, it gives gas X. On passing gas X through reagent Y, a brown coloured precipitate is formed. X and Y respectively, are:

- (1) X = NH and Y = HgO
 - (2) X = NH and Y = K₂HgI₄ + KOH
 - (3) X = NH₄Cl and Y = KOH
 - (4) X = HCl and Y = NH₄Cl
-

63. The group 14 elements A and B have the first ionisation enthalpy values of 708 and 715 kJ mol⁻¹ respectively. The above values are lowest among their group members. The nature of their ions A²⁺ and B⁴⁺ respectively is:

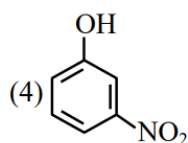
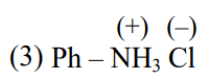
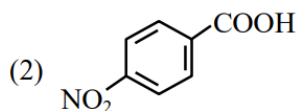
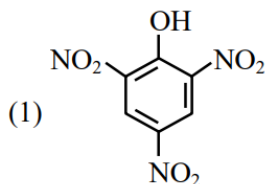
- (1) both reducing
 - (2) both oxidising
 - (3) reducing and oxidising
 - (4) oxidising and reducing
-

64. The first transition series metal 'M' has the highest enthalpy of atomisation in its series. One of its aquated ion (Mⁿ⁺) exists in green colour. The nature of the oxide formed by the above Mⁿ⁺ ion is:

- (1) neutral
- (2) acidic
- (3) basic

(4) amphoteric

65. Which of the following compounds is least likely to give effervescence of CO_2 in presence of aq. NaHCO_3 ?



66. Match the LIST-I with LIST-II.

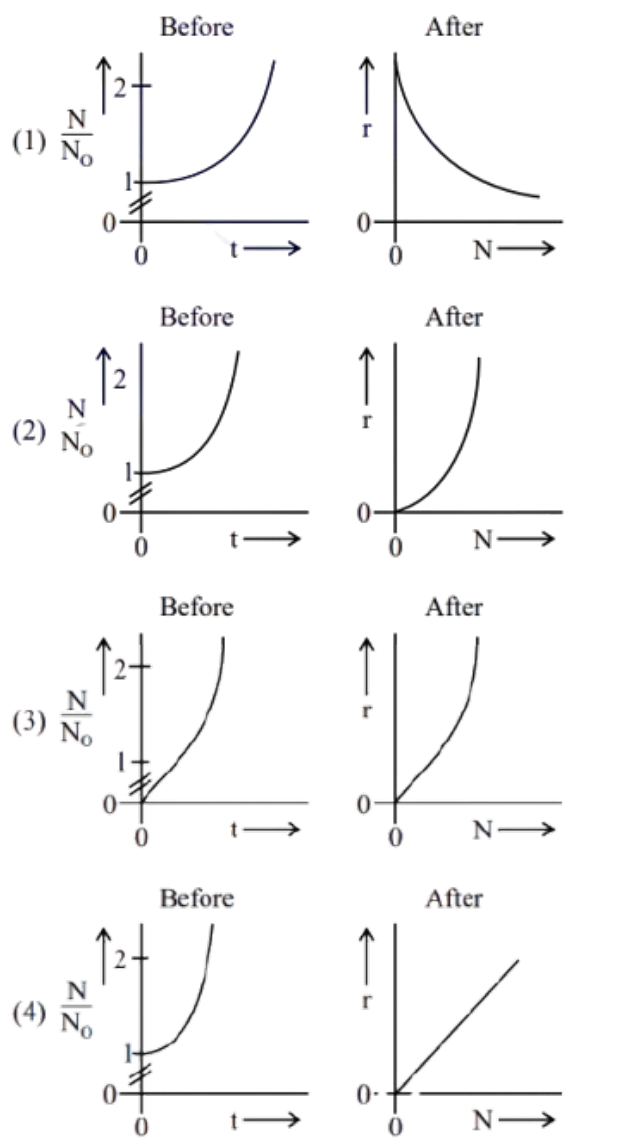
LIST-I		LIST-II	
Molecule/ion		Bond pair : lone pair (on the central atom)	
A.	ICl_2^-	I.	4 : 2
B.	H_2O	II.	4 : 1
C.	SO_2	III.	2 : 3
D.	XeF_4	IV.	2 : 2

Choose the correct answer from the options given below :

- (1) A-IV, B-III, C-II, D-I
 - (2) A-III, B-IV, C-II, D-I
 - (3) A-III, B-IV, C-I, D-II
 - (4) A-II, B-I, C-IV, D-III
-

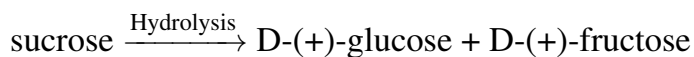
67. A person's wound was exposed to some bacteria and then bacteria growth started to happen at the same place. The wound was later treated with some antibacterial medicine and the rate of bacterial decay (r) was found to be proportional with the square of the existing number of bacteria at any instance. Which of the following set of graphs correctly represents the 'before' and 'after' situation of the application of the medicine?

[Given: N = No. of bacteria, t = time, bacterial growth follows 1st order kinetics.]



68. Given below are two statements:

Statement I: D-(+)-glucose + D-(+)-fructose $\xrightarrow{H_2O}$ sucrose



Statement II: Invert sugar is formed during sucrose hydrolysis.

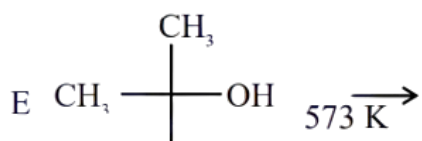
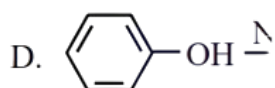
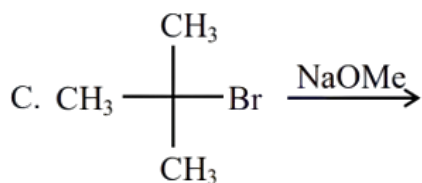
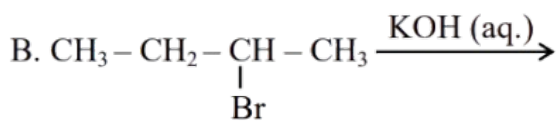
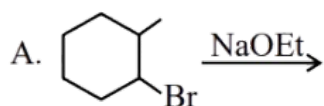
In the light of the above statements, choose the correct answer from the options given below -

- (1) Both Statement I and Statement II are true.
 - (2) Statement I is false but Statement II is true.
 - (3) Statement I is true but Statement II is false.
 - (4) Both Statement I and Statement II are false.
-

69. An octahedral complex having molecular composition $\text{Co.5NH}_3.\text{Cl.SO}_4$ has two isomers A and B. The solution of A gives a white precipitate with AgNO_3 solution and the solution of B gives a white precipitate with BaCl_2 solution. The type of isomerism exhibited by the complex is,

- (1) Co-ordinate isomerism
 - (2) Linkage isomerism
 - (3) Ionisation isomerism
 - (4) Geometrical isomerism
-

70. The reactions which cannot be applied to prepare an alkene by elimination, are



Choose the correct answer from the options given below:

- (1) B & E Only
 - (2) B, C & D Only
 - (3) A, C & D Only
 - (4) B & D Only
-

SECTION-B

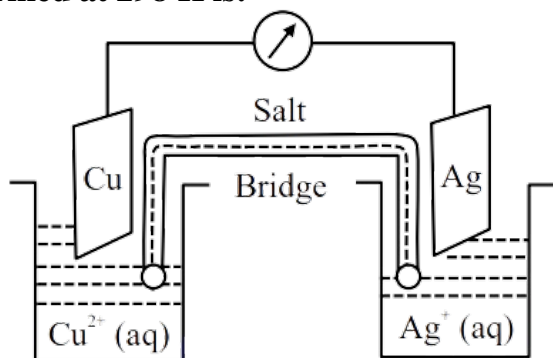
71. An organic compound weighing 500 mg, produced 220 mg of CO_2 on complete combustion. The percentage composition of carbon in the compound is % (nearest integer).

(Given molar mass in g mol^{-1} of C: 12, O: 16)

72. Thyroxine, the hormone has the given structure.

The percentage of iodine in thyroxine is % (nearest integer). (Given molar mass in g mol⁻¹: C:12, H:1, O:16, N:14, I:127)

73. 1 Faraday electricity was passed through Cu²⁺ (1.5 M, 1 L)/Cu and 0.1 Faraday was passed through Ag⁺ (0.2 M, 1 L) electrolytic cells. After this, the two cells were connected as shown below to make an electrochemical cell. The emf of the cell thus formed at 298 K is:



Given:

$$E_{\text{Cu}^{2+}/\text{Cu}}^{\circ} = 0.34 \text{ V}$$

$$E_{\text{Ag}^{+}/\text{Ag}}^{\circ} = 0.8 \text{ V}$$

$$\frac{2.303RT}{F} = 0.06 \text{ V}$$

74. The percentage dissociation of a salt (MX₃) solution at a given temperature (van't Hoff factor $i = 2$) is % (Nearest integer)

75. The number of paramagnetic complexes among

$[\text{FeF}_6]^{3-}$, $[\text{Fe}(\text{CN})_6]^{3-}$, $[\text{Mn}(\text{CN})_6]^{3-}$, $[\text{Co}(\text{C}_2\text{O}_4)_3]^{3-}$, $[\text{MnCl}_6]^{3-}$ and $[\text{CoF}_6]^{3-}$, which involved d^2sp^3 hybridization is
