

JEE MAIN 2025 (ONLINE) 3RD APRIL EVENING SHIFT

Question Paper · answer key at the end

Time: 3 Hours

Max. Marks: 300

Questions: 75

General Instructions:

- The duration of the paper is 3 hours. It has 75 questions: Physics 25, Chemistry 25, Mathematics 25.
- Each subject has Section A (multiple-choice questions, only one correct answer) and Section B (numerical-value questions).
- Marking: +4 for each correct answer, -1 for each wrong answer, 0 for a question not answered.
- The answer key is at the end. Scan the QR code beside any question for its step-by-step solution.
- Practise this paper as a timed test on the real exam screen, free, at pyqside.com.

Section A (MCQ) — 60 questions

- Q.1** Two cylindrical vessels of equal cross sectional area of 2 m^2 contain water up to heights 10 m and 6 m, respectively. If the vessels are connected at their bottom then the work done by the force of gravity is (Density of water is 10^3 kg/m^3 and $g = 10 \text{ m/s}^2$)

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- (1) $1 \times 10^5 \text{ J}$ (2) $4 \times 10^4 \text{ J}$ (3) $8 \times 10^4 \text{ J}$ (4) $6 \times 10^4 \text{ J}$

Scan or tap for the full solution



- Q.2** Two monochromatic light beams have intensities in the ratio 1:9. An interference pattern is obtained by these beams. The ratio of the intensities of maximum to minimum is

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- (1) 8:1 (2) 4:1 (3) 3:1 (4) 9:1

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- Q.3** A particle moves along the x-axis and has its displacement x varying with time t according to the equation:

$$x = c_0(t^2 - 2) + c(t - 2)^2$$

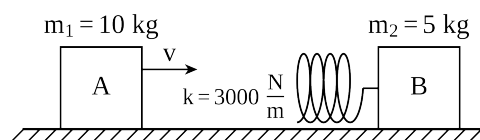
where c_0 and c are constants of appropriate dimensions.

Then, which of the following statements is correct?

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- (1) the acceleration of the particle is $2(c + c_0)$
 (2) the acceleration of the particle is $2c_0$
 (3) the acceleration of the particle is $2c$
 (4) the initial velocity of the particle is $4c$

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**Q.4**

Consider two blocks A and B of masses $m_1 = 10 \text{ kg}$ and $m_2 = 5 \text{ kg}$ that are placed on a frictionless table. The block A moves with a constant speed $v = 3 \text{ m/s}$ towards the block B kept at rest. A spring with spring constant $k = 3000 \text{ N/m}$ is attached with the block B as shown in the figure. After the collision, suppose that the blocks A and B, along with the spring in constant compression state, move together, then the compression in the spring is, (Neglect the mass of the spring)

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- (1) 0.3 m (2) 0.1 m (3) 0.4 m (4) 0.2 m

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- Q.5** A magnetic dipole experiences a torque of $80\sqrt{3} \text{ Nm}$ when placed in uniform magnetic field in such a way that dipole moment makes angle of 60° with magnetic field. The potential energy of the dipole is:

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- (1) $-40\sqrt{3} \text{ J}$ (2) -80 J
 (3) 80 J (4) -60 J

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- Q.6** An ideal gas exists in a state with pressure P_0 , volume V_0 . It is isothermally expanded to 4 times of its initial volume (V_0), then isobarically compressed to its original volume. Finally the system is heated isochorically to bring it to its initial state. The amount of heat exchanged in this process is

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- (1) $P_0 V_0 (\ln 2 - 0.75)$ (2) $P_0 V_0 (2 \ln 2 - 0.75)$
 (3) $P_0 V_0 (2 \ln 2 - 0.25)$ (4) $P_0 V_0 (\ln 2 - 0.25)$

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- Q.7** Width of one of the two slits in a Young's double slit interference experiment is half of the other slit. The ratio of the maximum to the minimum intensity in the interference pattern is:

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- (1) 3:1
 (2) $(2\sqrt{2} + 1) : (2\sqrt{2} - 1)$
 (3) 9:1
 (4) $(3 + 2\sqrt{2}) : (3 - 2\sqrt{2})$

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- Q.8** Using a battery, a 100 pF capacitor is charged to 60 V and then the battery is removed. After that, a second uncharged capacitor is connected to the first capacitor in parallel. If the final voltage across the second capacitor is 20 V, its capacitance is: (in pF)

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- (1) 600 (2) 100 (3) 400 (4) 200

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- Q.9** A motor operating on 100 V draws a current of 1 A. If the efficiency of the motor is 91.6%, then the loss of power in units of cal/s is

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- (1) 6.2 (2) 2 (3) 8.4 (4) 4

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- Q.10** In the resonance experiment, two air columns (closed at one end) of 100 cm and 120 cm long, give 15 beats per second when each one is sounding in the respective fundamental modes. The velocity of sound in the air column is:

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- (1) 370 m/s (2) 340 m/s (3) 335 m/s (4) 360 m/s

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- Q.11** A block of mass 1 kg, moving along x with speed $v_i = 10$ m/s enters a rough region ranging from $x = 0.1$ m to $x = 1.9$ m. The retarding force acting on the block in this range is $F_r = -kx$, with $k = 10$ N/m. Then the final speed of the block as it crosses the rough region is:

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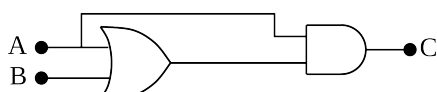
- (1) 4 m/s (2) 10 m/s (3) 8 m/s (4) 6 m/s

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- Q.12** The truth table corresponding to the circuit given below is:

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	A	B	C
	0	0	0
(1)	0	1	0
	1	0	1
	1	1	1

	A	B	C
	0	0	1
(3)	0	1	0
	1	0	0
	1	1	0

	A	B	C
	0	0	1
(2)	1	0	0
	0	1	0
	1	1	0

	A	B	C
	0	0	0
(4)	1	0	0
	0	1	0
	1	1	1

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- Q.13** A monochromatic light of frequency 5×10^{14} Hz travelling through air, is incident on a medium of refractive index '2'. Wavelength of the refracted light will be:

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- (1) 400 nm (2) 300 nm (3) 600 nm (4) 500 nm

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- Q.14** Match the LIST-I with LIST-II

LIST-I		LIST-II	
A.	Boltzmann constant	I.	ML^2T^{-1}
B.	Coefficient of viscosity	II.	$\text{MLT}^{-3}\text{K}^{-1}$
C.	Planck's constant	III.	$\text{ML}^2\text{T}^{-2}\text{K}^{-1}$
D.	Thermal conductivity	IV.	$\text{ML}^{-1}\text{T}^{-1}$

Choose the correct answer from the options given below: [JEE Main 2025 (Online) 3rd April Evening Shift]

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

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- Q.15** Pressure of an ideal gas, contained in a closed vessel, is increased by 0.4% when heated by 1°C . Its initial temperature must be:

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- (1) 2500 K (2) 25°C (3) 250°C (4) 250 K

Scan or tap for the full solution



- Q.16** A solid steel ball of diameter 3.6 mm acquired terminal velocity 2.45×10^{-2} m/s while falling under gravity through an oil of density 925 kg m^{-3} . Take density of steel as 7825 kg m^{-3} and g as 9.8 m/s^2 . The viscosity of the oil in SI unit is

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- (1) 2.18 (2) 1.68 (3) 2.38 (4) 1.99

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- Q.17** A particle is projected with velocity u so that its horizontal range is three times the maximum height attained by it. The horizontal range of the projectile is given as $\frac{nu^2}{25g}$, where value of n is: (Given, 'g' is the acceleration due to gravity.)

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- (1) 6 (2) 12 (3) 18 (4) 24

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- Q.18** Given below are two statements: one is labelled as **Assertion A** and the other is labelled as **Reason R**.
Assertion (A): The Bohr model is applicable to hydrogen and hydrogen-like atoms only.
Reason (R): The formulation of Bohr model does not include repulsive force between electrons.

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

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- (1) A is true but R is false
 (2) Both A and R are true and R is the correct explanation of A
 (3) A is false but R is true
 (4) Both A and R are true but R is NOT the correct explanation of A

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- Q.19** An electric bulb rated as 100 W – 220 V is connected to an ac source of rms voltage 220 V. The peak value of current through the bulb is:

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- (1) 0.32 A (2) 0.64 A (3) 0.45 A (4) 2.2 A

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- Q.20** Given below are two statements: one is labelled as **Assertion A** and the other is labelled as **Reason R**.
Assertion (A): If oxygen ion (O^{2-}) and hydrogen ion (H^+) enter normal to the magnetic field with equal momentum, then the path of O^{2-} ion has a smaller radius of curvature than that of H^+ .
Reason (R): A proton with same linear momentum as an electron will form a path of smaller radius of curvature on entering a uniform magnetic field perpendicularly.

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

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- (1) Both A and R are true but R is NOT the correct explanation of A
 (2) A is false but R is true
 (3) A is true but R is false
 (4) Both A and R are true and R is the correct explanation of A

Scan or tap for the full solution



- Q.21** Given below are two statements:

Statement-I: Wet cotton clothes made of cellulose based carbohydrate take comparatively longer time to get dried than wet nylon polymer based clothes.

Statement-II: Intermolecular hydrogen bonding with water molecule is more in nylon-based clothes than in the case of cotton clothes.

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

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

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- Q.22** Fat soluble vitamins are:

- A. Vitamin B_1 B. Vitamin C
 C. Vitamin E D. Vitamin B_{12}
 E. Vitamin K

Choose the correct answer from the options given below: [JEE Main 2025 (Online) 3rd April Evening Shift]

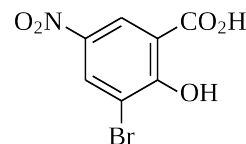
- (1) B & C Only (2) C & D Only
 (3) C & E Only (4) A & B Only

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- Q.23** What is the correct IUPAC name of ?

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- (1) 3-Bromo-2-hydroxy-5-nitrobenzoic acid
 (2) 2-Hydroxy-3-bromo-5-nitrobenzoic acid
 (3) 3-Bromo-4-hydroxy-1-nitrobenzoic acid
 (4) 5-Nitro-3-bromo-2-hydroxybenzoic acid

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- Q.24** Mass of magnesium required to produce 220 mL of hydrogen gas at STP on reaction with excess of dil. HCl is

Given: Molar mass of Mg is 24 g mol^{-1} .

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- (1) 0.24 mg (2) 235.7 g (3) 2.444 g (4) 236 mg

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full solution



Q.25 Given below are two statements:

Statement-I: When a system containing ice in equilibrium with water (liquid) is heated, heat is absorbed by the system and there is no change in the temperature of the system until whole ice gets melted.

Statement-II: At melting point of ice, there is absorption of heat in order to overcome intermolecular forces of attraction within the molecules of water in ice and kinetic energy of molecules is not increased at melting point.

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

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

Scan or tap for the
full solution



Q.26 The correct orders among the following are

- A. Atomic radius : $B < Al < Ga < In < Tl$
B. Electronegativity : $Al < Ga < In < Tl < B$
C. Density : $Tl < In < Ga < Al < B$
D. 1st Ionisation Energy : $In < Al < Ga < Tl < B$
Choose the correct answer from the options given below:

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

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full solution



Q.27 10 mL of 2 M NaOH solution is added to 20 mL of 1 M HCl solution kept in a beaker. Now, 10 mL of this mixture is poured into a volumetric flask of 100 mL containing 2 moles of HCl and made the volume up to the mark with distilled water. The solution in this flask is :

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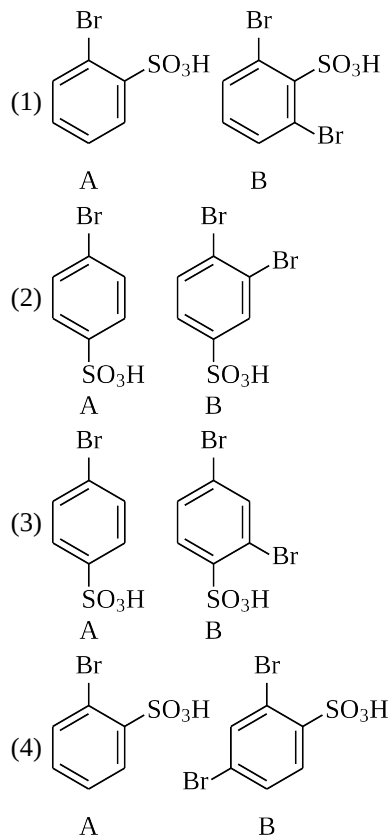
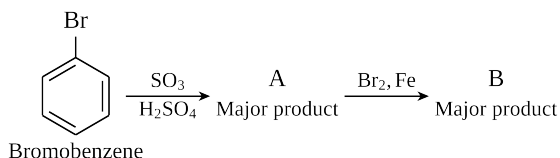
- (1) 0.2 M NaCl solution (2) 20 M HCl solution
(3) Neutral solution (4) 10 M HCl solution

Scan or tap for the
full solution



Q.28 In the following series of reactions identify the major products A & B respectively :

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full solution



Q.29 Identify the diamagnetic octahedral complex ions from below ;

- A. $[\text{Mn}(\text{CN})_6]^{3-}$ B. $[\text{Co}(\text{NH}_3)_6]^{3+}$
C. $[\text{Fe}(\text{CN})_6]^{4-}$ D. $[\text{Co}(\text{H}_2\text{O})_6]^{3+}$

Choose the correct answer from the options given below:

[JEE Main 2025 (Online) 3rd April Evening Shift]

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

Scan or tap for the
full solution



Q.30 Given below are two statements:

Statement-I: CrO_3 is a stronger oxidizing agent than MoO_3

Statement-II: Cr(VI) is more stable than Mo(VI)

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

[JEE Main 2025 (Online) 3rd April Evening Shift]

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

Scan or tap for the
full solution



Q.31 Consider the following statements related to temperature dependence of rate constants.

- A. The Arrhenius equation holds true only for an elementary homogeneous reaction.

- B. The unit of A is same as that of k in Arrhenius equation.
 C. At a given temperature, a low activation energy means a fast reaction.
 D. A and E_a as used in Arrhenius equation depend on temperature.
 E. When $E_a \gg RT$, A and E_a become interdependent.

Identify the correct statements.

Choose the correct answer from the options given below: [JEE Main 2025 (Online) 3rd April Evening Shift]

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

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Q.32 Given below are two statements :

Statement-I: Hyperconjugation is not a permanent effect.

Statement-II: In general, greater the number of alkyl groups attached to a positively charged carbon, greater is the hyperconjugation interaction and stabilization of the cation.

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

[JEE Main 2025 (Online) 3rd April Evening Shift]

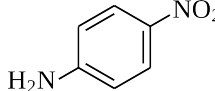
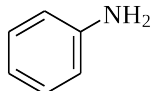
- (1) Statement-I is false but Statement-II is true
 (2) Statement-I is true but Statement-II is false
 (3) Both Statement-I and Statement-II are false
 (4) Both Statement-I and Statement-II are true

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Q.33 The sequence from the following that would result in giving predominantly 3,4,5-Tribromoaniline is :

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- (1)  $\xrightarrow[\text{(ii) Sn, HCl}]{\text{(i) Br}_2, \text{ acetic acid}}$
- (2)  $\xrightarrow[\text{(ii) NH}_3]{\text{(i) Br}_2, \text{ AlBr}_3}$
- (3)  $\xrightarrow[\text{(iii) Sn, HCl}]{\text{(i) Br}_2(\text{excess}), \text{ acetic acid} \text{ and } \text{(ii) NaNO}_2, \text{ HCl, CuBr}}$
- (4)  $\xrightarrow{\text{Br}_2, \text{ water}}$

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Q.34 Match the LIST-I with LIST-II

LIST-I (Family)		LIST-II (Symbol of Element)	
A.	Pnictogen (group 15)	I.	Ts
B.	Chalcogen	II.	Og
C.	Halogen	III.	Lv
D.	Noble gas	IV.	Mc

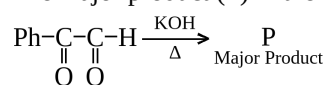
Choose the correct answer from the options given below: [JEE Main 2025 (Online) 3rd April Evening Shift]

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

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Q.35 The major product (P) in the following reaction is :



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

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Q.36 The standard cell potential ($E_{\text{cell}}^\ominus$) of a fuel cell based on the oxidation of methanol in air that has been used to power television relay station is measured as 1.21 V. The standard half cell reduction potential for O_2 ($E^\ominus_{\text{O}_2/\text{H}_2\text{O}}$) is 1.229 V.

Choose the correct statement :

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- (1) Reactants are fed at one go to each electrode.
 (2) Oxygen is formed at the anode.
 (3) The standard half cell reduction potential for the reduction of CO_2 ($E^\ominus_{\text{CO}_2/\text{CH}_3\text{OH}}$) is 19 mV
 (4) Reduction of methanol takes place at the cathode.

Scan or tap for the full solution



Q.37 For electrons in '2s' and '2p' orbitals, the orbital angular momentum values, respectively are:

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- (1) 0 and $\sqrt{6}\frac{h}{2\pi}$ (2) 0 and $\sqrt{2}\frac{h}{2\pi}$
 (3) $\sqrt{2}\frac{h}{2\pi}$ and 0 (4) $\frac{h}{2\pi}$ and $\sqrt{2}\frac{h}{2\pi}$

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Q.38 Compounds that should not be used as primary standards in titrimetric analysis are :

- A. $\text{Na}_2\text{Cr}_2\text{O}_7$ B. Oxalic acid
 C. NaOH D. $\text{FeSO}_4 \cdot 6\text{H}_2\text{O}$
 E. Sodium tetraborate

Choose the most appropriate answer from the options given below:

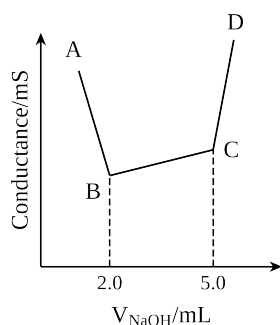
[JEE Main 2025 (Online) 3rd April Evening Shift]

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

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Q.39 40 mL of a mixture of CH_3COOH and HCl (aqueous solution) is titrated against 0.1 M NaOH solution conductometrically. Which of the following statement is correct?

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- (1) The concentration of CH_3COOH in the original mixture is 0.005 M
 (2) The concentration of HCl in the original mixture is 0.005 M
 (3) CH_3COOH is neutralised first followed by neutralisation of HCl
 (4) Point 'C' indicates the complete neutralisation of HCl

Scan or tap for the full solution 

Q.40 In Dumas' method for estimation of nitrogen 0.4 g of an organic compound gave 60 mL of nitrogen collected at 300 K temperature and 715 mm Hg pressure. The percentage composition of nitrogen in the compound is (Given : Aqueous tension at 300 K = 15 mm Hg)

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- (1) 15.71% (2) 17.46% (3) 7.85% (4) 20.95%

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Q.41 The area of the region $\{(x, y) : |x - y| \leq y \leq 4\sqrt{x}\}$ is

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- (1) $\frac{512}{3}$ (2) $\frac{2048}{3}$ (3) 512 (4) $\frac{1024}{3}$

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Q.42 Line L_1 of slope 2 and line L_2 of slope $\frac{1}{2}$ intersect at the origin O. In the first quadrant, $P_1, P_2, \dots, P_{12}$ are 12 points on line L_1 and $Q_1, Q_2, \dots, Q_9$ are 9 points on line L_2 . Then the total number of triangles, that can be formed having vertices at three of the 22 points O, $P_1, P_2, \dots, P_{12}, Q_1, Q_2, \dots, Q_9$, is:

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- (1) 1026 (2) 1188 (3) 1134 (4) 1080

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Q.43 Each of the angles β and γ that a given line makes with the positive y- and z-axes, respectively, is half of the angle that this line makes with the positive x-axis. Then the sum of all possible values of the angle β is

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

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Q.44 If $z_1, z_2, z_3 \in \mathbb{C}$ are the vertices of an equilateral triangle whose centroid is z_0 , then $\sum_{k=1}^3 (z_k - z_0)^2$ is equal to

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- (1) 0 (2) 1 (3) i (4) -i

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Q.45 Let C be the circle of minimum area enclosing the ellipse $E: \frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ with eccentricity $\frac{1}{2}$ and foci $(\pm 2, 0)$. Let PQR be a variable triangle, whose vertex P is on the circle C and the side QR of length 2a is parallel to the major axis of E and contains the point of intersection of E with the negative y-axis. Then the maximum area of the triangle PQR is :

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- (1) $8(3 + \sqrt{2})$ (2) $8(2 + \sqrt{3})$
 (3) $6(3 + \sqrt{2})$ (4) $6(2 + \sqrt{3})$

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- Q.46** The shortest distance between the curves $y^2 = 8x$ and $x^2 + y^2 + 12y + 35 = 0$ is:

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

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- Q.47** Consider the lines $x(3\lambda + 1) + y(7\lambda + 2) = 17\lambda + 5$, λ being a parameter, all passing through a point P. One of these lines (say L) is farthest from the origin. If the distance of L from the point (3, 6) is d, then the value of d^2 is

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- (1) 10 (2) 20 (3) 15 (4) 30

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- Q.48** Let $y = y(x)$ be the solution of the differential equation

$$\frac{dy}{dx} + 3(\tan^2 x)y + 3y = \sec^2 x, \quad y(0) = \frac{1}{3} + e^3. \quad \text{Then}$$

$y\left(\frac{\pi}{4}\right)$ is equal to :

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

Scan or tap for the full solution



- Q.49** Let f be a function such that $f(x) + 3f\left(\frac{24}{x}\right) = 4x$, $x \neq 0$. Then $f(3) + f(8)$ is equal to

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- (1) 13 (2) 11 (3) 10 (4) 12

Scan or tap for the full solution



- Q.50** Let the equation $x(x + 2)(12 - k) = 2$ have equal roots. Then the distance of the point $\left(k, \frac{k}{2}\right)$ from the line $3x + 4y + 5 = 0$ is

[JEE Main 2025 (Online) 3rd April Evening Shift]

- (1) 15 (2) 12 (3) $5\sqrt{3}$ (4) $15\sqrt{5}$

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- Q.51** Let $A = \{-2, -1, 0, 1, 2, 3\}$. Let R be a relation on A defined by xRy if and only if $y = \max\{x, 1\}$. Let l be the number of elements in R . Let m and n be the minimum number of elements required to be added in R to make it reflexive and symmetric relations, respectively. Then $l + m + n$ is equal to

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- (1) 11 (2) 12 (3) 14 (4) 13

Scan or tap for the full solution



- Q.52** Let the Mean and Variance of five observations $x_1 = 1$, $x_2 = 3$, $x_3 = a$, $x_4 = 7$ and $x_5 = b$, $a > b$, be 5 and 10 respectively. Then the Variance of the observations $n + x_n$, $n = 1, 2, \dots, 5$ is

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- (1) 17 (2) 16 (3) 16.4 (4) 17.4

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- Q.53** The integral $\int_0^\pi \frac{8x dx}{4\cos^2 x + \sin^2 x}$ is equal to

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

Scan or tap for the full solution



- Q.54** The distance of the point (7, 10, 11) from the line

$$\frac{x-4}{1} = \frac{y-4}{0} = \frac{z-2}{3} \text{ along the line}$$

$$\frac{x-9}{2} = \frac{y-13}{3} = \frac{z-17}{6} \text{ is}$$

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- (1) 16 (2) 12 (3) 18 (4) 14

Scan or tap for the full solution



- Q.55** If the probability that the random variable X takes the value x is given by $P(X = x) = k(x + 1)3^{-x}$, $x = 0, 1, 2, 3, \dots$, where k is a constant, then $P(X \geq 3)$ is equal to

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- (1) $\frac{1}{9}$ (2) $\frac{8}{27}$ (3) $\frac{7}{27}$ (4) $\frac{4}{9}$

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- Q.56** The number of solutions of the equation

$$(4 - \sqrt{3})\sin x - 2\sqrt{3}\cos^2 x = -\frac{4}{1 + \sqrt{3}}, \quad x \in \left[-2\pi, \frac{5\pi}{2}\right] \text{ is}$$

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- (1) 4 (2) 3 (3) 6 (4) 5

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- Q.57** If the domain of the function $f(x) = \log_7(1 - \log_4(x^2 - 9x + 18))$ is $(\alpha, \beta) \cup (\gamma, \delta)$, then $\alpha + \beta + \gamma + \delta$ is equal to

[JEE Main 2025 (Online) 3rd April Evening Shift]

- (1) 17 (2) 15 (3) 16 (4) 18

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- Q.58** Let $f: \mathbb{R} \rightarrow \mathbb{R}$ be a function defined by $f(x) = ||x+2| - 2|x||$. If m is the number of points of local minima and n is the number of points of local maxima of f , then $m + n$ is

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- (1) 3 (2) 4 (3) 2 (4) 5

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- Q.59** The sum $1 + \frac{1+3}{2!} + \frac{1+3+5}{3!} + \frac{1+3+5+7}{4!} + \dots$ up to ∞ terms, is equal to

[JEE Main 2025 (Online) 3rd April Evening Shift]

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

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- Q.60** If the four distinct points $(4, 6)$, $(-1, 5)$, $(0, 0)$ and $(k, 3k)$ lie on a circle of radius r , then $10k + r^2$ is equal to

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- (1) 34 (2) 32 (3) 35 (4) 33

Scan or tap for the full solution



Section B (Numerical) — 15 questions

- Q.61** An electron in the hydrogen atom initially in the fourth excited state makes a transition to n^{th} energy state by emitting a photon of energy 2.86 eV. The integer value of n will be _____.

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- Q.62** Light from a point source in air falls on a spherical glass surface (refractive index, $\mu = 1.5$ and radius of curvature = 50 cm). The image is formed at a distance of 200 cm from the glass surface inside the glass. The magnitude of distance of the light source from the glass surface is _____ m.

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- Q.63** Two cells of emfs 1 V and 2 V and internal resistances 2Ω and 1Ω , respectively, are connected in series with an external resistance of 6Ω . The total current in the circuit is I_1 . Now the same two cells in parallel configuration are connected to same external resistance. In this case, the total current drawn is I_2 . The value of $\left(\frac{I_1}{I_2}\right)$ is $\frac{x}{3}$. The value of x is _____.

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- Q.64** The excess pressure inside a soap bubble A in air is half the excess pressure inside another soap bubble B in air. If the volume of the bubble A is n times the volume of the bubble B, then, the value of n is _____.

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- Q.65** A physical quantity C is related to four other quantities p , q , r and s as follows

$$C = \frac{pq^2}{r^3\sqrt{s}}$$

The percentage errors in the measurement of p , q , r and s are 1%, 2%, 3% and 2%, respectively. The percentage error in the measurement of C will be _____ %

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- Q.66** X g of nitrobenzene on nitration gave 4.2 g of m -dinitrobenzene. $X =$ _____ g. (nearest integer)
[Given : molar mass (in g mol^{-1}) C : 12, H : 1, O : 16, N : 14]

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- Q.67** The total number of structural isomers possible for the substituted benzene derivatives with the molecular formula C_9H_{12} is _____.

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- Q.68** Among Sc, Mn, Co and Cu, identify the element with highest enthalpy of atomisation. The spin only magnetic moment value of that element in its +2 oxidation state is _____ BM (in nearest integer).

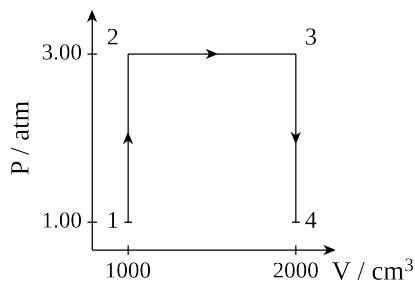
[JEE Main 2025 (Online) 3rd April Evening Shift]

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- Q.69** A perfect gas (0.1 mol) having $\bar{C}_v = 1.50 R$ (independent of temperature) undergoes the following transformation from point 1 to point 4. If each step is reversible, the total work done (w) while going from point 1 to point 4 is $(-)$ _____ J (nearest integer)
[Given: $R = 0.082 \text{ L atm K}^{-1} \text{ mol}^{-1}$]

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- Q.70** A sample of n-octane (1.14 g) was completely burnt in excess of oxygen in a bomb calorimeter, whose heat capacity is 5 kJ K^{-1} . As a result of combustion reaction, the temperature of the calorimeter is increased by 5 K. The magnitude of the heat of combustion of octane at constant volume is _____ kJ mol^{-1} (nearest integer).

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- Q.71** If $\lim_{x \rightarrow 0} \left(\frac{\tan x}{x} \right)^{\frac{1}{x^2}} = p$, then $96 \log_e p$ is equal to _____

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- Q.72** If the equation of the hyperbola with foci (4, 2) and (8, 2) is $3x^2 - y^2 - \alpha x + \beta y + \gamma = 0$, then $\alpha + \beta + \gamma$ is equal to _____.

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- Q.73** Let $(1 + x + x^2)^{10} = a_0 + a_1x + a_2x^2 + \dots + a_{20}x^{20}$. If $(a_1 + a_3 + a_5 + \dots + a_{19}) - 11a_2 = 121k$, then k is equal to _____.

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- Q.74** Let $\vec{a} = \hat{i} + 2\hat{j} + \hat{k}$, $\vec{b} = 3\hat{i} - 3\hat{j} + 3\hat{k}$, $\vec{c} = 2\hat{i} - \hat{j} + 2\hat{k}$ and $\vec{d}$ be a vector such that $\vec{b} \times \vec{d} = \vec{c} \times \vec{d}$ and $\vec{a} \cdot \vec{d} = 4$. Then $|(\vec{a} \times \vec{d})|^2$ is equal to _____.

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- Q.75** Let I be the identity matrix of order 3×3 and for the matrix $A = \begin{bmatrix} \lambda & 2 & 3 \\ 4 & 5 & 6 \\ 7 & -1 & 2 \end{bmatrix}$, $|A| = -1$. Let B be the inverse of the matrix $\text{adj}(A \text{adj}(A^2))$. Then $|(\lambda B + I)|$ is equal to _____

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ANSWER KEY

Section A (MCQ) — 60 questions

Ques.	1	2	3	4	5	6	7	8	9	10	11
Ans.	3	2	1	2	2	2	4	4	2	4	3
Ques.	12	13	14	15	16	17	18	19	20	21	22
Ans.	1	2	1	4	4	4	2	2	3	4	3
Ques.	23	24	25	26	27	28	29	30	31	32	33
Ans.	1	4	3	1	2	2	1	1	3	1	3
Ques.	34	35	36	37	38	39	40	41	42	43	44
Ans.	2	3	3	2	4	2	1	4	3	3	1
Ques.	45	46	47	48	49	50	51	52	53	54	55
Ans.	2	2	2	1	2	1	2	2	1	4	1
Ques.	56	57	58	59	60						
Ans.	4	4	1	2	3						

Section B (Numerical) — 15 questions

Ques.	61	62	63	64
Ans.	2	4	4	8
Ques.	65	66	67	68
Ans.	15	3	8	4
Ques.	69	70	71	72
Ans.	304	2500	32	141
Ques.	73	74	75	
Ans.	239	128	38 or -38	