

JEE MAIN 2025 · QUESTION PAPER

7 Apr 2025 **Shift 1**

74 questions in exam order, with answer key

Subject	Section A multiple choice	Section B numerical value
● Physics	20 Q1 to Q20	5 Q21 to Q25
● Chemistry	19 Q26 to Q44	5 Q45 to Q49
● Mathematics	20 Q50 to Q69	5 Q70 to Q74
In this PDF	74 questions · answer key at the end	

- 1 Set a 3 hour timer and attempt the paper in one sitting, like the real exam.
- 2 Check yourself against the answer key at the end. Every question names its chapter, so you can see where marks went.
- 3 Got one wrong? Tap “Step-by-step solution” at the top right of it for the full working, where available.

Attempt this paper online

The same questions in the same order, with instant answer checking and step-by-step solutions where available.

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Answers follow NTA's final answer keys. Typing errors are possible, so check doubtful answers against the official key. Spotted a mistake? prepwise.in/feedback · Terms: prepwise.in/terms

Q1 Alternating Current

[Step-by-step solution](#) > [prepwisar.in/questions/GCuWEfScD1](https://www.prepwisar.in/questions/GCuWEfScD1)

An ac current is represented as

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

The r.m.s value of the current is

- (A) 10 Amp (B) $5\sqrt{2}$ Amp (C) 100 Amp (D) 50 Amp

Q2 Atomic Physics

[Step-by-step solution](#) > [prepwisar.in/questions/Ww9ZP9G801](https://www.prepwisar.in/questions/Ww9ZP9G801)

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:

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

Q3 Atomic Physics

[Step-by-step solution](#) > [prepwisar.in/questions/MlxBUVLFyT](https://www.prepwisar.in/questions/MlxBUVLFyT)

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

- (A) 5 : 27 (B) 27 : 5 (C) 3 : 4 (D) 5 : 36

Q4 Centre of Mass & Linear Momentum

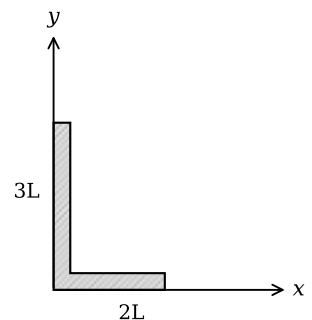
[Step-by-step solution](#) > [prepwisar.in/questions/qgMVtmwIHF](https://www.prepwisar.in/questions/qgMVtmwIHF)

A rod of length 5 L is bent right angle keeping one side length as 2 L.

The position of the centre of mass of the system:

(Consider $L = 10\text{cm}$)

- (A) $4\hat{i} + 9\hat{j}$ (B) $2\hat{i} + 3\hat{j}$ (C) $5\hat{i} + 8\hat{j}$ (D) $3\hat{i} + 7\hat{j}$



Q5 Current Electricity

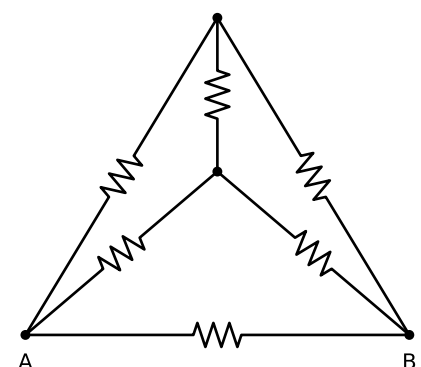
[Step-by-step solution](#) > [prepwisar.in/questions/rUITCKs043](https://www.prepwisar.in/questions/rUITCKs043)

A wire of resistance R is bent into a triangular pyramid as shown in

figure with each segment having same length. The resistance

between points A and B is R/n . The value of n is:

- (A) 16 (B) 10 (C) 12 (D) 14

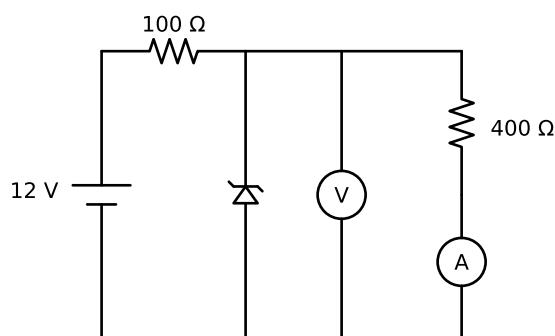


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Q6 Semiconductors & Electronic Devices[Step-by-step solution](https://www.prepwisar.in/questions/-L9IAff8Pe)

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

- (A) 60 mA (B) 80 mA (C) 10 mA (D) 24 mA

**Q7** Electromagnetic Waves[Step-by-step solution](https://www.prepwisar.in/questions/n_HSMvr1f7)

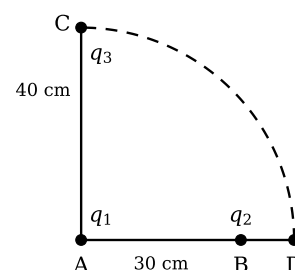
If ϵ_0 denotes the permittivity of free space and Φ_E is the flux of the electric field through the area bounded by the closed surface, then dimensions of $\left(\epsilon_0 \frac{d\Phi_E}{dt}\right)$ are that of:

- (A) electric charge (B) electric field (C) electric current (D) electric potential

Q8 Electrostatics II: Potential & Capacitance[Step-by-step solution](https://www.prepwisar.in/questions/gXx8ja-HxX)

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 movement of q_3 from C to D is given by $\frac{q_3 K}{4\pi\epsilon_0}$, the value of K is:

- (A) $6q_2$ (B) $6q_1$ (C) $8q_1$ (D) $8q_2$

**Q9** Ray Optics[Step-by-step solution](https://www.prepwisar.in/questions/0n8UjNqpx6)

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

- (A) 5 D (B) 1 D (C) 20 D (D) 10 D

Q10 Ray Optics[Step-by-step solution](https://www.prepwisar.in/questions/eDtFqRCB06)

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)

- (A) 355 mm (B) 655 mm (C) 288 mm (D) 555 mm

Q11 Kinetic Theory of Gases[Step-by-step solution](https://www.prepwisar.in/questions/6kVKPWj_A_)

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:

- (A) A-III, B-IV, C-I, D-II (B) A-II, B-IV, C-I, D-III (C) A-IV, B-II, C-III, D-I (D) A-III, B-II, C-IV, D-I

Q12 Friction[Step-by-step solution](https://www.prepwise.in/questions/w94Ccs6qnN)

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

- (A) $\frac{\sqrt{3}}{2}$ (B) $\frac{\sqrt{2}}{3}$ (C) $1 - \frac{\sqrt{3}}{2}$ (D) $\sqrt{3} - 1$

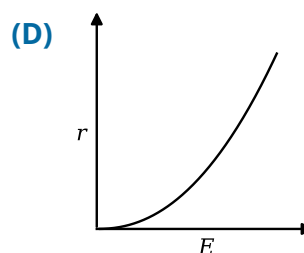
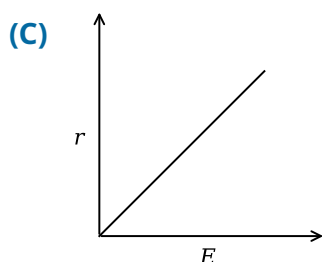
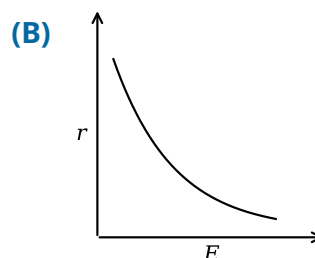
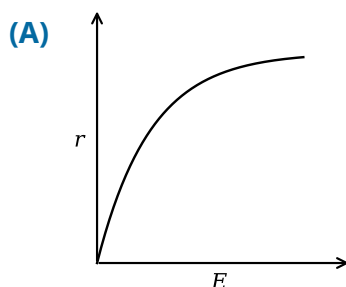
Q13 Magnetism & Matter[Step-by-step solution](https://www.prepwise.in/questions/hRUGAyKuj3)

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

- (A) $\frac{5}{3} \times 10^{-5}\%$ (B) $\frac{5}{6} \times 10^{-4}\%$ (C) $\frac{5}{6} \times 10^{-5}\%$ (D) $\frac{6}{5} \times 10^{-3}\%$

Q14 Moving Charges & Magnetism[Step-by-step solution](https://www.prepwise.in/questions/Lymo50IFBk)

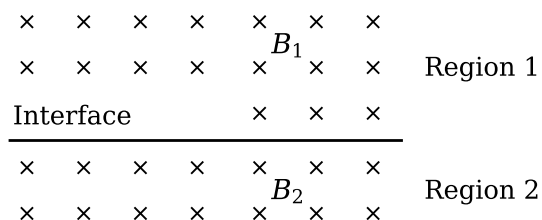
A particle of charge q , mass m and kinetic energy E enters in magnetic field perpendicular to its velocity and undergoes a circular arc of radius (r). Which of the following curves represents the variation of r with E ?

**Q15** Moving Charges & Magnetism[Step-by-step solution](https://www.prepwise.in/questions/0UxGVDfuVL)

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 the 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 $B_2 > B_1$)

- (A) $\frac{mv}{qB_1} \left(1 - \frac{B_1}{B_2}\right) \times 2$ (B) $\frac{mv}{qB_1} \left(1 - \frac{B_2}{B_1}\right) \times 2$
 (C) $\frac{mv}{qB_1} \left(1 - \frac{B_2}{B_1}\right)$ (D) $\frac{mv}{qB_1} \left(1 - \frac{B_1}{B_2}\right)$



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

- (A) $\frac{1 + \tan \alpha}{1 - \tan \alpha}$ (B) $\frac{1 + \sin 2\alpha}{1 - \sin 2\alpha}$ (C) $\frac{1 - \tan \alpha}{1 + \tan \alpha}$ (D) 1

Two wires A and B are made of same material having 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 same force, what would be the ratio of their respective elongations?

- (A) 3 : 4 (B) 1 : 12 (C) 1 : 3 (D) 1 : 6

Two plane polarized light waves combine at a certain point whose electric field components are

$$E_1 = E_0 \sin \omega t$$

$$E_2 = E_0 \sin \left(\omega t + \frac{\pi}{3} \right)$$

Find the amplitude of the resultant wave.

- (A) $1.7E_0$ (B) E_0 (C) $0.9E_0$ (D) $3.4E_0$

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 nearest integer)

- (A) 1 s (B) 4 s (C) 2 s (D) 6 s

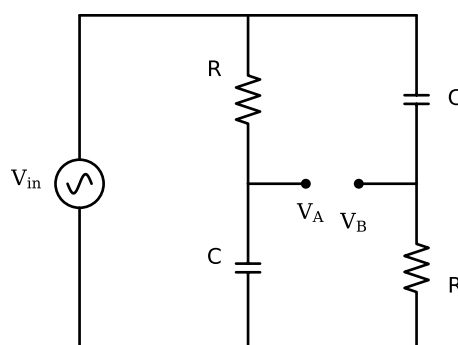
An object of mass 1000 g experiences a time dependent force $\vec{F} = (2t\hat{i} + 3t^2\hat{j}) \text{ N}$. The power generated by the force at time t is:

- (A) $(2t^2 + 18t^3) \text{ W}$ (B) $(3t^3 + 5t^5) \text{ W}$ (C) $(2t^3 + 3t^5) \text{ W}$ (D) $(2t^2 + 3t^3) \text{ W}$

Physics Section B · Numerical value

Q21 to Q25

For ac circuit shown in 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 _____.



Q22 Ray Optics **NUMERICAL**[Step-by-step solution](#) > [prepwiser.in/questions/2V94KIIncy](#)

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 first liquid. If viewed from above, the apparent shift in the position of bottom of container is 40 cm. The value of H is _____ cm. (Consider liquids are immisible)

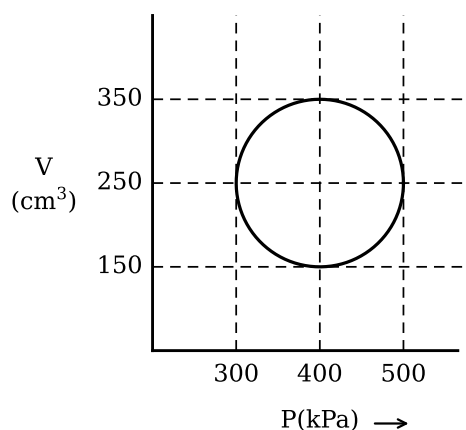
Q23 Heat Transfer **NUMERICAL**[Step-by-step solution](#) > [prepwiser.in/questions/ebBoIku0Yf](#)

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 $x = \underline{\hspace{2cm}}$.

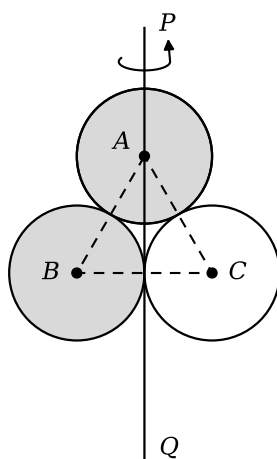
(Given $\sigma = 6.0 \times 10^{-8} \text{ W m}^{-2} \text{ K}^{-4}$, $\pi = 3.14$ and assume that the emissivity of wire material is same at all wavelength.)

Q24 Thermodynamics **NUMERICAL**[Step-by-step solution](#) > [prepwiser.in/questions/1MrAI8VedC](#)

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

**Q25** Rotational Motion **NUMERICAL**[Step-by-step solution](#) > [prepwiser.in/questions/C24iAT8ZIO](#)

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



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

Q26 Alcohols, Phenols & Ethers[Step-by-step solution](https://www.prepwisar.in/questions/tnxDewQEMJ) · [prepwisar.in/questions/tnxDewQEMJ](https://www.prepwisar.in/questions/tnxDewQEMJ)

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.

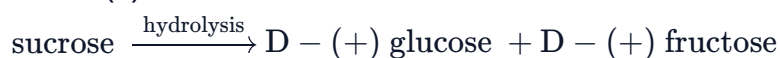
In the light of given statements. choose the correct answer from the options given below

- (A) Statement I is false but Statement II are true (B) Statement I is true but Statement II is false
(C) Both Statement I and Statement II are true (D) Both Statement I and Statement II are False

Q27 Carbohydrates & Biomolecules[Step-by-step solution](https://www.prepwisar.in/questions/ojkHj_0J0w) · [prepwisar.in/questions/ojkHj_0J0w](https://www.prepwisar.in/questions/ojkHj_0J0w)

Given below are two statements:

Statement I: D-(+)-glucose + D-(+) fructose $\xrightarrow{-\text{H}_2\text{O}}$ Sucrose



Statement II: Invert sugar is formed during sucrose hydrolysis

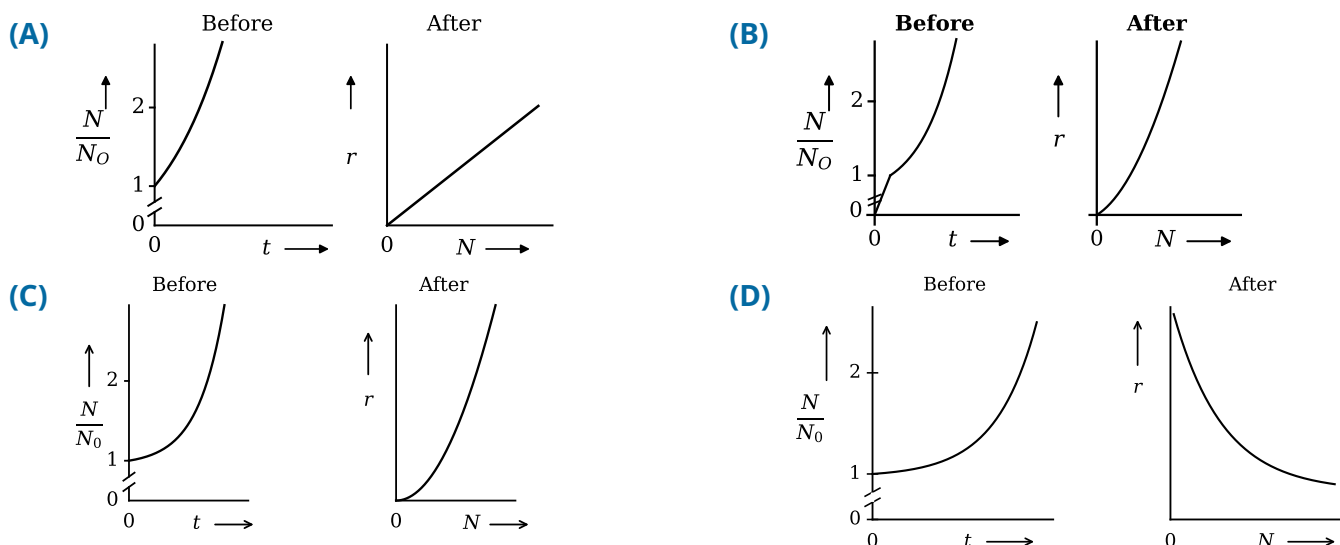
In the light of the above statements, choose the correct answer from the options given below

- (A) Both Statement I and Statement II are False (B) Statement I is false but Statement II are true
(C) Both Statement I and Statement II are true (D) Statement I is true but Statement II is false

Q28 Chemical Kinetics[Step-by-step solution](https://www.prepwisar.in/questions/04OHtWBb8R) · [prepwisar.in/questions/04OHtWBb8R](https://www.prepwisar.in/questions/04OHtWBb8R)

A person's wound was exposed to some bacteria and then bacterial 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.]



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

t/min	Pressure of system at time t/mm Hg
10	160
∞	240

Which of the following option is incorrect?

- (A) Initial pressure of A is 80 mm Hg
 (B) The reaction never goes to completion
 (C) Partial pressure of A after 10 minute is 40 mm Hg
 (D) Rate constant of the reaction is 1.693 min^{-1}

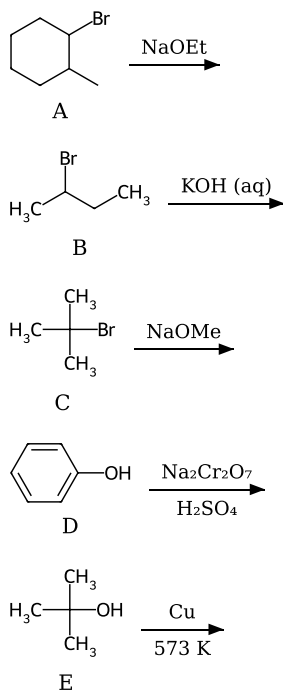
An octahedral complex having molecular composition $\text{Co} \cdot 5\text{NH}_3 \cdot \text{Cl}^2 \cdot \text{SO}_4$ has two isomers A and B. The solution of A gives a white precipitate with AgNO_3 solution and the solution of B gives white precipitate with BaCl_2 solution. The type of isomerism exhibited by the complex is,

- (A) Co-ordinate isomerism
 (B) Ionisation isomerism
 (C) Geometrical isomerism
 (D) Linkage isomerism

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

- (A) basic
 (B) neutral
 (C) amphoteric
 (D) acidic

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



Choose the correct answer from the options given below:

- (A) B & E Only
 (B) B, C & D Only
 (C) A, C & D Only
 (D) B & D Only

Given below are two statements:

Statement I: Ozonolysis followed by treatment with $\text{Zn}, \text{H}_2\text{O}$ of cis-2-butene gives ethanal.

Statement II: The product obtained by ozonolysis followed by treatment with $\text{Zn}, \text{H}_2\text{O}$ 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

- (A) Statement I is false but Statement II are true (B) Both Statement I and Statement II are False
(C) Statement I is true but Statement II is false (D) Both Statement I and Statement II are true

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

(Given $\log 2 = 0.30$)

- (A) increase to 1.3 (B) reduce to 0.5 (C) increase to 2 (D) remain same

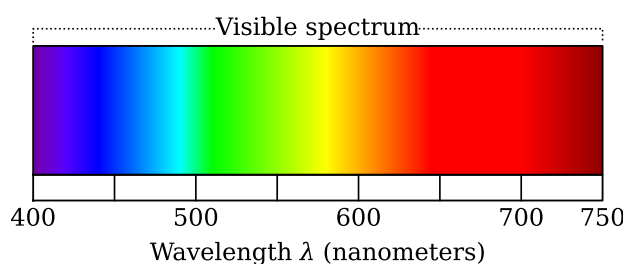
The number of valence electrons present in the metal among Cr, Co, Fe and Ni which has the lowest enthalpy of atomisation is:

- (A) 10 (B) 6 (C) 9 (D) 8

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 A^{2+} and B^{4+} respectively is

- (A) both reducing (B) oxidising and reducing
(C) both oxidising (D) reducing and oxidising

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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.

Choose the correct answer from the options given below:

- (A) B, C and D Only (B) A, C, D and E Only (C) A, B, D and E Only (D) A, D and E Only

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

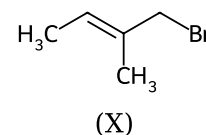
(Given: $\Delta_{\text{fus}}H = x \text{ kJ/mol}$)

$$C_p [\text{H}_2\text{O}(l)] = y \text{ Jmol}^{-1}\text{K}^{-1}$$

$$C_p [\text{H}_2\text{O}(s)] = z \text{ Jmol}^{-1}\text{K}^{-1}$$

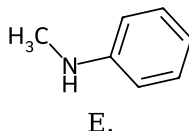
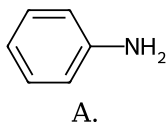
- (A) $-x - 10y - 10z$ (B) $x - 10y - 10z$ (C) $-10(100x + y + z)$ (D) $10(100x + y + z)$

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



- (A) 4-Bromo-3-methylbut-2-ene (B) 1-Bromo-2-methylbut-2-ene
(C) 3-Bromo-3-methylprop-2-ene (D) 2-Bromo-2-methylbut-2-ene

Which of the following amine (s) show (s) positive carbylamine test?



Choose the correct answer from the options given below:

(A) C Only

(B) B, C and D Only

(C) A and E Only

(D) A and C Only

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 total pressure is 1.15 atm, then calculate the ratio of 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 40g mol^{-1} respectively.)

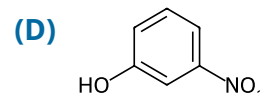
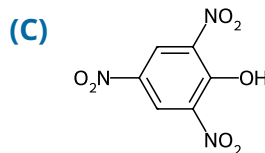
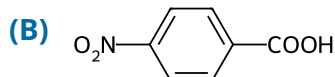
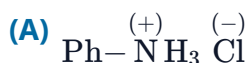
(A) 5.46, 17.8

(B) 2.96, 11.2

(C) 4.26, 19.3

(D) 2.59, 11.85

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



Given below are two statements:

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

Statement II: If the molar conductance at infinite dilution for ferrous, ammonium and sulfate ions are x_1 , x_2 and $x_3\text{Scm}^2\text{mol}^{-1}$, respectively then the molar conductance for Mohr's salt solution at infinite dilution would be given by $x_1 + x_2 + 2x_3$

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

(A) Both Statements I and Statement II are true

(B) Statement I is true but Statement II are false

(C) Both Statements I and Statement II are false

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

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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

- (A) $X = \text{NH}_3$ and $Y = \text{HgO}$ (B) $X = \text{NH}_4\text{Cl}$ and $Y = \text{KOH}$
 (C) $X = \text{NH}_3$ and $Y = \text{K}_2\text{HgI}_4 + \text{KOH}$ (D) $X = \text{HCl}$ and $Y = \text{NH}_4\text{Cl}$

Chemistry Section B · Numerical value

Q45 to Q49

Q45 Coordination Compounds NUMERICAL

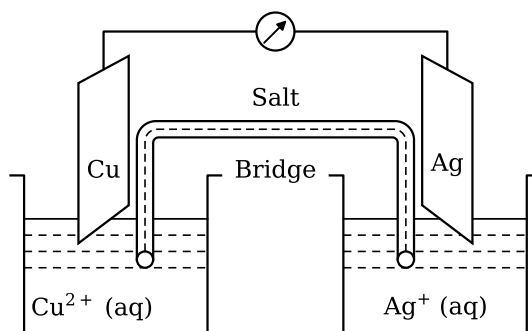
[Step-by-step solution](#) > [prepwisar.in/questions/aRe1dqvwF1](https://www.prepwisar.in/questions/aRe1dqvwF1)

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 _____.

Q46 Electrochemistry NUMERICAL

[Step-by-step solution](#) > [prepwisar.in/questions/cF2PpFOSW0](https://www.prepwisar.in/questions/cF2PpFOSW0)

1 Faraday electricity was passed through Cu^{2+} (1.5M, 1L)/Cu and 0.1 Faraday was passed through Ag^+ (0.2M, 1L)/Ag 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 _____ mV (nearest integer)



$$\text{Given : } E^\circ \text{Cu}^{2+}/\text{Cu} = 0.34\text{V}$$

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

$$\frac{2 \cdot 303RT}{F} = 0.06\text{V}$$

Q47 Solutions & Colligative Properties NUMERICAL

[Step-by-step solution](#) > [prepwisar.in/questions/cvgdBk9LKq](https://www.prepwisar.in/questions/cvgdBk9LKq)

The percentage dissociation of a salt (MX_3) solution at given temperature (van't Hoff factor $i = 2$) is _____ % (Nearest integer)

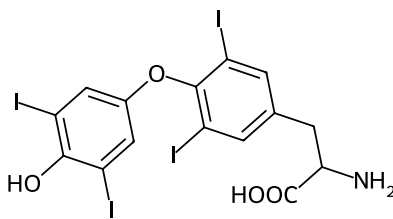
Q48 Purification & Characterisation of Organic Compounds NUMERICAL

[Step-by-step solution](#) > [prepwisar.in/questions/6UnDcnGVtT](https://www.prepwisar.in/questions/6UnDcnGVtT)

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 gmol^{-1} of C : 12, O : 16)

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Thyroxine, the hormone has given below structure



The percentage of iodine in thyroxine is _____. (nearest integer)

(Given molar mass in gmol^{-1} C : 12, H : 1, O : 16, N : 14, I : 127)

Mathematics Section A · Multiple choice

Q50 to Q69

Q50 Three Dimensional Geometry

Step-by-step solution > [prepwisar.in/questions/RevUyUnNrr](https://www.prepwisar.in/questions/RevUyUnNrr)

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 ?

- (A) $(7, 15, 13)$ (B) $(4, 22, 7)$ (C) $(10, -29, -50)$ (D) $(5, 4, 3)$

Q51 Three Dimensional Geometry

Step-by-step solution > [prepwisar.in/questions/jjbdIbPCoF](https://www.prepwisar.in/questions/jjbdIbPCoF)

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

- (A) $\frac{3}{2}$ (B) 3 (C) -3 (D) $-\frac{3}{2}$

Q52 Applications of Derivatives

Step-by-step solution > [prepwisar.in/questions/ZaBvtJDgEn](https://www.prepwisar.in/questions/ZaBvtJDgEn)

Let $x = -1$ and $x = 2$ be the critical points of the function $f(x) = x^3 + ax^2 + b \log_e |x| + 1$, $x \neq 0$. Let m and M respectively be the absolute minimum and the absolute maximum values of f in the interval $[-2, -\frac{1}{2}]$. Then $|M + m|$ is equal to (Take $\log_e 2 = 0.7$) :

- (A) 21.1 (B) 19.8 (C) 22.1 (D) 20.9

Q53 Binomial Theorem

Step-by-step solution > [prepwisar.in/questions/jL4fVHJn-S](https://www.prepwisar.in/questions/jL4fVHJn-S)

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

- (A) 4 (B) 6 (C) 3 (D) 1

Q54 Circles

Step-by-step solution > [prepwisar.in/questions/-kBe8Dtz-W](https://www.prepwisar.in/questions/-kBe8Dtz-W)

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 centre $(1, 3)$ that touches C_1 externally at the point (α, β) . If $(\beta - \alpha)^2 = \frac{m}{n}$, $\gcd(m, n) = 1$, then $m + n$ is equal to

- (A) 22 (B) 13 (C) 9 (D) 31

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Q55 Complex Numbers[Step-by-step solution > prepwisar.in/questions/MZajj49IYc](https://www.prepwisar.in/questions/MZajj49IYc)

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, and(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.**(A)** both are incorrect **(B)** both are correct **(C)** only (S2) is correct **(D)** only (S1) is correct**Q56** Definite Integration[Step-by-step solution > prepwisar.in/questions/F8UjLc4RTB](https://www.prepwisar.in/questions/F8UjLc4RTB)The integral $\int_0^\pi \frac{(x+3)\sin x}{1+3\cos^2 x} dx$ is equal to**(A)** $\frac{\pi}{\sqrt{3}}(\pi+1)$ **(B)** $\frac{\pi}{3\sqrt{3}}(\pi+6)$ **(C)** $\frac{\pi}{\sqrt{3}}(\pi+2)$ **(D)** $\frac{\pi}{2\sqrt{3}}(\pi+4)$ **Q57** Differential Equations[Step-by-step solution > prepwisar.in/questions/S9iXAWjbj9](https://www.prepwisar.in/questions/S9iXAWjbj9)Let $y = y(x)$ be the solution curve of the differential equation $x(x^2 + e^x) dy + (e^x(x-2)y - x^3) dx = 0, x > 0$, passing through the point $(1, 0)$. Then $y(2)$ is equal to:**(A)** $\frac{2}{2+e^2}$ **(B)** $\frac{4}{4-e^2}$ **(C)** $\frac{4}{4+e^2}$ **(D)** $\frac{2}{2-e^2}$ **Q58** Limits[Step-by-step solution > prepwisar.in/questions/yoFY-qANKV](https://www.prepwisar.in/questions/yoFY-qANKV) $\lim_{x \rightarrow 0^+} \frac{\tan\left(5(x)^{\frac{1}{3}}\right) \log_e(1+3x^2)}{(\tan^{-1} 3\sqrt{x})^2 (e^{5(x)^{\frac{4}{3}}} - 1)}$ is equal to**(A)** $\frac{5}{3}$ **(B)** 1 **(C)** $\frac{1}{3}$ **(D)** $\frac{1}{15}$ **Q59** Determinants[Step-by-step solution > prepwisar.in/questions/F3FsolZCvn](https://www.prepwisar.in/questions/F3FsolZCvn)Let A be a 3×3 matrix such that $|\text{adj}(\text{adj}(\text{adj } A))| = 81$.If $S = \left\{n \in \mathbb{Z} : (|\text{adj}(\text{adj } A)|)^{\frac{(n-1)^2}{2}} = |A|^{(3n^2-5n-4)}\right\}$, then $\sum_{n \in S} |A|^{(n^2+n)}$ is equal to:**(A)** 820 **(B)** 866 **(C)** 750 **(D)** 732**Q60** Determinants[Step-by-step solution > prepwisar.in/questions/7sfuiW2zs_](https://www.prepwisar.in/questions/7sfuiW2zs_)

Let the system of equations:

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

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

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

have infinitely many solutions. Then the radius of the circle centred at (λ, μ) and touching the line $4x = 3y$ is:**(A)** $\frac{7}{5}$ **(B)** $\frac{21}{5}$ **(C)** 7 **(D)** $\frac{17}{5}$ **Q61** Parabola[Step-by-step solution > prepwisar.in/questions/cmQs7APuit](https://www.prepwisar.in/questions/cmQs7APuit)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**(A)** $\frac{5}{2}$ **(B)** $\frac{3}{2}$ **(C)** $\frac{3}{4}$ **(D)** $\frac{1}{4}$

From a group of 7 batsmen and 6 bowlers, 10 players are to be chosen for a team, which should include atleast 4 batsmen and atleast 4 bowlers. One batsmen 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

- (A) 145 (B) 165 (C) 155 (D) 135

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 $(\alpha, \beta]$. Then $\beta - 2\alpha$ is equal to

- (A) 5 (B) 0 (C) 20 (D) 9

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:

- (A) 18 (B) 216 (C) 36 (D) 72

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

- (A) 447 (B) 445 (C) 449 (D) 451

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

- (A) 31 (B) 29 (C) 24 (D) 27

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

- (A) 210 (B) 250 (C) 240 (D) 220

Let ABC be the triangle such that the equations of lines AB and AC be $3y - x = 2$ and $x + y = 2$, respectively, and the points B and C lie on x -axis. If P is the orthocentre of the triangle ABC, then the area of the triangle PBC is equal to

- (A) 8 (B) 4 (C) 10 (D) 6

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:

- (A) 75 (B) 96 (C) 80 (D) 72

Q70 Hyperbola **NUMERICAL**

[Step-by-step solution](#) › [prepwisar.in/questions/v7LdVR1XMV](https://www.prepwisar.in/questions/v7LdVR1XMV)

Consider the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ having one of its focus at $P(-3, 0)$. If the latus rectum through its other focus subtends a right angle at P and $a^2b^2 = \alpha\sqrt{2} - \beta$, $\alpha, \beta \in \mathbb{N}$, then $\alpha + \beta$ is _____.

Q71 Continuity & Differentiability **NUMERICAL**

[Step-by-step solution](#) › [prepwisar.in/questions/1ANIDolvyP](https://www.prepwisar.in/questions/1ANIDolvyP)

The number of points of discontinuity of the function $f(x) = \left\lceil \frac{x^2}{2} \right\rceil - [\sqrt{x}]$, $x \in [0, 4]$, where $[\cdot]$ denotes the greatest integer function, is _____.

Q72 Determinants **NUMERICAL**

[Step-by-step solution](#) › [prepwisar.in/questions/4wEh_puSIu](https://www.prepwisar.in/questions/4wEh_puSIu)

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

Q73 Relations & Functions (Basic) **NUMERICAL**

[Step-by-step solution](#) › [prepwisar.in/questions/K0Tgy8qdil](https://www.prepwisar.in/questions/K0Tgy8qdil)

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 _____.

Q74 Permutations & Combinations **NUMERICAL**

[Step-by-step solution](#) › [prepwisar.in/questions/xrh26yg4Zr](https://www.prepwisar.in/questions/xrh26yg4Zr)

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

Answer key: JEE Main 2025 · 7 Apr · Shift 1

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Physics

1.	A	2.	C	3.	A	4.	A	5.	C	6.	C	7.	C	8.	D
9.	D	10.	C	11.	A	12.	D	13.	D	14.	A	15.	A	16.	A
17.	B	18.	A	19.	C	20.	C	21.	5	22.	80	23.	5	24.	314
25.	199														

Chemistry

26.	C	27.	B	28.	C	29.	D	30.	B	31.	A	32.	D	33.	C
34.	A	35.	B	36.	D	37.	C	38.	C	39.	B	40.	D	41.	B
42.	D	43.	B	44.	C	45.	2	46.	400	47.	33	48.	12	49.	65

Mathematics

50.	A	51.	C	52.	A	53.	D	54.	A	55.	C	56.	B	57.	C
58.	C	59.	D	60.	A	61.	B	62.	C	63.	A	64.	B	65.	C
66.	B	67.	B	68.	D	69.	A	70.	1944	71.	8	72.	36	73.	6
74.	13														

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