

JEE MAIN 2025 · QUESTION PAPER

# 2 Apr 2025 **Shift 2**

74 questions in exam order, with answer key

| Subject              | Section A multiple choice                   | Section B numerical value |
|----------------------|---------------------------------------------|---------------------------|
| ● <b>Physics</b>     | <b>20</b> Q1 to Q20                         | <b>5</b> Q21 to Q25       |
| ● <b>Chemistry</b>   | <b>19</b> Q26 to Q44                        | <b>5</b> Q45 to Q49       |
| ● <b>Mathematics</b> | <b>20</b> Q50 to Q69                        | <b>5</b> Q70 to Q74       |
| <b>In this PDF</b>   | <b>74</b> 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.

[prepwise.in/pyqs/paper/2025-04-02-evening](https://prepwise.in/pyqs/paper/2025-04-02-evening) · Free, no signup needed to start

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](https://prepwise.in/feedback) · Terms: [prepwise.in/terms](https://prepwise.in/terms)

**Q1** Nuclear Physics

[Step-by-step solution](#) · [prepwiser.in/questions/aVFW5VUIaX](#)

Energy released when two deuterons ( ${}_1\text{H}^2$ ) fuse to form a helium nucleus ( ${}_2\text{He}^4$ ) is : (Given : Binding energy per nucleon of  ${}_1\text{H}^2 = 1.1\text{MeV}$  and binding energy per nucleon of  ${}_2\text{He}^4 = 7.0\text{MeV}$  )

- (A) 26.8 MeV (B) 8.1 MeV (C) 23.6 MeV (D) 5.9 MeV

**Q2** Atomic Physics

[Step-by-step solution](#) · [prepwiser.in/questions/CTcp0bcDdT](#)

Assuming the validity of Bohr's atomic model for hydrogen like ions the radius of  $\text{Li}^{++}$  ion in its ground state is given by  $\frac{1}{X}a_0$ , where  $X = \underline{\hspace{2cm}}$  (Where  $a_0$  is the first Bohr's radius.)

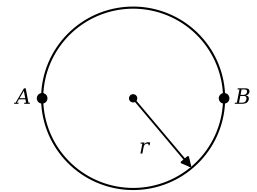
- (A) 2 (B) 9 (C) 1 (D) 3

**Q3** Rectilinear Motion

[Step-by-step solution](#) · [prepwiser.in/questions/Ahwp3CF3\\_U](#)

A sportsman runs around a circular track of radius  $r$  such that he traverses the path  $ABAB$ . The distance travelled and displacement, respectively, are

- (A)  $\pi r, 3r$  (B)  $2r, 3\pi r$  (C)  $3\pi r, 2r$  (D)  $3\pi r, \pi r$



**Q4** Dual Nature of Radiation & Matter

[Step-by-step solution](#) · [prepwiser.in/questions/wYobAXpgRa](#)

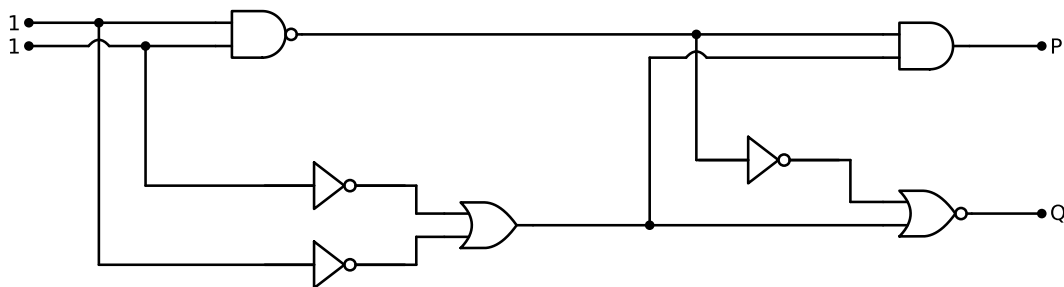
An electron with mass 'm' with an initial velocity ( $t = 0$ )  $\vec{v} = v_0\hat{i}$  ( $v_0 > 0$ ) enters a magnetic field  $\vec{B} = B_0\hat{j}$ . If the initial de-Broglie wavelength at  $t = 0$  is  $\lambda_0$  then its value after time 't' would be:

- (A)  $\frac{\lambda_0}{\sqrt{1 - \frac{e^2 B_0^2 t^2}{m^2}}}$  (B)  $\lambda_0$  (C)  $\lambda_0 \sqrt{1 + \frac{e^2 B_0^2 t^2}{m^2}}$  (D)  $\frac{\lambda_0}{\sqrt{1 + \frac{e^2 B_0^2 t^2}{m^2}}}$

**Q5** Semiconductors & Electronic Devices

[Step-by-step solution](#) · [prepwiser.in/questions/vL4JAdpRHr](#)

In the digital circuit shown in the figure, for the given inputs the  $P$  and  $Q$  values are :



- (A)  $P = 0, Q = 1$  (B)  $P = 1, Q = 0$  (C)  $P = 0, Q = 0$  (D)  $P = 1, Q = 1$

Attempt this paper online with instant answer checking · [prepwiser.in/pyqs/paper/2025-04-02-evening](#)

Given below are two statements : one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

**Assertion (A):** Net dipole moment of a polar linear isotropic dielectric substance is not zero even in the absence of an external electric field.

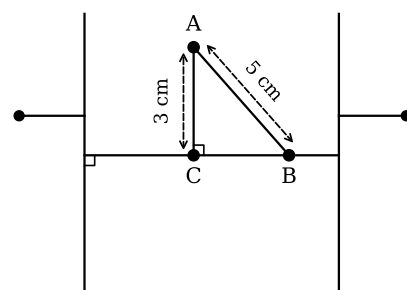
**Reason (R):** In absence of an external electric field, the different permanent dipoles of a polar dielectric substance are oriented in random directions.

In the light of the above statements, choose the most appropriate answer from the options given below:

- (A) Both (A) and (R) are correct and (R) is the correct explanation of (A) 2.  
 (B) Both (A) and (R) are correct but (R) is not the correct explanation of (A)  
 (C) (A) is not correct but (R) is correct  
 (D) (A) is correct but (R) is not correct

Two large plane parallel conducting plates are kept 10 cm apart as shown in figure. The potential difference between them is  $V$ . The potential difference between the points  $A$  and  $B$  (shown in the figure) is:

- (A) 1 V                      (B)  $\frac{1}{4}V$                       (C)  $\frac{3}{4}V$                       (D)  $\frac{2}{5}V$



Consider a circular loop that is uniformly charged and has a radius  $a\sqrt{2}$ . Find the position along the positive  $z$ -axis of the cartesian coordinate system where the electric field is maximum if the ring was assumed to be placed in  $xy$  plane at the origin:

- (A)  $a$                       (B)  $a/2$                       (C) 0                      (D)  $a/\sqrt{2}$

Two identical objects are placed in front of convex mirror and concave mirror having same radii of curvature of 12 cm, at same distance of 18 cm from the respective mirrors. The ratio of sizes of the images formed by convex mirror and by concave mirror is:

- (A) 2                      (B)  $1/2$                       (C)  $1/3$                       (D) 3

A bi-convex lens has radius of curvature of both the surfaces same as  $1/6$  cm. If this lens is required to be replaced by another convex lens having different radii of curvatures on both sides ( $R_1 \neq R_2$ ), without any change in lens power then possible combination of  $R_1$  and  $R_2$  is:

- (A)  $\frac{1}{3}$  cm and  $\frac{1}{7}$  cm                      (B)  $\frac{1}{5}$  cm and  $\frac{1}{7}$  cm                      (C)  $\frac{1}{3}$  cm and  $\frac{1}{3}$  cm                      (D)  $\frac{1}{6}$  cm and  $\frac{1}{9}$  cm

Attempt this paper online with instant answer checking > [prepwiser.in/pyqs/paper/2025-04-02-evening](https://www.prepwiser.in/pyqs/paper/2025-04-02-evening)

Match List - I with List - II.

List - I

List - II

- |                                    |                                                 |
|------------------------------------|-------------------------------------------------|
| (A) Heat capacity of body          | (I) $\text{Jkg}^{-1}$                           |
| (B) Specific heat capacity of body | (II) $\text{JK}^{-1}$                           |
| (C) Latent heat                    | (III) $\text{Jkg}^{-1}\text{K}^{-1}$            |
| (D) Thermal conductivity           | (IV) $\text{Jm}^{-1}\text{K}^{-1}\text{s}^{-1}$ |

Choose the correct answer from the options given below :

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

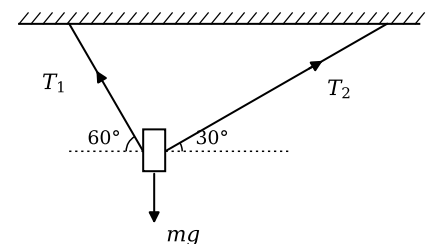
Identify the characteristics of an adiabatic process in a monoatomic gas. (A) Internal energy is constant. (B) Work done in the process is equal to the change in internal energy. (C) The product of temperature and volume is a constant. (D) The product of pressure and volume is a constant. (E) The work done to change the temperature from  $T_1$  to  $T_2$  is proportional to  $(T_2 - T_1)$ . Choose the correct answer from the options given below:

- (A) (B), (D) only      (B) (B), (E) only      (C) (A), (C), (E) only      (D) (A), (C), (D) only

A body of mass 1 kg is suspended with the help of two strings making angles as shown in figure. Magnitudes of tensions  $T_1$  and  $T_2$ , respectively, are (in N):

(Take acceleration due to gravity  $10\text{m/s}^2$ )

- (A)  $5\sqrt{3}, 5$       (B)  $5\sqrt{3}, 5\sqrt{3}$       (C) 5, 5      (D) 5,  $5\sqrt{3}$



In a moving coil galvanometer, two moving coils  $M_1$  and  $M_2$  have the following particulars:

$$R_1 = 5\Omega, N_1 = 15, A_1 = 3.6 \times 10^{-3}\text{m}^2, B_1 = 0.25\text{T}$$

$$R_2 = 7\Omega, N_2 = 21, A_2 = 1.8 \times 10^{-3}\text{m}^2, B_2 = 0.50\text{T}$$

Assuming that torsional constant of the springs are same for both coils, what will be the ratio of voltage sensitivity of  $M_1$  and  $M_2$ ?

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

A solenoid having area  $A$  and length ' $l$ ' is filled with a material having relative permeability 2. The magnetic energy stored in the solenoid is:

- (A)  $\frac{B^2 Al}{4\mu_0}$       (B)  $\frac{B^2 Al}{2\mu_0}$       (C)  $\frac{B^2 Al}{\mu_0}$       (D)  $B^2 Al$

Attempt this paper online with instant answer checking > [prepwisar.in/pyqs/paper/2025-04-02-evening](https://www.prepwisar.in/pyqs/paper/2025-04-02-evening)

**Q16** Surface Tension[Step-by-step solution](#) > [prepwiser.in/questions/8v-TTiB-kN](https://www.prepwiser.in/questions/8v-TTiB-kN)

Two water drops each of radius ' $r$ ' coalesce to form a bigger drop. If ' $T$ ' is the surface tension, the surface energy released in this process is:

- (A)  $4\pi r^2 T [2 - 2^{1/3}]$  (B)  $4\pi r^2 T [1 + \sqrt{2}]$  (C)  $4\pi r^2 T [2 - 2^{2/3}]$  (D)  $4\pi r^2 T [\sqrt{2} - 1]$

**Q17** Rotational Motion[Step-by-step solution](#) > [prepwiser.in/questions/qMZqdQyzOi](https://www.prepwiser.in/questions/qMZqdQyzOi)

The moment of inertia of a circular ring of mass  $M$  and diameter  $r$  about a tangential axis lying in the plane of the ring is:

- (A)  $\frac{3}{8}Mr^2$  (B)  $2Mr^2$  (C)  $\frac{1}{2}Mr^2$  (D)  $\frac{3}{2}Mr^2$

**Q18** Mechanical Waves[Step-by-step solution](#) > [prepwiser.in/questions/J7T9--YwPZ](https://www.prepwiser.in/questions/J7T9--YwPZ)

A sinusoidal wave of wavelength 7.5 cm travels a distance of 1.2 cm along the  $x$ -direction in 0.3 sec. The crest P is at  $x = 0$  at  $t = 0$  sec and maximum displacement of the wave is 2 cm. Which equation correctly represents this wave?

- (A)  $y = 2 \cos(0.83x - 3.35t)$  cm (B)  $y = 2 \sin(0.83x - 3.5t)$  cm  
(C)  $y = 2 \cos(0.13x - 0.5t)$  cm (D)  $y = 2 \cos(3.35x - 0.83t)$  cm

**Q19** Units, Dimensions & Errors[Step-by-step solution](#) > [prepwiser.in/questions/QmSUyI\\_o0\\_](https://www.prepwiser.in/questions/QmSUyI_o0_)

If  $\mu_0$  and  $\epsilon_0$  are the permeability and permittivity of free space, respectively, then the dimension of  $\left(\frac{1}{\mu_0 \epsilon_0}\right)$  is:

- (A)  $T^2/L$  (B)  $L^2/T^2$  (C)  $T^2/L^2$  (D)  $L/T^2$

**Q20** Units, Dimensions & Errors[Step-by-step solution](#) > [prepwiser.in/questions/4VTDZSJXEx](https://www.prepwiser.in/questions/4VTDZSJXEx)

Given a charge  $q$ , current  $I$  and permeability of vacuum  $\mu_0$ . Which of the following quantity has the dimension of momentum?

- (A)  $qI/\mu_0$  (B)  $q^2\mu_0 I$  (C)  $q\mu_0/I$  (D)  $q\mu_0 I$

**Physics Section B · Numerical value**

Q21 to Q25

**Q21** Ray Optics **NUMERICAL**[Step-by-step solution](#) > [prepwiser.in/questions/oXrhHFiw3E](https://www.prepwiser.in/questions/oXrhHFiw3E)

A ray of light suffers minimum deviation when incident on a prism having angle of the prism equal to  $60^\circ$ . The refractive index of the prism material is  $\sqrt{2}$ . The angle of incidence (in degrees) is \_\_\_\_\_

**Q22** Gravitation **NUMERICAL**[Step-by-step solution](#) > [prepwiser.in/questions/fAHBzH7M4O](https://www.prepwiser.in/questions/fAHBzH7M4O)

A satellite of mass 1000 kg is launched to revolve around the earth in an orbit at a height of 270 km from the earth's surface. Kinetic energy of the satellite in this orbit is \_\_\_\_\_  $\times 10^{10}$  J.

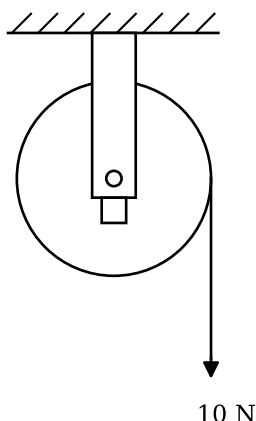
(Mass of earth =  $6 \times 10^{24}$  kg, Radius of earth =  $6.4 \times 10^6$  m, Gravitational constant =  $6.67 \times 10^{-11}$  N m<sup>2</sup> kg<sup>-2</sup>)

**Q23** Kinetic Theory of Gases **NUMERICAL**[Step-by-step solution](#) > [prepwiser.in/questions/efO96uzH6J](https://www.prepwiser.in/questions/efO96uzH6J)

The internal energy of air in  $4\text{m} \times 4\text{m} \times 3\text{m}$  sized room at 1 atmospheric pressure will be \_\_\_\_\_  $\times 10^6$  J

(Consider air as diatomic molecule)

The length of a light string is 1.4 m when the tension on it is 5 N. If the tension increases to 7 N, the length of the string is 1.56 m. The original length of the string is \_\_\_\_\_ m.



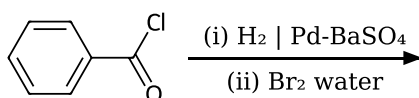
A wheel of radius 0.2 m rotates freely about its center when a string that is wrapped over its rim is pulled by force of 10 N as shown in figure. The established torque produces an angular acceleration of  $2\text{rad/s}^2$ . Moment of inertia of the wheel is \_\_\_\_\_  $\text{kg m}^2$ . (Acceleration due to gravity =  $10\text{m/s}^2$ )

## Chemistry Section A · Multiple choice

Q26 to Q44

Consider the following reactions. From these reactions which reaction will give carboxylic acid as a major product?

- (A)  $\text{R} - \text{C} \equiv \text{N} \xrightarrow[\text{mild condition}]{\text{(i) } \text{H}^+/\text{H}_2\text{O}}$
- (B)  $\text{R} - \text{MgX} \xrightarrow[\text{(ii) } \text{H}_3\text{O}^+]{\text{(i) } \text{CO}_2}$
- (C)  $\text{R} - \text{C} \equiv \text{N} \xrightarrow[\text{(ii) } \text{H}_3\text{O}^+]{\text{(i) } \text{SnCl}_2/\text{HCl}}$
- (D)  $\text{R} \cdot \text{CH}_2 \cdot \text{OH} \xrightarrow{\text{PCC}}$
- (E)



Choose the correct answer from the options given below:

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

A tetrapeptide, "x" on complete hydrolysis produced glycine (Gly), alanine (Ala), valine (Val), leucine (Leu) in equimolar proportion each. The number of tetrapeptides (sequences) possible involving each of these amino acids is:

- (A) 32      (B) 24      (C) 8      (D) 16

Attempt this paper online with instant answer checking > [prepwisar.in/pyqs/paper/2025-04-02-evening](https://www.prepwisar.in/pyqs/paper/2025-04-02-evening)

Which among the following molecules is (a) involved in  $sp^3d$  hybridization, (b) has different bond lengths and (c) has lone pair of electrons on the central atom?

(A)  $XeF_4$ (B)  $XeF_2$ (C)  $PF_5$ (D)  $SF_4$ 

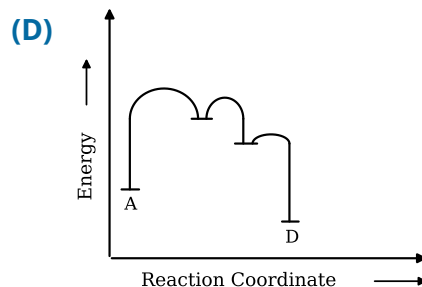
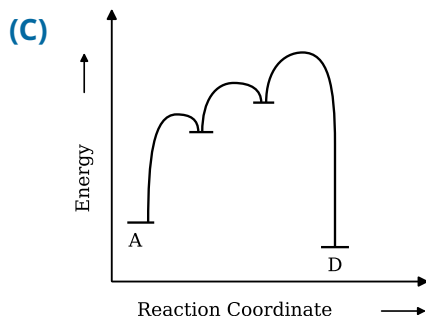
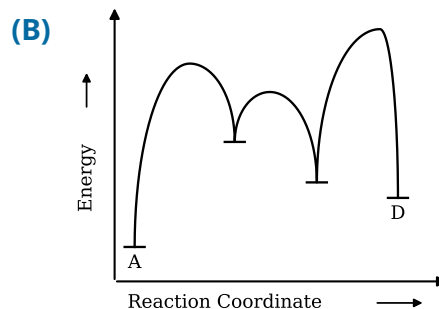
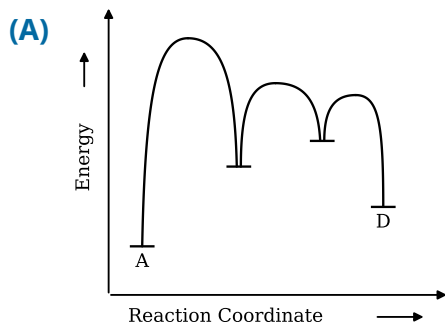
Reactant A converts to product D through the given mechanism (with the net evolution of heat):

$A \rightarrow B$  slow;  $\Delta H = +ve$

$B \rightarrow C$  fast;  $\Delta H = -ve$

$C \rightarrow D$  fast;  $\Delta H = -ve$

Which of the following represents the above reaction mechanism?



The type of hybridization and the magnetic property of  $[MnCl_6]^{3-}$  are,

(A)  $sp^3d^2$ , paramagnetic with four unpaired electrons.

(B)  $d^2sp^3$ , paramagnetic with four unpaired electrons.

(C)  $sp^3d^2$ , paramagnetic with two unpaired electrons.

(D)  $d^2sp^3$ , paramagnetic with two unpaired electrons.

The d-orbital electronic configuration of the complex among  $[Co(en)_3]^{3+}$ ,  $[CoF_6]^{3-}$ ,  $[Mn(H_2O)_6]^{2+}$  and  $[Zn(H_2O)_6]^{2+}$  that has the highest CFSE is:

(A)  $t_{2g}^6 e_g^0$

(B)  $t_{2g}^3 e_g^2$

(C)  $t_{2g}^4 e_g^2$

(D)  $t_{2g}^6 e_g^4$

Attempt this paper online with instant answer checking > [prepwiser.in/pyqs/paper/2025-04-02-evening](https://prepwiser.in/pyqs/paper/2025-04-02-evening)

Given below are two statements:

Statement (I) : Neopentane forms only one monosubstituted derivative.

Statement (II) : Melting point of neopentane is higher than n-pentane.

In the light of the above statements, choose the most appropriate answer from the options given below:

- (A) Statement I is incorrect but Statement II is correct  
(B) Both Statement I and Statement II are correct  
(C) Statement I is correct but Statement II is incorrect  
(D) Both Statement I and Statement II are incorrect

The nature of oxide ( $\text{TeO}_2$ ) and hydride ( $\text{TeH}_2$ ) formed by Te, respectively are:

- (A) Reducing and basic (B) Reducing and acidic  
(C) Oxidising and acidic (D) Oxidising and basic

Electronic configuration of four elements A, B, C and D are given below:

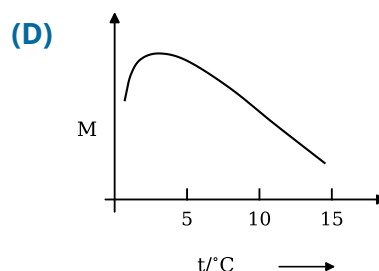
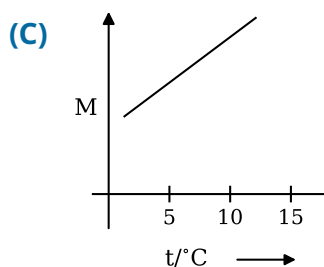
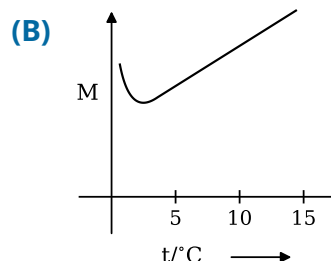
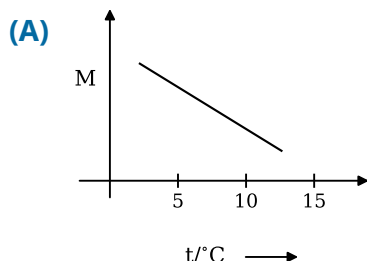
- (A)  $1s^2 2s^2 2p^3$   
(B)  $1s^2 2s^2 2p^4$   
(C)  $1s^2 2s^2 2p^5$   
(D)  $1s^2 2s^2 2p^2$

Which of the following is the correct order of increasing electronegativity (Pauling's scale)?

- (A)  $D < A < B < C$  (B)  $A < B < C < D$  (C)  $A < C < B < D$  (D)  $A < D < B < C$

'x' g of NaCl is added to water in a beaker with a lid. The temperature of the system is raised from  $1^\circ\text{C}$  to  $25^\circ\text{C}$ . Which out of the following plots, is best suited for the change in the molarity (M) of the solution with respect to temperature?

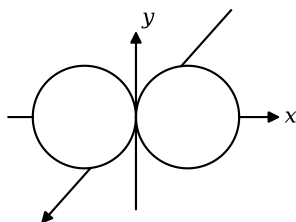
[Consider the solubility of NaCl remains unchanged over the temperature range]



Which of the following statements are true?

(A) The subsidiary quantum number  $l$  describes the shape of the orbital occupied by the electron.

(B)



is the boundary surface diagram of the  $2p_x$  orbital.

(C) The + and - signs in the wave function of the  $2p_x$  orbital refer to charge.

(D) The wave function of  $2p_x$  orbital is zero everywhere in the  $xy$  plane.

Choose the correct answer from the options given below:

- (A) (A) and (B) only      (B) (B) and (D) only      (C) (C) and (D) only      (D) (A), (B) and (C) only

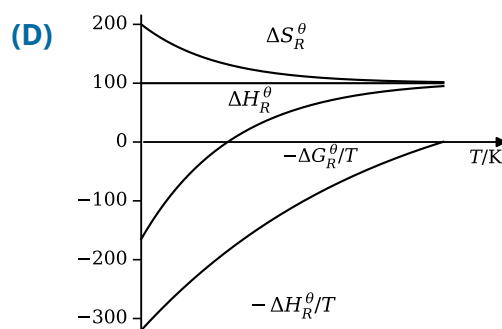
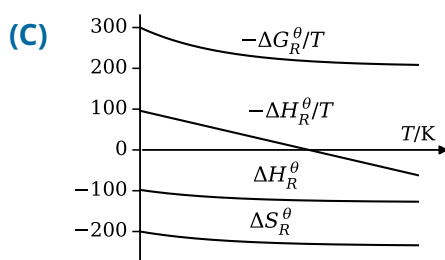
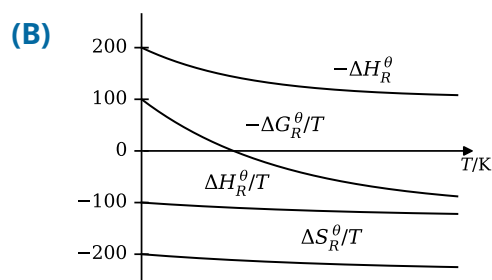
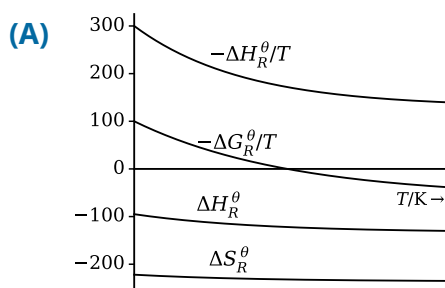
Arrange the following in order of magnitude of work done by the system/on the system at constant temperature.

- (a)  $|w_{\text{reversible}}|$  for expansion in infinite stages.  
 (b)  $|w_{\text{irreversible}}|$  for expansion in single stage.  
 (c)  $|w_{\text{reversible}}|$  for compression in infinite stages.  
 (d)  $|w_{\text{irreversible}}|$  for compression in single stage.

Choose the correct answer from the options given below:

- (A)  $d > c = a > b$       (B)  $c = a > d > b$       (C)  $a > c > b > d$       (D)  $a > b > c > d$

Which of the following graphs correctly represents the variation of thermodynamic properties of Haber's process?



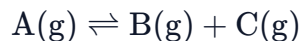
**Q39** General Organic Chemistry (GOC)[Step-by-step solution](https://www.prepwiser.in/questions/nmJdIODpcP)

In 3,3-dimethylhex-1-en-4-yne, there are \_\_\_\_\_  $sp^3$ , \_\_\_\_\_  $sp^2$  and \_\_\_\_\_  $sp$  hybridised carbon atoms respectively.

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

**Q40** Chemical Equilibrium[Step-by-step solution](https://www.prepwiser.in/questions/dye_VaXZjC)

Consider the following chemical equilibrium of the gas phase reaction at a constant temperature:



If  $p$  being the total pressure,  $K_p$  is the pressure equilibrium constant and  $\alpha$  is the degree of dissociation, then which of the following is true at equilibrium?

- (A) If  $K_p$  value is extremely high compared to  $p$ ,  $\alpha$  becomes much less than unity  
(B) When  $p$  increases  $\alpha$  increases  
(C) If  $p$  value is extremely high compared to  $K_p$ ,  $\alpha \approx 1$   
(D) When  $p$  increases  $\alpha$  decreases

**Q41** Amines & Diazonium Salts[Step-by-step solution](https://www.prepwiser.in/questions/2m1r7m2vgL)

When a concentrated solution of sulphanilic acid and 1-naphthylamine is treated with nitrous acid (273K) and acidified with acetic acid, the mass (g) of 0.1 mole of product formed is:

(Given molar mass in  $\text{gmol}^{-1}$  H : 1, C : 12, N : 14, O : 16, S : 32 )

- (A) 330                      (B) 33                      (C) 343                      (D) 66

**Q42** Purification & Characterisation of Organic Compounds[Step-by-step solution](https://www.prepwiser.in/questions/VZUmXC-79g)

In Dumas' method for estimation of nitrogen, 0.5 gram 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 (Aqueous tension at 300K = 15mmHg ) is \_\_\_\_\_ %.

- (A) 20.87                      (B) 12.57                      (C) 1.257                      (D) 18.67

**Q43** Purification & Characterisation of Organic Compounds[Step-by-step solution](https://www.prepwiser.in/questions/MhFQmDBhF8)

Match List - I with List - II.

| List - I<br>(Purification technique) |                                     | List - II<br>(Mixture of organic compounds) |                      |
|--------------------------------------|-------------------------------------|---------------------------------------------|----------------------|
| (A)                                  | Distillation (simple)               | (I)                                         | Diesel + Petrol      |
| (B)                                  | Fractional distillation             | (II)                                        | Aniline + Water      |
| (C)                                  | Distillation under reduced pressure | (III)                                       | Chloroform + Aniline |
| (D)                                  | Steam distillation                  | (IV)                                        | Glycerol + Spent-lye |

Choose the correct answer from the options given below:

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

**Q44** Qualitative Analysis: Salt Analysis[Step-by-step solution](https://www.prepwiser.in/questions/4mBQ0xrSfE)

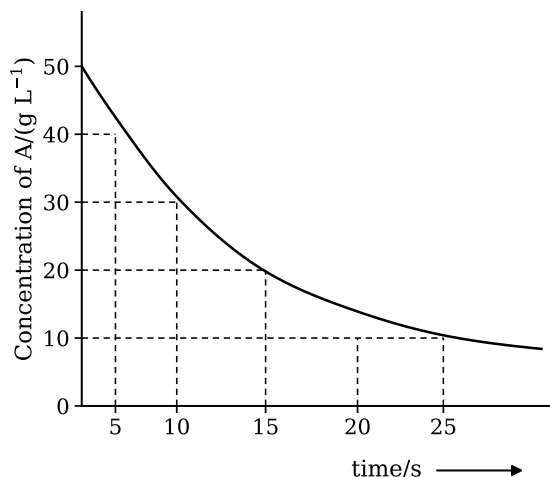
Formation of  $\text{Na}_4[\text{Fe}(\text{CN})_5\text{NOS}]$ , a purple coloured complex formed by addition of sodium nitroprusside in sodium carbonate extract of salt indicates the presence of:

- (A) Sulphide ion                      (B) Sulphite ion                      (C) Sulphate ion                      (D) Sodium ion

**Q45** Chemical Kinetics **NUMERICAL**[Step-by-step solution](#) › prepwiser.in/questions/cYZm6r70fe

For the reaction  $A \rightarrow B$  the following graph was obtained. The time required (in seconds) for the concentration of A to reduce to  $2.5\text{g L}^{-1}$  (if the initial concentration of A was  $50\text{g L}^{-1}$ ) is \_\_\_\_\_. (Nearest integer)

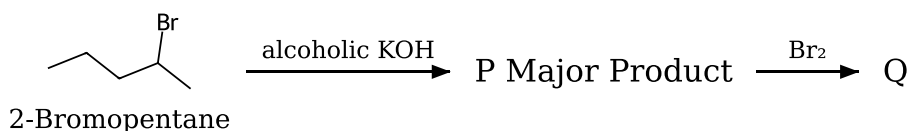
Given:  $\log 2 = 0.3010$

**Q46** Coordination Compounds **NUMERICAL**[Step-by-step solution](#) › prepwiser.in/questions/rLr9x3EIfw

The spin-only magnetic moment value of  $M^{n+}$  ion formed among Ni, Zn, Mn and Cu that has the least enthalpy of atomisation is \_\_\_\_\_. (in nearest integer) Here n is equal to the number of diamagnetic complexes among  $K_2[NiCl_4]$ ,  $[Zn(H_2O)_6]Cl_2$ ,  $K_3[Mn(CN)_6]$  and  $[Cu(PPh_3)_3]I$

**Q47** Electrochemistry **NUMERICAL**[Step-by-step solution](#) › prepwiser.in/questions/uwC4viUmJI

0.2% (w/v) solution of NaOH is measured to have resistivity  $870.0\text{m}\Omega\text{m}$ . The molar conductivity of the solution will be \_\_\_\_\_  $\times 10^2\text{mSdm}^2\text{mol}^{-1}$ . (Nearest integer)

**Q48** Mole Concept & Stoichiometry **NUMERICAL**[Step-by-step solution](#) › prepwiser.in/questions/vG21qysyBD

Consider the above sequence of reactions. 151 g of 2-bromopentane is made to react. Yield of major product P is 80% whereas Q is 100%.

Mass of product Q obtained is \_\_\_\_\_ g.

(Given molar mass in  $\text{g mol}^{-1}$  H : 1, C : 12, O : 16, Br : 80)

**Q49** Solutions & Colligative Properties **NUMERICAL**[Step-by-step solution](#) › prepwiser.in/questions/xPH8AfNVfW

When 1 g each of compounds AB and  $AB_2$  are dissolved in 15 g of water separately, they increased the boiling point of water by 2.7 K and 1.5 K respectively. The atomic mass of A (in  $\text{amu}$ ) is \_\_\_\_\_  $\times 10^{-1}$  (Nearest integer)

(Given : Molal boiling point elevation constant is  $0.5\text{K kg mol}^{-1}$ )

**Q50** Three Dimensional Geometry

[Step-by-step solution](#) › [prepwisar.in/questions/i\\_3kznBkBBQ](https://www.prepwisar.in/questions/i_3kznBkBBQ)

If the image of the point  $P(1, 0, 3)$  in the line joining the points  $A(4, 7, 1)$  and  $B(3, 5, 3)$  is  $Q(\alpha, \beta, \gamma)$ , then  $\alpha + \beta + \gamma$  is equal to:

- (A)  $\frac{46}{3}$  (B) 18 (C) 13 (D)  $\frac{47}{3}$

**Q51** Three Dimensional Geometry

[Step-by-step solution](#) › [prepwisar.in/questions/bz6GnFm6S9](https://www.prepwisar.in/questions/bz6GnFm6S9)

The line  $L_1$  is parallel to the vector  $\vec{a} = -3\hat{i} + 2\hat{j} + 4\hat{k}$  and passes through the point  $(7, 6, 2)$  and the line  $L_2$  is parallel to the vector  $\vec{b} = 2\hat{i} + \hat{j} + 3\hat{k}$  and passes through the point  $(5, 3, 4)$ . The shortest distance between the lines  $L_1$  and  $L_2$  is:

- (A)  $\frac{23}{\sqrt{38}}$  (B)  $\frac{21}{\sqrt{38}}$  (C)  $\frac{23}{\sqrt{57}}$  (D)  $\frac{21}{\sqrt{57}}$

**Q52** Binomial Theorem

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

If  $\sum_{r=0}^{10} \left( \frac{10^{r+1} - 1}{10^r} \right) \cdot {}^{11}C_{r+1} = \frac{\alpha 11 - 11^{11}}{10^{10}}$ , then  $\alpha$  is equal to :

- (A) 11 (B) 20 (C) 24 (D) 15

**Q53** Definite Integration

[Step-by-step solution](#) › [prepwisar.in/questions/tTcH4K\\_ER-](https://www.prepwisar.in/questions/tTcH4K_ER-)

Let  $f : [1, \infty) \rightarrow [2, \infty)$  be a differentiable function. If  $10 \int_1^x f(t) dt = 5xf(x) - x^5 - 9$  for all  $x \geq 1$ , then the value of  $f(3)$  is:

- (A) 22 (B) 26 (C) 32 (D) 18

**Q54** Definite Integration

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

Let  $(a, b)$  be the point of intersection of the curve  $x^2 = 2y$  and the straight line  $y - 2x - 6 = 0$  in the second quadrant. Then the integral  $I = \int_a^b \frac{9x^2}{1+5^x} dx$  is equal to:

- (A) 27 (B) 18 (C) 24 (D) 21

**Q55** Definite Integration

[Step-by-step solution](#) › [prepwisar.in/questions/cioAmGE8qd](https://www.prepwisar.in/questions/cioAmGE8qd)

$4 \int_0^1 \left( \frac{1}{\sqrt{3+x^2} + \sqrt{1+x^2}} \right) dx - 3 \log_e(\sqrt{3})$  is equal to:

- (A)  $2 - \sqrt{2} - \log_e(1 + \sqrt{2})$  (B)  $2 + \sqrt{2} + \log_e(1 + \sqrt{2})$   
(C)  $2 + \sqrt{2} - \log_e(1 + \sqrt{2})$  (D)  $2 - \sqrt{2} + \log_e(1 + \sqrt{2})$

**Q56** Ellipse

[Step-by-step solution](#) › [prepwisar.in/questions/4Nc-eEG7GV](https://www.prepwisar.in/questions/4Nc-eEG7GV)

If the length of the minor axis of an ellipse is equal to one fourth of the distance between the foci, then the eccentricity of the ellipse is:

- (A)  $\frac{3}{\sqrt{19}}$  (B)  $\frac{\sqrt{3}}{16}$  (C)  $\frac{4}{\sqrt{17}}$  (D)  $\frac{\sqrt{5}}{7}$

**Q57** Functions (Advanced)

[Step-by-step solution](#) › [prepwisar.in/questions/mwCobcX\\_Cp](https://www.prepwisar.in/questions/mwCobcX_Cp)

If the domain of the function  $f(x) = \frac{1}{\sqrt{10+3x-x^2}} + \frac{1}{\sqrt{x+|x|}}$  is  $(a, b)$ , then  $(1+a)^2 + b^2$  is equal to:

- (A) 29 (B) 30 (C) 25 (D) 26

If  $\lim_{x \rightarrow 0} \frac{\cos(2x) + a \cos(4x) - b}{x^4}$  is finite, then  $(a + b)$  is equal to :

- (A) 0 (B)  $\frac{3}{4}$  (C) -1 (D)  $\frac{1}{2}$

If the system of equations

$$2x + \lambda y + 3z = 5$$

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

$$4x + 5y + \mu z = 9$$

has infinitely many solutions, then  $(\lambda^2 + \mu^2)$  is equal to:

- (A) 30 (B) 26 (C) 22 (D) 18

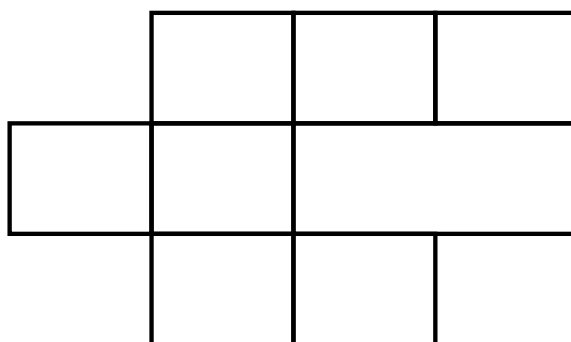
Let  $A$  be a  $3 \times 3$  real matrix such that  $A^2(A - 2I) - 4(A - I) = O$ , where  $I$  and  $O$  are the identity and null matrices, respectively. If  $A^5 = \alpha A^2 + \beta A + \gamma I$ , where  $\alpha, \beta$ , and  $\gamma$  are real constants, then  $\alpha + \beta + \gamma$  is equal to:

- (A) 76 (B) 12 (C) 4 (D) 20

Let the point  $P$  of the focal chord  $PQ$  of the parabola  $y^2 = 16x$  be  $(1, -4)$ . If the focus of the parabola divides the chord  $PQ$  in the ratio  $m : n$ ,  $\gcd(m, n) = 1$ , then  $m^2 + n^2$  is equal to:

- (A) 17 (B) 37 (C) 10 (D) 26

The number of ways, in which the letters A, B, C, D, E can be placed in the 8 boxes of the figure below so that no row remains empty and at most one letter can be placed in a box, is:



- (A) 5880 (B) 840 (C) 960 (D) 5760

Attempt this paper online with instant answer checking › [prepwiser.in/pyqs/paper/2025-04-02-evening](https://www.prepwiser.in/pyqs/paper/2025-04-02-evening)

Given three identical bags each containing 10 balls, whose colours are as follows :

|         | Red | Blue | Green |
|---------|-----|------|-------|
| Bag I   | 3   | 2    | 5     |
| Bag II  | 4   | 3    | 3     |
| Bag III | 5   | 1    | 4     |

A person chooses a bag at random and takes out a ball. If the ball is Red, the probability that it is from bag I is  $p$  and if the ball is Green, the probability that it is from bag III is  $q$ , then the value of  $\left(\frac{1}{p} + \frac{1}{q}\right)$  is:

- (A) 6 (B) 9 (C) 7 (D) 8

The number of terms of an A.P. is even; the sum of all the odd terms is 24, the sum of all the even terms is 30 and the last term exceeds the first by  $\frac{21}{2}$ . Then the number of terms which are integers in the A.P. is:

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

Let  $A = \{1, 2, 3, \dots, 100\}$  and  $R$  be a relation on  $A$  such that  $R = \{(a, b) : a = 2b + 1\}$ . Let  $(a_1, a_2), (a_2, a_3), (a_3, a_4), \dots, (a_k, a_{k+1})$  be a sequence of  $k$  elements of  $R$  such that the second entry of an ordered pair is equal to the first entry of the next ordered pair. Then the largest integer  $k$ , for which such a sequence exists, is equal to:

- (A) 6 (B) 8 (C) 7 (D) 5

If the mean and the variance of 6, 4,  $a$ , 8,  $b$ , 12, 10, 13 are 9 and 9.25 respectively, then  $a + b + ab$  is equal to:

- (A) 103 (B) 106 (C) 100 (D) 105

If  $\theta \in \left[-\frac{7\pi}{6}, \frac{4\pi}{3}\right]$ , then the number of solutions of  $\sqrt{3} \operatorname{cosec}^2 \theta - 2(\sqrt{3} - 1) \operatorname{cosec} \theta - 4 = 0$ , is equal to:

- (A) 7 (B) 10 (C) 6 (D) 8

Let  $\vec{a} = 2\hat{i} - 3\hat{j} + \hat{k}$ ,  $\vec{b} = 3\hat{i} + 2\hat{j} + 5\hat{k}$  and a vector  $\vec{c}$  be such that  $(\vec{a} - \vec{c}) \times \vec{b} = -18\hat{i} - 3\hat{j} + 12\hat{k}$  and  $\vec{a} \cdot \vec{c} = 3$ . If  $\vec{b} \times \vec{c} = \vec{d}$ , then  $|\vec{a} \cdot \vec{d}|$  is equal to:

- (A) 15 (B) 18 (C) 12 (D) 9

Let the area of the triangle formed by a straight line  $L : x + by + c = 0$  with co-ordinate axes be 48 square units. If the perpendicular drawn from the origin to the line  $L$  makes an angle of  $45^\circ$  with the positive  $x$ -axis, then the value of  $b^2 + c^2$  is:

- (A) 90 (B) 83 (C) 93 (D) 97

**Q70** Applications of Derivatives **NUMERICAL** [Step-by-step solution](#) › [prepwiser.in/questions/lf7oKcg\\_sj](https://prepwiser.in/questions/lf7oKcg_sj)

Let  $A(4, -2)$ ,  $B(1, 1)$  and  $C(9, -3)$  be the vertices of a triangle  $ABC$ . Then the maximum area of the parallelogram  $AFDE$ , formed with vertices  $D$ ,  $E$  and  $F$  on the sides  $BC$ ,  $CA$  and  $AB$  of the triangle  $ABC$  respectively, is \_\_\_\_\_

**Q71** Differential Equations **NUMERICAL** [Step-by-step solution](#) › [prepwiser.in/questions/g\\_XHicky70](https://prepwiser.in/questions/g_XHicky70)

Let  $y = y(x)$  be the solution of the differential equation  $\frac{dy}{dx} + 2y \sec^2 x = 2 \sec^2 x + 3 \tan x \cdot \sec^2 x$  such that  $y(0) = \frac{5}{4}$ . Then  $12 \left( y\left(\frac{\pi}{4}\right) - e^{-2} \right)$  is equal to \_\_\_\_\_

**Q72** Inverse Trigonometric Functions **NUMERICAL** [Step-by-step solution](#) › [prepwiser.in/questions/a3FRCs5F3x](https://prepwiser.in/questions/a3FRCs5F3x)

If  $y = \cos\left(\frac{\pi}{3} + \cos^{-1} \frac{x}{2}\right)$ , then  $(x - y)^2 + 3y^2$  is equal to \_\_\_\_\_

**Q73** Quadratic Equations & Polynomial Inequalities **NUMERICAL** [Step-by-step solution](#) › [prepwiser.in/questions/fhidWV0bY7](https://prepwiser.in/questions/fhidWV0bY7)

If the set of all  $a \in \mathbf{R} - \{1\}$ , for which the roots of the equation  $(1 - a)x^2 + 2(a - 3)x + 9 = 0$  are positive is  $(-\infty, -\alpha] \cup [\beta, \gamma)$ , then  $2\alpha + \beta + \gamma$  is equal to \_\_\_\_\_.

**Q74** Sequences & Series **NUMERICAL** [Step-by-step solution](#) › [prepwiser.in/questions/1OmYY1OM9c](https://prepwiser.in/questions/1OmYY1OM9c)

If the sum of the first 10 terms of the series  $\frac{4 \cdot 1}{1+4 \cdot 1^4} + \frac{4 \cdot 2}{1+4 \cdot 2^4} + \frac{4 \cdot 3}{1+4 \cdot 3^4} + \dots$  is  $\frac{m}{n}$ , where  $\gcd(m, n) = 1$ , then  $m + n$  is equal to \_\_\_\_\_

## Answer key: JEE Main 2025 · 2 Apr · Shift 2

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

Numbers match the question numbers above. For full working, open the solution link at the top right of each question.

Attempt this paper online with instant answer checking › [prepwiser.in/pyqs/paper/2025-04-02-evening](https://prepwiser.in/pyqs/paper/2025-04-02-evening)

### Physics

|               |              |               |              |              |              |              |              |              |              |
|---------------|--------------|---------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| 1. <b>C</b>   | 2. <b>D</b>  | 3. <b>C</b>   | 4. <b>B</b>  | 5. <b>C</b>  | 6. <b>C</b>  | 7. <b>D</b>  | 8. <b>A</b>  | 9. <b>B</b>  | 10. <b>B</b> |
| 11. <b>D</b>  | 12. <b>B</b> | 13. <b>A</b>  | 14. <b>A</b> | 15. <b>A</b> | 16. <b>C</b> | 17. <b>A</b> | 18. <b>A</b> | 19. <b>B</b> | 20. <b>D</b> |
| 21. <b>45</b> | 22. <b>3</b> | 23. <b>12</b> | 24. <b>1</b> | 25. <b>1</b> |              |              |              |              |              |

### Chemistry

|              |               |                |               |              |              |              |              |              |               |
|--------------|---------------|----------------|---------------|--------------|--------------|--------------|--------------|--------------|---------------|
| 26. <b>D</b> | 27. <b>B</b>  | 28. <b>D</b>   | 29. <b>D</b>  | 30. <b>A</b> | 31. <b>A</b> | 32. <b>B</b> | 33. <b>C</b> | 34. <b>A</b> | 35. <b>D</b>  |
| 36. <b>A</b> | 37. <b>A</b>  | 38. <b>A</b>   | 39. <b>A</b>  | 40. <b>D</b> | 41. <b>B</b> | 42. <b>B</b> | 43. <b>A</b> | 44. <b>A</b> | 45. <b>43</b> |
| 46. <b>0</b> | 47. <b>23</b> | 48. <b>184</b> | 49. <b>25</b> |              |              |              |              |              |               |

### Mathematics

|              |               |              |              |                |              |              |              |              |              |
|--------------|---------------|--------------|--------------|----------------|--------------|--------------|--------------|--------------|--------------|
| 50. <b>A</b> | 51. <b>A</b>  | 52. <b>B</b> | 53. <b>C</b> | 54. <b>C</b>   | 55. <b>A</b> | 56. <b>C</b> | 57. <b>D</b> | 58. <b>D</b> | 59. <b>B</b> |
| 60. <b>B</b> | 61. <b>A</b>  | 62. <b>D</b> | 63. <b>C</b> | 64. <b>B</b>   | 65. <b>D</b> | 66. <b>A</b> | 67. <b>C</b> | 68. <b>A</b> | 69. <b>D</b> |
| 70. <b>3</b> | 71. <b>21</b> | 72. <b>3</b> | 73. <b>7</b> | 74. <b>441</b> |              |              |              |              |              |



# Attempt this paper online

Done with the paper version? Take the same paper online: check each answer instantly and read step-by-step solutions where available. It is free, and you can start without signing up.



- 1 Scan the code to open this paper online, or go to [prepwisser.in/pyqs/paper/2025-04-02-evening](https://prepwisser.in/pyqs/paper/2025-04-02-evening).
- 2 Mark the questions you got wrong. Each one names its chapter at the top left.
- 3 Practise those chapters next with the free chapter-wise PYQ PDFs at [prepwisser.in/pyq-pdfs](https://prepwisser.in/pyq-pdfs).

## Also free on PrepWiser

### All JEE Main 2025 papers

Every shift of 2025 as a PDF, and the year's questions chapter-wise: [prepwisser.in/pyq-pdfs/jee-main/2025/](https://prepwisser.in/pyq-pdfs/jee-main/2025/)

### Chapter-wise PYQ PDFs

Every chapter with answer keys, 2020 to 2026: [prepwisser.in/pyq-pdfs/](https://prepwisser.in/pyq-pdfs/)

### Daily Arena

10 questions from one chapter, every day: [prepwisser.in/arena](https://prepwisser.in/arena)

Spotted a mistake in this PDF? Tell us at [prepwisser.in/feedback](https://prepwisser.in/feedback).