

JEE MAIN 2026 · QUESTION PAPER

2 Apr 2026 **Shift 1**

75 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	20 Q26 to Q45	5 Q46 to Q50
● Mathematics	20 Q51 to Q70	5 Q71 to Q75
In this PDF	75 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 Circular Motion

[Step-by-step solution](https://www.prepwiser.in/questions/NWnJOJxTxM) › prepwiser.in/questions/NWnJOJxTxM

A particle is rotating in a circular path and at any instant its motion can be described as

$$\theta = \frac{5t^4}{40} - \frac{t^3}{3}.$$

The angular acceleration of the particle after 10 seconds is _____ rad/s².

- (A) 150 (B) 120 (C) 130 (D) 170

Q2 Electromagnetic Waves

[Step-by-step solution](https://www.prepwiser.in/questions/hU7gijt8s) › prepwiser.in/questions/hU7gijt8s

An electromagnetic wave travelling in **x-direction** is described by field equation

$$E_y = 300 \sin \omega \left(t - \frac{x}{c} \right).$$

If the electron is restricted to move in **y-direction** only with speed of 1.5×10^6 m/s then ratio of maximum electric and magnetic forces acting on the electron is _____.

- (A) 200 (B) 150 (C) 400 (D) 300

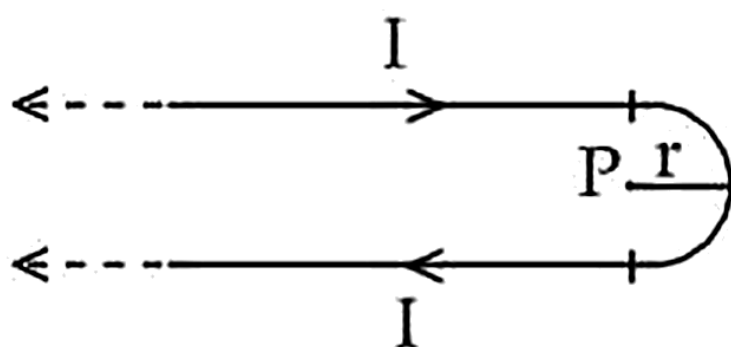
Q3 Gravitation

[Step-by-step solution](https://www.prepwiser.in/questions/aoguEPYiu) › prepwiser.in/questions/aoguEPYiu

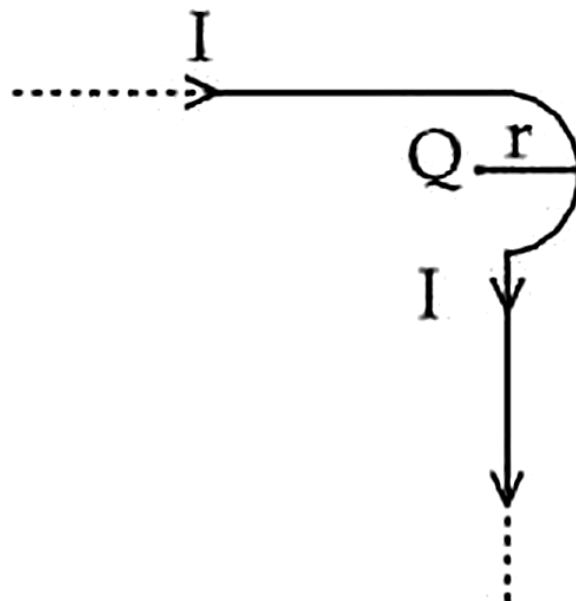
A planet (P_1) is moving around the star of mass $2M$ in the orbit of radius R . Another planet (P_2) is moving around another star of mass $4M$ in a orbit of radius $2R$. Ratio of time periods of revolution of P_2 and P_1 is _____.

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

Two identical long current carrying wires are bent into the shapes shown in the following figures. If the magnitude of magnetic fields at the centres P and Q of a semicircular arc are B_1 and B_2 respectively, then the ratio $\frac{B_1}{B_2}$ is ____.



(I)



(II)

(A) $\frac{2 + \pi}{1 + \pi}$

(B) $\frac{1 + \pi}{1 - \pi}$

(C) $\frac{2 + \pi}{1 - \pi}$

(D) $\frac{1 + \pi}{2 - \pi}$

The position of an object having mass 0.1 kg as a function of time t is given as

$\vec{r} = (10t^2\hat{i} + 5t^3\hat{j})$ m. At $t = 1$ s, which of the following statements are **correct**?

- A. The linear momentum $\vec{p} = (2\hat{i} + 1.5\hat{j})$ kg·m/s.
 B. The force acting on the object $\vec{F} = (2\hat{i} + 3\hat{j})$ N.
 C. The angular momentum of the object about its origin $\vec{L} = 15\hat{k}$ J·s.
 D. The torque acting on the object about its origin $\vec{\tau} = 20\hat{k}$ N·m.

Choose the **correct** answer from the options given below:

(A) A, B and C only

(B) B, C and D only

(C) A, C and D only

(D) A, B and D only

Angular momentum of an electron in a hydrogen atom is $\frac{3h}{\pi}$, then the energy of the electron is ____ eV.

(A) -1.51

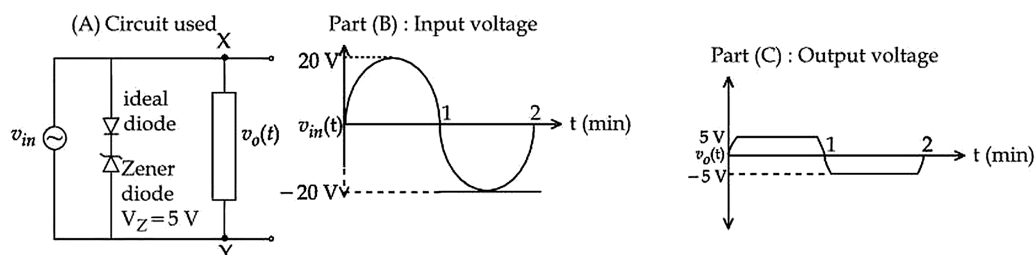
(B) -0.85

(C) -0.38

(D) -0.28

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For the given circuit (shown in part (A)) the time dependent input voltage $v_{in}(t)$ and corresponding output $v_o(t)$ are shown in part (B) and part (C), respectively. Identify the components that are used in the circuit between points X and Y.



(A) $X \rightarrow \text{resistor} \rightarrow \text{ideal diode} \rightarrow Y$

(B) $X \rightarrow \text{ideal diode} \rightarrow \text{Zener diode} \rightarrow Y$

(C) $X \rightarrow \text{resistor} \rightarrow \text{Zener diode} \rightarrow Y$

(D) $X \rightarrow \text{ideal diode} \rightarrow \text{ideal diode} \rightarrow Y$

Heat is supplied to a diatomic gas at constant pressure. Then the ratio of $\Delta Q : \Delta U : \Delta W$ is ____.

(A) 2 : 3 : 5

(B) 5 : 3 : 2

(C) 2 : 5 : 7

(D) 7 : 5 : 2

The equation of a plane progressive wave is given by $y = 5 \cos \pi \left(200t - \frac{x}{150} \right)$ where x and y are in cm and t is in second. The velocity of the wave is _____ m/s.

(A) 120

(B) 150

(C) 200

(D) 300

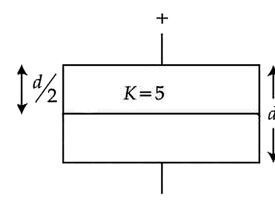
A parallel plate air capacitor has a capacitance C . When it is half filled as shown in figure with a dielectric constant $K = 5$, the percentage increase in the capacitance is ____.

(A) 33.34

(B) 66.67

(C) 200

(D) 400



For a certain metal, when monochromatic light of wavelength λ is incident, the stopping potential for photoelectrons is $3V_0$. When the same metal is illuminated by light of wavelength 2λ , then the stopping potential becomes V_0 . The threshold wavelength for photoelectric emission for the given metal is $\alpha\lambda$. The value of α is ____.

(A) 1

(B) 4

(C) 2

(D) 3

Two charged conducting spheres S_1 and S_2 of radii 8 cm and 18 cm are connected to each other by a wire. After equilibrium is established, the ratio of electric fields on S_1 and S_2 spheres are E_{S_1} and E_{S_2} respectively. The value of $\frac{E_{S_1}}{E_{S_2}}$ is ____.

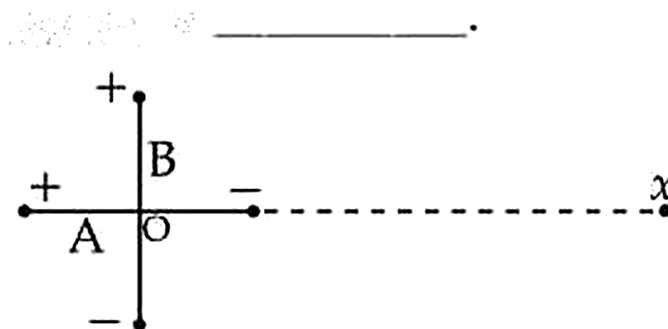
(A) $\frac{3}{2}$

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

(C) $\frac{4}{9}$

(D) $\frac{9}{4}$

Two short electric dipoles **A** and **B** having dipole moment p_1 and p_2 respectively are placed with their axis mutually perpendicular as shown in the figure. The resultant electric field at a point x is making an angle of 60° with the line joining points O and x . The ratio of the dipole moments p_2/p_1 is _____.



(A) $\frac{\sqrt{3}}{2}$

(B) $2\sqrt{3}$

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

(D) $\sqrt{3}$

The dimensional formula of $\frac{1}{2}\epsilon_0 E^2$ (ϵ_0 = permittivity of vacuum and E = electric field) is $M^a L^b T^c$.

The value of $2a - b + c =$ _____.

(A) 0

(B) 1

(C) -1

(D) 2

The diameter of a wire measured by a screw gauge of least count 0.001 cm is 0.08 cm. The length measured by a scale of least count 0.1 cm is 150 cm. When a weight of 100 N is applied to the wire, the extension in length is 0.5 cm, measured by a micrometer of least count 0.001 cm. The error in the measured Young's modulus is $\alpha \times 10^9 \text{ N/m}^2$. The value of α is _____.

(Ignore the contribution of the load to Young's modulus error calculation)

(A) 1.3

(B) 1.65

(C) 0.13

(D) 0.25

When a coil is placed in a time dependent magnetic field the power dissipated in it is P . The number of turns, area of the coil and radius of the coil wire are N , A and r respectively. For a second coil number of turns, area of the coil and radius of the coil wire are $2N$, $2A$ and $3r$ respectively. When the first coil is replaced with second coil the power dissipated in it is $\sqrt{2} \alpha P$. The value of α is _____.

(A) 36

(B) $128\sqrt{2}$

(C) 16

(D) 64

For a thin symmetric prism made of glass (refractive index 1.5), the ratio of incident angle and minimum deviation will be _____.

(A) 3 : 4

(B) 3 : 2

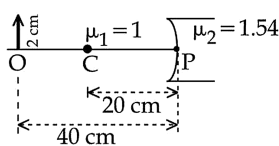
(C) 2 : 1

(D) 1 : 2

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Q18 Ray Optics[Step-by-step solution](#) > [prepwisar.in/questions/f9tppwRxMo](https://www.prepwisar.in/questions/f9tppwRxMo)

Refer the figure given below. μ_1 and μ_2 are refractive indices of air and lens material. The height of image will be _____ cm.



- (A) 1 (B) 0.5 (C) 1.2 (D) 0.25

Q19 Surface Tension[Step-by-step solution](#) > [prepwisar.in/questions/OX-Zebr4F3](https://www.prepwisar.in/questions/OX-Zebr4F3)

A liquid drop of diameter 2 mm breaks into 512 droplets. The change in surface energy is $\alpha \times 10^{-6}$ J. The value of α is _____. (Take surface tension of liquid = 0.08 N/m)

- (A) 10 (B) 7 (C) 8 (D) 11

Q20 Vectors[Step-by-step solution](#) > [prepwisar.in/questions/Zvx_7aRmcj](https://www.prepwisar.in/questions/Zvx_7aRmcj)

The velocity of a particle is given as $\vec{v} = -x\hat{i} + 2y\hat{j} - z\hat{k}$ m/s. The magnitude of acceleration at point (1, 2, 4) is _____ m/s².

- (A) $\sqrt{6}$ (B) 9 (C) $\sqrt{33}$ (D) 0

Physics Section B · Numerical value

Q21 to Q25

Q21 Moving Charges & Magnetism**NUMERICAL**[Step-by-step solution](#) > [prepwisar.in/questions/Mow2pywo12](https://www.prepwisar.in/questions/Mow2pywo12)

1 μC charge moving with velocity $\vec{v} = (\hat{i} - 2\hat{j} + 3\hat{k})$ m/s in the region of magnetic field $\vec{B} = (2\hat{i} + 3\hat{j} - 5\hat{k})$ T. The magnitude of force acting on it is $\sqrt{\alpha} \times 10^{-6}$ N. The value of α is _____.

Q22 Wave Optics**NUMERICAL**[Step-by-step solution](#) > [prepwisar.in/questions/gOTjvfv9N](https://www.prepwisar.in/questions/gOTjvfv9N)

In single slit diffraction pattern, the wavelength of light used is 628 nm and slit width is 0.2 mm, the angular width of central maximum is $\alpha \times 10^{-2}$ degrees. The value of α is _____.

Q23 Thermodynamics**NUMERICAL**[Step-by-step solution](#) > [prepwisar.in/questions/DKdSbAgTyS](https://www.prepwisar.in/questions/DKdSbAgTyS)

A vessel contains 0.15 m³ of a gas at pressure 8 bar and temperature 140 °C with $c_p = 3R$ and $c_v = 2R$. It is expanded adiabatically till pressure falls to 1 bar. The work done during this process is _____ kJ. (R is gas constant)

Q24 Elasticity**NUMERICAL**[Step-by-step solution](#) > [prepwisar.in/questions/QUvW1x1R0W](https://www.prepwisar.in/questions/QUvW1x1R0W)

A uniform wire of length l of weight w is suspended from the roof with a weight of W at the other end. The stress in the wire at $\frac{l}{3}$ distance from the top is $\left(\frac{W}{A} + \frac{2}{\gamma} \frac{w}{A}\right)$, where A is the cross sectional area of the wire. The value of γ is _____.

Q25 Fluid Mechanics**NUMERICAL**[Step-by-step solution](#) > [prepwisar.in/questions/jqhKEcrfCu](https://www.prepwisar.in/questions/jqhKEcrfCu)

A tub is filled with water and a wooden cube 10cm $\times$ 10cm $\times$ 10cm is placed in the water. The wooden cube is found to float on the water with a part of it submerged in water. When a metal coin is placed on the wooden cube, the submerged part is increased by 3.87 cm. The mass of the metal coin is _____ gram.
(Take water density as 1g/cm³ and density of wood as 0.4g/cm³)

Q26 Coordination Compounds[Step-by-step solution > prepwiser.in/questions/2vMdfaqVoj](https://www.prepwiser.in/questions/2vMdfaqVoj)

Match List - I with List - II.

	List - I Chromium (III) Complexes (en = ethylene diamine)	List - II Δ_o (cm ⁻¹)
A	[Cr(CN) ₆] ³⁻	I. 15,060
B	[CrF ₆] ³⁻	II. 17,400
C	[Cr(H ₂ O) ₆] ³⁺	III. 22,300
D	[Cr(en) ₃] ³⁺	IV. 26,600

Choose the **correct** answer from the options given below:

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

Q27 Ionic Equilibrium[Step-by-step solution > prepwiser.in/questions/zPyJMqJbPH](https://www.prepwiser.in/questions/zPyJMqJbPH)The solubility product constants of Ag₂CrO₄ and AgBr are 32x and 4y respectively at 298 K.The value of $\left(\frac{\text{molarity of Ag}_2\text{CrO}_4}{\text{molarity of AgBr}}\right)$ can be expressed as:

- (A) $\frac{2\sqrt[3]{x}}{y}$ (B) $2\sqrt{\frac{x}{y}}$ (C) $\sqrt{\frac{x}{y}}$ (D) $\frac{\sqrt[3]{x}}{\sqrt{y}}$

Q28 Qualitative Analysis: Salt Analysis[Step-by-step solution > prepwiser.in/questions/r_mWqRBn9B](https://www.prepwiser.in/questions/r_mWqRBn9B)

A salt with few drops of conc. HCl gives apple green colour in flame test. The group precipitate of the salt is dissolved in acetic acid and treated with K₂CrO₄ to give yellow precipitate. When the sodium carbonate extract of the salt solution is heated with conc. HNO₃ and ammonium molybdate, it resulted a canary yellow precipitate. The cation and anion present in the salt are respectively,

- (A) Ca²⁺ and SO₄²⁻ (B) Ba²⁺ and PO₄³⁻ (C) Mn²⁺ and PO₄³⁻ (D) Ba²⁺ and SO₄²⁻

Q29 Atomic Structure[Step-by-step solution > prepwiser.in/questions/_7jFVdb7ZY](https://www.prepwiser.in/questions/_7jFVdb7ZY)What is the energy (in J atom⁻¹) required for the following process?(Take the ionization energy for the H atom in the ground state as 2.18×10^{-18} J atom⁻¹)

- (A) 8.72×10^{-18} (B) 1.962×10^{-18} (C) 1.962×10^{-17} (D) 6.54×10^{-17}

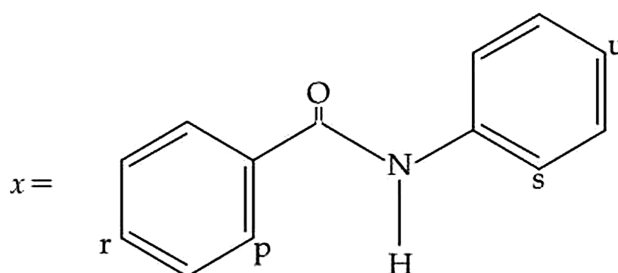
Q30 General Organic Chemistry (GOC)[Step-by-step solution > prepwiser.in/questions/YWShtl2Pjh](https://www.prepwiser.in/questions/YWShtl2Pjh)In IUPAC nomenclature, the **correct** order of decreasing priority of functional group is:

- (A) -CONH₂, >C=O, -CHO, -NH₂, -C≡C- (B) -CONH₂, -COOCH₃, -CHO, -NH₂, -OH
(C) -CONH₂, -CHO, >C=O, -NH₂, -C≡C- (D) -CONH₂, -CHO, -CN, -NH₂, -C≡C-

Q31 Hydrocarbons: Aromatic (Arenes)[Step-by-step solution > prepwiser.in/questions/Ge4tQh8amQ](https://www.prepwiser.in/questions/Ge4tQh8amQ)

For the given molecule, "x", the preferred site for the attack of the electrophile is:

- (A) Predominantly at "r" (B) "r" and "u"
(C) "p" and "s" (D) Predominantly at "u"



Q32 Chemical Kinetics[Step-by-step solution > prepwiser.in/questions/isR3xjZH6T](https://www.prepwiser.in/questions/isR3xjZH6T)

$t_{100\%}$ is the time required for the 100% completion of the reaction while $t_{1/2}$ is the time required for 50% of the reaction to be completed. Which of the following option correctly represents the relation between $t_{100\%}$ and $t_{1/2}$ for zero and first order reactions respectively?

- (A) $t_{100\%} = (t_{1/2})^2$ and $t_{100\%} = (t_{1/2})^{-\infty}$ (B) $t_{100\%} = 2t_{1/2}$ and $t_{100\%} = (t_{1/2})^{\infty}$
 (C) $t_{100\%} = 2t_{1/2}$ and $t_{100\%} = (2t_{1/2})^2$ (D) $t_{100\%} = (t_{1/2})^{\infty}$ and $t_{100\%} = 2t_{1/2}$

Q33 d & f Block Elements[Step-by-step solution > prepwiser.in/questions/m5BzgyHJZu](https://www.prepwiser.in/questions/m5BzgyHJZu)

Which of the following sets includes all the species that will change the orange colour of $K_2Cr_2O_7$ in acidic medium?

- (A) Fe^{2+} , Sn^{2+} , I^- , S^{2-} (B) S^{2-} , Fe^{3+} , I^- , $C_2O_4^{2-}$
 (C) Fe^{2+} , NO_2^- , SO_2 , Sn^{4+} (D) Fe^{3+} , SO_4^{2-} , S^{2-} , Sn^{4+}

Q34 Halogen Derivatives: Haloalkanes & Haloarenes[Step-by-step solution > prepwiser.in/questions/aKXU6rOk1r](https://www.prepwiser.in/questions/aKXU6rOk1r)

Given below are two statements:

Statement (I): Benzyl chloride reacts faster in S_N1 mechanism than ethyl chloride.

Statement (II): Ethyl carbocation intermediate is less stabilized by hyperconjugation than benzyl carbocation by resonance.

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

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

Q35 Purification & Characterisation of Organic Compounds[Step-by-step solution > prepwiser.in/questions/TyYc3HqaUl](https://www.prepwiser.in/questions/TyYc3HqaUl)

Given below are two statements:

Statement (I): 1,2,3-Trihydroxypropane can be separated from water by simple distillation.

Statement (II): An azeotropic mixture cannot be separated by fractional distillation.

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

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

Q36 Practical Organic Chemistry[Step-by-step solution > prepwiser.in/questions/xHkBZwpZkr](https://www.prepwiser.in/questions/xHkBZwpZkr)

Match **List - I** with **List - II**.

	List - I Mixture of Compounds		List - II Reagent used to distinguish
A	Diethyl amine + Ethyl amine	I	Bromine water
B	Acetaldehyde + Acetone	II	$CHCl_3 + KOH, \Delta$
C	Ethanol + Phenol	III	Neutral $FeCl_3$
D	Benzoic acid + Cinnamic acid	IV	Ammoniacal silver nitrate

Choose the **correct** answer from the options given below:

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

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Match List - I with List - II.

	List - I Vitamin		List - II Name
A	Vitamin B ₁	I	Pyridoxine
B	Vitamin B ₂	II	Ascorbic acid
C	Vitamin B ₆	III	Thiamine
D	Vitamin C	IV	Riboflavin

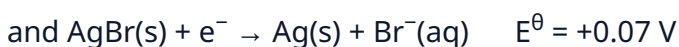
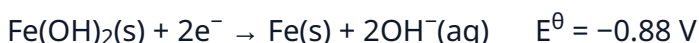
Choose the **correct** answer from the options given below:

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

Q38 Electrochemistry

[Step-by-step solution](https://www.prepwisar.in/questions/N0JQWvTAGo) > prepwisar.in/questions/N0JQWvTAGo

An electrochemical cell is constructed using half cells in the direction of spontaneous change:



Which of the following option is **correct**?

- (A) Overall reaction $\text{Fe}(\text{s}) + 2\text{OH}^-(\text{aq}) + 2\text{AgBr}(\text{s}) \rightleftharpoons \text{Fe}(\text{OH})_2(\text{s}) + 2\text{Ag}(\text{s}) + 2\text{Br}^-(\text{aq})$
 (B) $E_{\text{cell}}^\ominus = -0.95 \text{ V}$
 (C) Fe is reduced in the electrochemical cell
 (D) $E_{\text{cell}}^\ominus$ is an extensive property

Q39 Redox Reactions

[Step-by-step solution](https://www.prepwisar.in/questions/3TP3FdHeaR) > prepwisar.in/questions/3TP3FdHeaR

Given below are two statements:

Statement (I): Oxidising power of halogens decreases in the order $F_2 > Cl_2 > Br_2 > I_2$, which is the basis of "Layer test".

Statement (II): "Layer test" to identify Br_2 and I_2 in aqueous solution involves the oxidation of bromide or iodide into Br_2 or I_2 respectively with Cl_2 , which is a type of displacement redox reaction.

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

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

Q40 Solutions & Colligative Properties

[Step-by-step solution](https://www.prepwisar.in/questions/dDmMkb34IR) > prepwisar.in/questions/dDmMkb34IR

19.5 g of fluoro acetic acid (molar mass = 78 g mol⁻¹) is dissolved in 500 g of water at 298 K. The depression in the freezing point of water was 1°C. What is K_a of fluoro acetic acid?

(For water, $K_f = 1.86 \text{ K kg mol}^{-1}$). Assume molarity and molality to have same values.

- (A) 10^{-6} (B) 4×10^{-4} (C) 3×10^{-5} (D) 3×10^{-3}

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Consider the following data.



The enthalpy of formation of anhydrous solid Al_2Cl_6 is:

- (A) -648kJmol^{-1} (B) -1350kJmol^{-1} (C) -2002kJmol^{-1} (D) -1527kJmol^{-1}

Given below are two statements:

Statement (I): The correct sequence of bond lengths in the following species is:



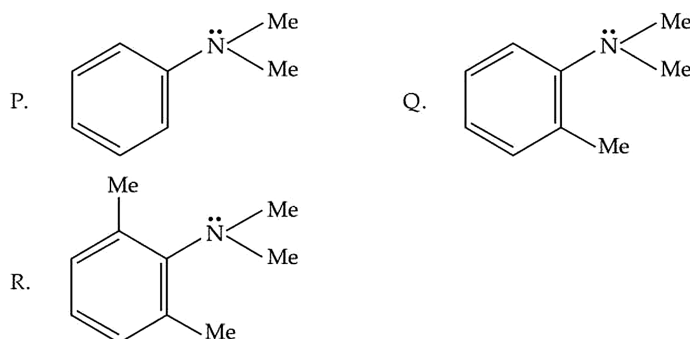
Statement (II): The correct sequence of number of unpaired electrons in the following species is:



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

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

Consider the three aromatic molecules (P, Q and R) whose structures have been given below:



The correct order regarding the reactivity of these compounds with $\text{Ph} - \text{N} \equiv \text{NCl}^{(-)}$ under optimum but slightly acidic medium is:

The **correct** order regarding the reactivity of these compounds with $\text{Ph} - \text{N} \equiv \text{NCl}^{(-)}$ under optimum but slightly acidic medium is:

- (A) $\text{P} > \text{Q} > \text{R}$ (B) $\text{R} > \text{P} > \text{Q}$ (C) $\text{R} > \text{Q} > \text{P}$ (D) $\text{P} > \text{R} > \text{Q}$

Given below are two statements:

Statement (I): The first ionisation enthalpy of the elements Na, Mg, Cl and Ar follows the order $\text{Na} > \text{Mg} > \text{Cl} > \text{Ar}$.

Statement (II): Among Ca, Al, Fe and B, the third ionisation enthalpy is very high for Ca.

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

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

The mass of iron converted into Fe_3O_4 by the action of 18 g of steam is:

(Given: Molar mass of H, O and Fe are 1, 16 and 56 g mol^{-1} respectively)

Assume iron is present in excess:

- (A) 2.1 g (B) 4.2 g (C) 21 g (D) 42 g

Chemistry Section B · Numerical value

Q46 to Q50

5.33 g of $\text{CrCl}_3 \cdot 6\text{H}_2\text{O}$, which is a 1 : 3 electrolyte, is dissolved in water and is passed through a cation exchanger. The chloride ions in the eluted solution, on treatment with AgNO_3 results in 8.61 g of AgCl . The ratio of moles of complex reacted and moles of AgCl formed is $\text{_____} \times 10^{-2}$. (Nearest integer)
[Molar mass in g mol^{-1} Cr : 52, Ag : 108, Cl : 35.5, H : 1, O : 16]

For reaction $\text{A} \rightarrow \text{P}$, rate constant $k = 1.5 \times 10^3 \text{ s}^{-1}$ at 27°C

If activation energy for the above reaction is 60 kJ mol^{-1} , then the temperature (in $^\circ\text{C}$) at which rate constant, $k = 4.5 \times 10^3 \text{ s}^{-1}$ is _____. (Nearest integer)

Given: $\log 2 = 0.30$, $\log 3 = 0.48$, $R = 8.3 \text{ J K}^{-1} \text{ mol}^{-1}$, $\ln 10 = 2.3$

Consider the isomers of hydrocarbon with molecular formula C_5H_{10} . These isomers do not decolourise KMnO_4 solution. These isomers are subjected to chlorination with chlorine in presence of light to give monochloro compounds. The total number of monochloro compounds (structural isomers only) formed is _____.

One mole of an alkane (x) requires 8 mole oxygen for complete combustion. Sum of number of carbon and hydrogen atoms in the alkane (x) is _____.

At the transition temperature T , $\text{A} \rightleftharpoons \text{B}$ and $\Delta G^0 = 105 - 35 \log T$ where A and B are two states of substance X. The transition temperature in $^\circ\text{C}$ when pressure is 1 atm is _____. (Nearest integer)

Q51 Applications of Derivatives

[Step-by-step solution](#) › [prepwisar.in/questions/o8kit2YWWTM](https://www.prepwisar.in/questions/o8kit2YWWTM)

The number of critical points of the function

$$f(x) = \begin{cases} \left| \frac{\sin x}{x} \right|, & x \neq 0 \\ 1, & x = 0 \end{cases} \text{ in the interval } (-2\pi, 2\pi) \text{ is equal to:}$$

- (A) 1 (B) 3 (C) 5 (D) 7

Q52 Complex Numbers

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

Let x and y be real numbers such that $50 \left(\frac{2x}{1+3i} - \frac{y}{1-2i} \right) = 31 + 17i, i = \sqrt{-1}$. Then the value of $10(x - 3y)$ is:

- (A) 20 (B) 31 (C) 35 (D) 75

Q53 Ellipse

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

Let an ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1, a < b$, pass through the point $(4, 3)$ and have eccentricity $\frac{\sqrt{5}}{3}$.

Then the length of its latus rectum is:

- (A) $\frac{4\sqrt{5}}{3}$ (B) $2\sqrt{5}$ (C) $\frac{7\sqrt{5}}{3}$ (D) $\frac{8\sqrt{5}}{3}$

Q54 Determinants

[Step-by-step solution](#) › [prepwisar.in/questions/2qRh0oX4yo](https://www.prepwisar.in/questions/2qRh0oX4yo)

Let $\alpha, \beta \in \mathbb{R}$ be such that the system of linear equations

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

$$2x + y + \alpha z = 5$$

$$8x + 4y + \beta z = 18$$

has no solution. Then $\frac{\beta}{\alpha}$ is equal to:

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

Q55 Matrices

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

Let $A = \begin{bmatrix} 1 & 2 \\ 1 & \alpha \end{bmatrix}$ and $B = \begin{bmatrix} 3 & 3 \\ \beta & 2 \end{bmatrix}$. If $A^2 - 4A + I = O$ and $B^2 - 5B - 6I = O$, then among the two statements:

$$(S1): [(B - A)(B + A)]^T = \begin{bmatrix} 13 & 15 \\ 7 & 10 \end{bmatrix}$$

and

$$(S2): \det(\text{adj}(A + B)) = -5$$

- (A) only (S1) is correct (B) only (S2) is correct
(C) both (S1) and (S2) are correct (D) both (S1) and (S2) are wrong

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If the mean of the data

Class	5-10	10-15	15-20	20-25	25-30	30-35
Frequency	2	k	28	54	k + 1	5

is 21, then k is one of the roots of the equation:

(A) $2x^2 - 23x - 10 = 0$

(B) $4x^2 - 35x + 24 = 0$

(C) $2x^2 - 19x - 10 = 0$

(D) $2x^2 - 35x + 98 = 0$

If $\vec{a}$ and $\vec{b}$ are two vectors such that $|\vec{a}| = 2$ and $|\vec{b}| = 3$, then the maximum value of $3|(3\vec{a} + 2\vec{b})| + 4|(3\vec{a} - 2\vec{b})|$ is:

(A) 30

(B) 36

(C) 60

(D) 72

Let $[.]$ denote the greatest integer function. Then the value of $\int_0^3 \left(\frac{e^x + e^{-x}}{[x]!} \right) dx$ is:

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

(B) $\frac{1}{2} \left(e^2 + e^3 - \frac{1}{e^2} - \frac{1}{e^3} \right)$

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

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

Let $\alpha, \alpha + 2, \alpha \in \mathbf{Z}$, be the roots of the quadratic equation $x(x + 2) + (x + 1)(x + 3) + (x + 2)(x + 4) + \dots + (x + n - 1)(x + n + 1) = 4n$ for some $n \in \mathbf{N}$. Then $n + \alpha$ is equal to:

(A) 0

(B) 1

(C) 2

(D) 3

Let the mid points of the sides of a triangle ABC be $\left(\frac{5}{2}, 7\right)$, $\left(\frac{5}{2}, 3\right)$ and $(4, 5)$. If its incentre is (h, k) , then $3h + k$ is equal to:

(A) 11

(B) 12

(C) 13

(D) 14

If the curve $y = f(x)$ passes through the point $(1, e)$ and satisfies the differential equation $dy = y(2 + \log_e x)dx$, $x > 0$, then $f(e)$ is equal to:

(A) e^e

(B) e^{e^2}

(C) e^{2e}

(D) e^{2e}

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

$(1 + \sin x) \frac{dy}{dx} + (y + 1) \cos x = 0$, $y(0) = 0$. If the curve $y = y(x)$ passes through the point $\left(\alpha, \frac{-1}{2}\right)$, then a value of α is:

(A) $\frac{\pi}{6}$

(B) $\frac{\pi}{4}$

(C) $\frac{\pi}{3}$

(D) $\frac{\pi}{2}$

Q63 Limits[Step-by-step solution](#) > [prepwiser.in/questions/YrWQ0ddJkP](https://www.prepwiser.in/questions/YrWQ0ddJkP)

If $\lim_{x \rightarrow 2} \frac{\sin(x^3 - 5x^2 + ax + b)}{(\sqrt{x-1} - 1) \log_e(x-1)} = m$, then $a + b + m$ is equal to:

- (A) 5 (B) 6 (C) 8 (D) 10

Q64 Permutations & Combinations[Step-by-step solution](#) > [prepwiser.in/questions/SjInFG9iNg](https://www.prepwiser.in/questions/SjInFG9iNg)

The number of seven-digit numbers, that can be formed by using the digits 1, 2, 3, 5 and 7 such that each digit is used at least once, is:

- (A) 15400 (B) 17800 (C) 16800 (D) 29400

Q65 Permutations & Combinations[Step-by-step solution](#) > [prepwiser.in/questions/wUw2Sn14gr](https://www.prepwiser.in/questions/wUw2Sn14gr)

The number of elements in the set $S = \left\{ (r, k) : k \in \mathbb{Z} \text{ and } {}^{36}C_{r+1} = \frac{{}^6C_r}{(k^2-3)} \right\}$ is:

- (A) 2 (B) 4 (C) 8 (D) 16

Q66 Sequences & Series[Step-by-step solution](#) > [prepwiser.in/questions/Bpd31A1k5l](https://www.prepwiser.in/questions/Bpd31A1k5l)

Let A be the set of first 101 terms of an A.P., whose first term is 1 and the common difference is 5 and let B be the set of first 71 terms of an A.P., whose first term is 9 and the common difference is 7. Then the number of elements in $A \cap B$, which are divisible by 3, is:

- (A) 4 (B) 5 (C) 6 (D) 7

Q67 Trigonometric Equations[Step-by-step solution](#) > [prepwiser.in/questions/658ubI1ZCV](https://www.prepwiser.in/questions/658ubI1ZCV)

Let $S = \{x \in [-\pi, \pi] : \sin x (\sin x + \cos x) = a, a \in \mathbb{Z}\}$. Then $n(S)$ is equal to:

- (A) 3 (B) 6 (C) 7 (D) 9

Q68 Three Dimensional Geometry[Step-by-step solution](#) > [prepwiser.in/questions/X08_QQw_yL](https://www.prepwiser.in/questions/X08_QQw_yL)

If the point of intersection of the lines $\frac{x+1}{3} = \frac{y+a}{5} = \frac{z+b+1}{7}$ and $\frac{x-2}{1} = \frac{y-b}{4} = \frac{z-2a}{7}$ lies on xy-plane, then the value of $a + b$ is:

- (A) 2 (B) 5 (C) 7 (D) 9

Q69 Three Dimensional Geometry[Step-by-step solution](#) > [prepwiser.in/questions/dynvzg-GDb](https://www.prepwiser.in/questions/dynvzg-GDb)

Let a line L passing through the point (1, 1, 1) be perpendicular to both the vectors $2\hat{i} + 2\hat{j} + \hat{k}$ and $\hat{i} + 2\hat{j} + 2\hat{k}$. If $P(a, b, c)$ is the foot of perpendicular from the origin on the line L, then the value of $34(a + b + c)$ is:

- (A) 50 (B) 80 (C) 100 (D) 120

Q70 Trigonometric Ratios & Identities[Step-by-step solution](#) > [prepwiser.in/questions/LFn3whjKjNj](https://www.prepwiser.in/questions/LFn3whjKjNj)

If $\sin\left(\frac{\pi}{18}\right) \sin\left(\frac{5\pi}{18}\right) \sin\left(\frac{7\pi}{18}\right) = K$, then the value of $\sin\left(\frac{10K\pi}{3}\right)$ is:

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

Q71 Definite Integration **NUMERICAL**

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

If $\alpha = \int_0^{2\sqrt{3}} \log_2(x^2 + 4) dx + \int_2^4 \sqrt{2x-4} dx$, then α^2 is equal to _____.

Q72 Functions (Advanced) **NUMERICAL**

[Step-by-step solution](#) › [prepwisar.in/questions/D4pkODJoEj](https://www.prepwisar.in/questions/D4pkODJoEj)

If the domain of the function

$f(x) = \sqrt{\log_{(0.6)}\left(\left|\frac{2x-5}{x^2-4}\right|\right)}$ is $(-\infty, a] \cup \{b\} \cup [c, d) \cup (e, \infty)$, then the value of $a + b + c + d + e$ is _____.

Q73 Sequences & Series **NUMERICAL**

[Step-by-step solution](#) › [prepwisar.in/questions/f5SkwV6sSX](https://www.prepwisar.in/questions/f5SkwV6sSX)

If $\sum_{k=1}^n a_k = 6n^3$, then $\sum_{k=1}^6 \left(\frac{a_{k+1}-a_k}{36}\right)^2$ is equal to _____.

Q74 Circles **NUMERICAL**

[Step-by-step solution](#) › [prepwisar.in/questions/cP967qxxNC](https://www.prepwisar.in/questions/cP967qxxNC)

Let a circle C have its centre in the first quadrant, intersect the coordinate axes at exactly three points and cut off equal intercepts from the coordinate axes. If the length of the chord of C on the line $x + y = 1$ is $\sqrt{14}$, then the square of the radius of C is _____.

Q75 Probability: Basic **NUMERICAL**

[Step-by-step solution](#) › [prepwisar.in/questions/h00r4uEjB4](https://www.prepwisar.in/questions/h00r4uEjB4)

Let $a, b, c \in \{1, 2, 3, 4\}$. If the probability, that $ax^2 + 2\sqrt{2}bx + c > 0$ for all $x \in \mathbb{R}$, is $\frac{m}{n}$, $\gcd(m, n) = 1$, then $m + n$ is equal to _____.

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Physics

1. C	2. A	3. B	4. A	5. D	6. C	7. B	8. D	9. D	10. B
11. B	12. D	13. B	14. B	15. B	16. A	17. B	18. A	19. B	20. B
21. 171	22. 36	23. 120	24. 3	25. 387					

Chemistry

26. D	27. D	28. B	29. C	30. C	31. D	32. B	33. A	34. A	35. D
36. D	37. C	38. A	39. A	40. D	41. D	42. C	43. A	44. D	45. D
46. 33	47. 41	48. 14	49. 17	50. 727					

Mathematics

51. C	52. D	53. D	54. B	55. B	56. C	57. C	58. B	59. C	60. C
61. C	62. D	63. B	64. C	65. B	66. B	67. D	68. C	69. C	70. A
71. 192	72. 4	73. 91	74. 8	75. 81					

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