

JEE MAIN 2025 · QUESTION PAPER

28 Jan 2025 **Shift 2**

71 questions in exam order, with answer key

Subject	Section A multiple choice	Section B numerical value
● Physics	19 Q1 to Q19	5 Q20 to Q24
● Chemistry	17 Q25 to Q41	5 Q42 to Q46
● Mathematics	20 Q47 to Q66	5 Q67 to Q71
In this PDF	71 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.

prepwis.in/pyqs/paper/2025-01-28-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? prepwis.in/feedback · Terms: prepwis.in/terms

Q1 Atomic Physics

[Step-by-step solution](#) › [prepwisar.in/questions/Mgk9buaYwP](https://www.prepwisar.in/questions/Mgk9buaYwP)

The frequency of revolution of the electron in Bohr's orbit varies with n , the principal quantum number as:

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

Q2 Electrostatics II: Potential & Capacitance

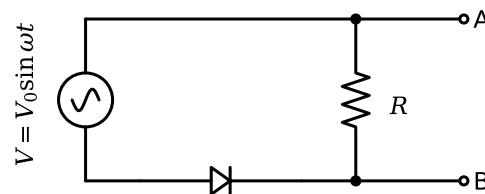
[Step-by-step solution](#) › [prepwisar.in/questions/3Vi9ARlxVU](https://www.prepwisar.in/questions/3Vi9ARlxVU)

A parallel plate capacitor of capacitance $1 \mu\text{F}$ is charged to a potential difference of 20 V . The distance between plates is $1 \mu\text{m}$. The energy density between plates of capacitor is:

- (A) $1.8 \times 10^3 \text{ J/m}^3$ (B) $2 \times 10^2 \text{ J/m}^3$ (C) $2 \times 10^{-4} \text{ J/m}^3$ (D) $1.8 \times 10^5 \text{ J/m}^3$

Q3 Semiconductors & Electronic Devices

[Step-by-step solution](#) › [prepwisar.in/questions/r5U89kXUku](https://www.prepwisar.in/questions/r5U89kXUku)



In the circuit shown here, assuming threshold voltage of diode is negligibly small, then voltage V_{AB} is correctly represented by:

- (A) (B)
- (C) V_{AB} would be zero at all times. (D)

Q4 Dual Nature of Radiation & Matter

[Step-by-step solution](#) › [prepwisar.in/questions/PyW9r8Lumd](https://www.prepwisar.in/questions/PyW9r8Lumd)

Which of the following phenomena cannot be explained by wave theory of light?

- (A) Refraction of light (B) Reflection of light (C) Diffraction of light (D) Compton effect

Q5 Electromagnetic Induction

[Step-by-step solution](#) › [prepwisar.in/questions/HWGBA7Nmmt](https://www.prepwisar.in/questions/HWGBA7Nmmt)

A uniform magnetic field of 0.4 T acts perpendicular to a circular copper disc 20 cm in radius. The disc is having a uniform angular velocity of $10 \pi \text{ rad s}^{-1}$ about an axis through its centre and perpendicular to the disc. What is the potential difference developed between the axis of the disc and the rim? ($\pi = 3.14$)

- (A) 0.5024 V (B) 0.0628 V (C) 0.2512 V (D) 0.1256 V

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Q6 Electromagnetic Waves[Step-by-step solution](https://www.prepwiser.in/questions/WOuHczuDRn)

The magnetic field of an E.M. wave is given by $\vec{B} = \left(\frac{\sqrt{3}}{2}\hat{i} + \frac{1}{2}\hat{j}\right) 30 \sin \left[\omega \left(t - \frac{z}{c}\right)\right]$ (S.I. Units).

The corresponding electric field in S.I. units is:

- (A) $\vec{E} = \left(\frac{1}{2}\hat{i} + \frac{\sqrt{3}}{2}\hat{j}\right) 30c \sin \left[\omega \left(t + \frac{z}{c}\right)\right]$ (B) $\vec{E} = \left(\frac{1}{2}\hat{i} - \frac{\sqrt{3}}{2}\hat{j}\right) 30c \sin \left[\omega \left(t - \frac{z}{c}\right)\right]$
(C) $\vec{E} = \left(\frac{\sqrt{3}}{2}\hat{i} - \frac{1}{2}\hat{j}\right) 30c \sin \left[\omega \left(t + \frac{z}{c}\right)\right]$ (D) $\vec{E} = \left(\frac{3}{4}\hat{i} + \frac{1}{4}\hat{j}\right) 30c \cos \left[\omega \left(t - \frac{z}{c}\right)\right]$

Q7 Ray Optics[Step-by-step solution](https://www.prepwiser.in/questions/h19a612_i-)

A concave mirror produces an image of an object such that the distance between the object and image is 20 cm. If the magnification of the image is -3 , then the magnitude of the radius of curvature of the mirror is:

- (A) 3.75 cm (B) 15 cm (C) 7.5 cm (D) 30 cm

Q8 Ray Optics[Step-by-step solution](https://www.prepwiser.in/questions/ZeTwwQ-I7G)

In a long glass tube, mixture of two liquids A and B with refractive indices 1.3 and 1.4 respectively, forms a convex refractive meniscus towards A. If an object placed at 13 cm from the vertex of the meniscus in A forms an image with a magnification of $-2'$ then the radius of curvature of meniscus is:

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

Q9 Gravitation[Step-by-step solution](https://www.prepwiser.in/questions/ryZ4M57_as)

Earth has mass 8 times and radius 2 times that of a planet. If the escape velocity from the earth is 11.2 km/s, the escape velocity in km/s from the planet will be:

- (A) 8.4 (B) 11.2 (C) 5.6 (D) 2.8

Q10 Kinetic Theory of Gases[Step-by-step solution](https://www.prepwiser.in/questions/p4GnXBt57c)

The ratio of vapour densities of two gases at the same temperature is $\frac{4}{25}$, then the ratio of r.m.s. velocities will be:

- (A) $\frac{5}{2}$ (B) $\frac{25}{4}$ (C) $\frac{4}{25}$ (D) $\frac{2}{5}$

Q11 Kinetic Theory of Gases[Step-by-step solution](https://www.prepwiser.in/questions/WGohuh83sg)

The kinetic energy of translation of the molecules in 50 g of CO_2 gas at 17°C is:

- (A) 4205.5 J (B) 3582.7 J (C) 3986.3 J (D) 4102.8 J

Q12 Newton's Laws of Motion[Step-by-step solution](https://www.prepwiser.in/questions/G7PFqb5m1x)

A balloon and its content having mass M is moving up with an acceleration ' a '. The mass that must be released from the content so that the balloon starts moving up with an acceleration ' $3a$ ' will be (Take ' g ' as acceleration due to gravity)

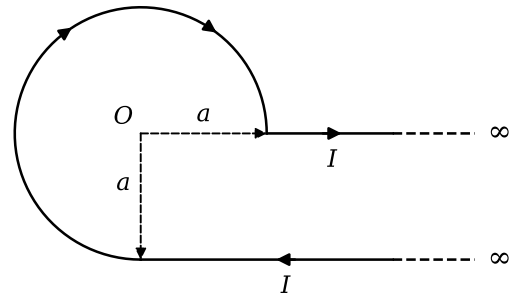
- (A) $\frac{3Ma}{2a + g}$ (B) $\frac{2Ma}{3a + g}$ (C) $\frac{3Ma}{2a - g}$ (D) $\frac{2Ma}{3a - g}$

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Q13 Moving Charges & Magnetism[Step-by-step solution > prepwisar.in/questions/L-VX5buKwB](https://www.prepwisar.in/questions/L-VX5buKwB)

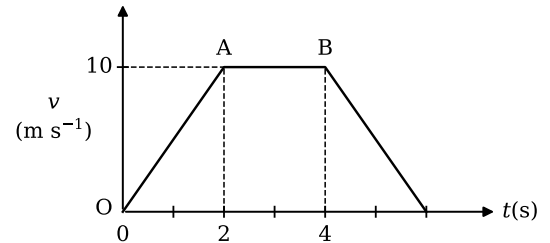
An infinite wire has a circular bend of radius a , and carrying a current I as shown in the figure. The magnitude of magnetic field at the origin O of the arc is given by:

- (A) $\frac{\mu_0}{2\pi} \frac{I}{a} \left[\frac{\pi}{2} + 2 \right]$ (B) $\frac{\mu_0}{4\pi} \frac{I}{a} \left[\frac{3\pi}{2} + 1 \right]$
 (C) $\frac{\mu_0}{4\pi} \frac{I}{a} \left[\frac{\pi}{2} + 1 \right]$ (D) $\frac{\mu_0}{4\pi} \frac{I}{a} \left[\frac{3\pi}{2} + 2 \right]$

**Q14** Rectilinear Motion[Step-by-step solution > prepwisar.in/questions/-CTHft5G7K](https://www.prepwisar.in/questions/-CTHft5G7K)

The velocity-time graph of an object moving along a straight line is shown in the figure. What is the distance covered by the object between $t = 0$ to $t = 4$ s?

- (A) 11 m (B) 30 m (C) 13 m (D) 10 m

**Q15** Fluid Mechanics[Step-by-step solution > prepwisar.in/questions/O7Urcf4DIA](https://www.prepwisar.in/questions/O7Urcf4DIA)

A 400 g solid cube having an edge of length 10 cm floats in water. How much volume of the cube is outside the water?

(Given: density of water = 1000 kg m^{-3})

- (A) 400 cm^3 (B) 600 cm^3 (C) 1400 cm^3 (D) 4000 cm^3

Q16 Rotational Motion[Step-by-step solution > prepwisar.in/questions/67OIZOXAk4](https://www.prepwisar.in/questions/67OIZOXAk4)

A uniform rod of mass 250 g having length 100 cm is balanced on a sharp edge at 40 cm mark. A mass of 400 g is suspended at 10 cm mark. To maintain the balance of the rod, the mass to be suspended at 90 cm mark, is

- (A) 290 g (B) 200 g (C) 190 g (D) 300 g

Q17 Simple Harmonic Motion[Step-by-step solution > prepwisar.in/questions/AIpNaSEW9Y](https://www.prepwisar.in/questions/AIpNaSEW9Y)

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

Assertion (A): Knowing initial position x_0 and initial momentum p_0 is enough to determine the position and momentum at any time t for a simple harmonic motion with a given angular frequency ω .

Reason (R): The amplitude and phase can be expressed in terms of X_0 and p_0 .

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

- (A) (A) is true but (R) is false
 (B) Both (A) and (R) are true but (R) is NOT the correct explanation of (A)
 (C) (A) is false but (R) is true
 (D) Both (A) and (R) are true and (R) is the correct explanation of (A)

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A body of mass 4 kg is placed on a plane at a point P having coordinate $(3, 4)\text{m}$. Under the action of force $\vec{F} = (2\hat{i} + 3\hat{j})\text{N}$, it moves to a new point Q having coordinates $(6, 10)\text{m}$ in 4 sec. The average power and instantaneous power at the end of 4 sec are in the ratio of:

- (A) 4 : 3 (B) 13 : 6 (C) 1 : 2 (D) 6 : 13

Match List - I with List - II.

List - I	List - II
(A) Angular Impulse	(I) $M^0 L^2 T^{-2}$
(B) Latent Heat	(II) $M L^2 T^{-3} A^{-1}$
(C) Electrical resistivity	(III) $M L^2 T^{-1}$
(D) Electromotive force	(IV) $M L^3 T^{-3} A^{-2}$

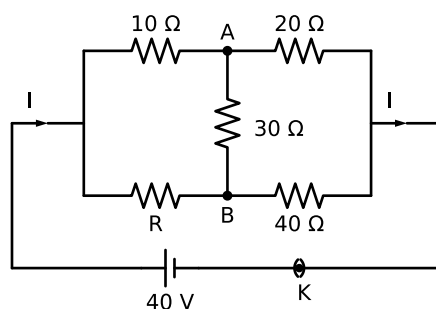
Choose the correct answer from the options given below:

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

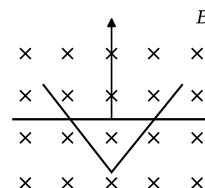
Physics Section B · Numerical value

Q20 to Q24

The value of current I in the electrical circuit as given below, when potential at A is equal to the potential at B, will be _____ A.



A conducting bar moves on two conducting rails as shown in the figure. A constant magnetic field B exists into the page. The bar starts to move from the vertex at time $t = 0$ with a constant velocity. If the induced EMF is $E \propto t^n$, then value of n is _____.



An electric dipole of dipole moment $6 \times 10^{-6}\text{Cm}$ is placed in uniform electric field of magnitude 10^6V/m . Initially, the dipole moment is parallel to electric field. The work that needs to be done on the dipole to make its dipole moment opposite to the field, will be _____ J.

The volume contraction of a solid copper cube of edge length 10 cm, when subjected to a hydraulic pressure of $7 \times 10^6\text{Pa}$, would be _____ mm^3 .

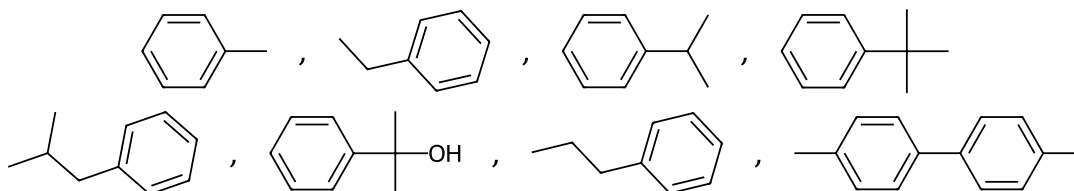
(Given bulk modulus of copper = $1.4 \times 10^{11}\text{Nm}^{-2}$)

A thin transparent film with refractive index 1.4, is held on circular ring of radius 1.8 cm. The fluid in the film evaporates such that transmission through the film at wavelength 560 nm goes to a minimum every 12 seconds. Assuming that the film is flat on its two sides, the rate of evaporation is _____
 $\pi \times 10^{-13} \text{ m}^3/\text{s}$.

Chemistry Section A · Multiple choice

Q25 to Q41

The total number of compounds from below when treated with hot KMnO_4 , giving benzoic acid is:



(A) 4

(B) 3

(C) 5

(D) 6

Match List-I with List-II.

List - I (Saccharides)	List - II (Glycosidic-linkages found)
(A) Sucrose	(I) α 1 – 4
(B) Maltose	(II) α 1 – 4 and α 1 – 6
(C) Lactose	(III) α 1 – β 2
(D) Amylopectin	(IV) β 1 – 4

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

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

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

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

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

Identify correct conversion during acidic hydrolysis from the following:

(A) starch gives galactose.

(B) cane sugar gives equal amount of glucose and fructose.

(C) milk sugar gives glucose and galactose.

(D) amylopectin gives glucose and fructose.

(E) amylose gives only glucose.

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

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

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

(C) (B), (C) and (E) only

(D) (C), (D) and (E) only

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Consider an elementary reaction

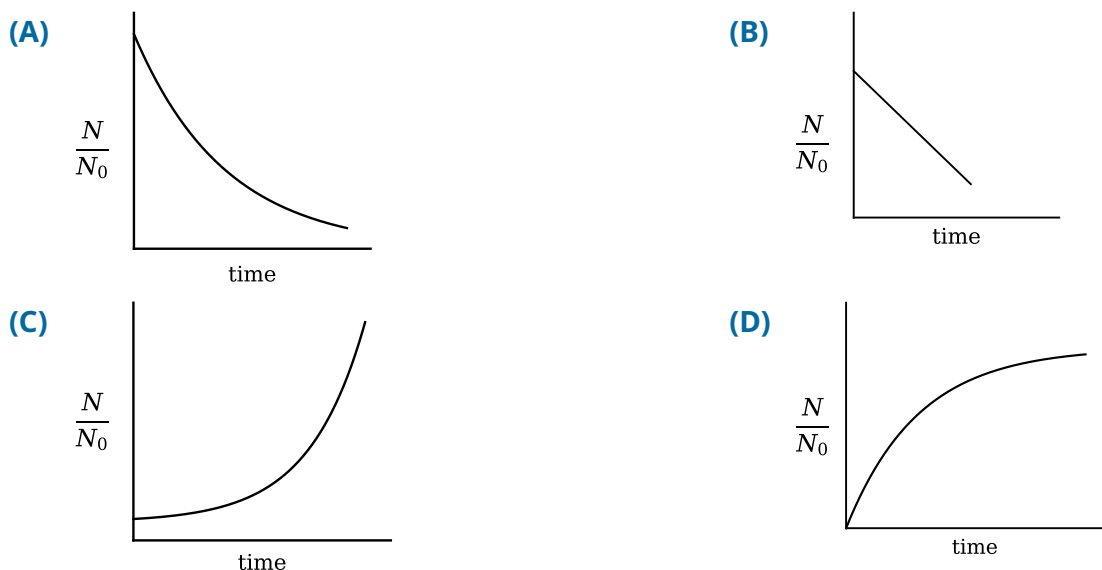


If the volume of reaction mixture is suddenly reduced to $\frac{1}{3}$ of its initial volume, the reaction rate will become ' x ' times of the original reaction rate. The value of x is:

- (A) 3 (B) 9 (C) $\frac{1}{3}$ (D) $\frac{1}{9}$

For bacterial growth in a cell culture, growth law is very similar to the law of radioactive decay. Which of the following graphs is most suitable to represent bacterial colony growth?

Where N - Number of Bacteria at any time, N_0 - Initial number of Bacteria.



Match List - I with List - II.

List - I (Complex)	List - II (Hybridisation of central metal ion)
(A) $[\text{CoF}_6]^{3-}$	(I) d^2sp^3
(B) $[\text{NiCl}_4]^{2-}$	(II) sp^3
(C) $[\text{Co}(\text{NH}_3)_6]^{3+}$	(III) sp^3d^2
(D) $[\text{Ni}(\text{CN})_4]^{2-}$	(IV) dsp^2

Choose the correct answer from the options given below:

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

The amphoteric oxide among V_2O_3 , V_2O_4 and V_2O_5 , upon reaction with alkali leads to formation of an oxide anion. The oxidation state of V in the oxide anion is:

- (A) +4 (B) +5 (C) +3 (D) +7

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Q32 Hydrocarbons: Alkenes & Alkynes[Step-by-step solution](https://www.prepwisar.in/questions/kv5uVOdv0E)

Identify product [A], [B] and [C] in the following reaction sequence.



(A) [A]: $\text{CH}_3\text{—CH=CH}_2$, [B]: CH_3CHO , [C]: $\text{CH}_3\text{CH}_2\text{OH}$

(B) [A]: $\text{CH}_3\text{—CH=CH}_2$, [B]: CH_3CHO , [C]: HCHO

(C) [A]: $\text{CH}_3\text{CH}_2\text{CH}_3$, [B]: CH_3CHO , [C]: HCHO

(D) [A] : $\text{CH}_2 = \text{CH}_2$, [B] : $\text{H}_3\text{C} - \overset{\text{O}}{\parallel} \text{C} - \text{CH}_3$, [C] : HCHO

Q33 Ionic Equilibrium[Step-by-step solution](https://www.prepwisar.in/questions/gcSC_V0R0m)

Arrange the following in increasing order of solubility product:

Ca(OH)_2 , AgBr , PbS , HgS

(A) $\text{PbS} < \text{HgS} < \text{Ca(OH)}_2 < \text{AgBr}$

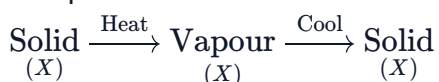
(B) $\text{HgS} < \text{AgBr} < \text{PbS} < \text{Ca(OH)}_2$

(C) $\text{HgS} < \text{PbS} < \text{AgBr} < \text{Ca(OH)}_2$

(D) $\text{Ca(OH)}_2 < \text{AgBr} < \text{HgS} < \text{PbS}$

Q34 Purification & Characterisation of Organic Compounds[Step-by-step solution](https://www.prepwisar.in/questions/LztgKjVo4J)

The purification method based on the following physical transformation is:



(A) Extraction

(B) Crystallization

(C) Distillation

(D) Sublimation

Q35 Periodic Table & Periodicity[Step-by-step solution](https://www.prepwisar.in/questions/oViuMjGNnc)

Given below are two statements:

Statement I: According to the Law of Octaves, the elements were arranged in the increasing order of their atomic number.

Statement II: Meyer observed a periodically repeated pattern upon plotting physical properties of certain elements against their respective atomic numbers.

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** is true

(C) **Statement I** is true but **Statement II** is false

(D) Both **Statement I** and **Statement II** are true

Q36 Mole Concept & Stoichiometry[Step-by-step solution](https://www.prepwisar.in/questions/pbuSsNz6kc)

Concentrated nitric acid is labelled as 75% by mass. The volume in mL of the solution which contains 30 g of nitric acid is _____.

Given : Density of nitric acid solution is 1.25g/mL.

(A) 32

(B) 40

(C) 55

(D) 45

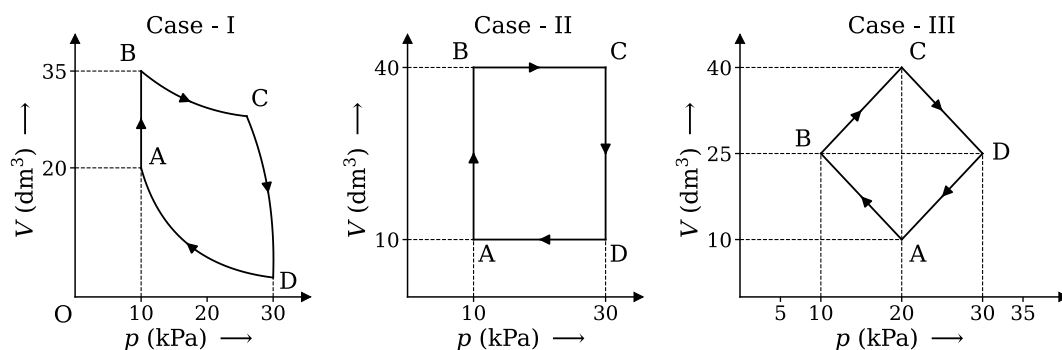
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Which of the following is/are not correct with respect to energy of atomic orbitals of hydrogen atom?

- (A) $1s < 2p < 3d < 4s$
 (B) $1s < 2s = 2p < 3s = 3p$
 (C) $1s < 2s < 2p < 3s < 3p$
 (D) $1s < 2s < 4s < 3d$

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

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



An ideal gas undergoes a cyclic transformation starting from the point A and coming back to the same point by tracing the path $A \rightarrow B \rightarrow C \rightarrow D \rightarrow A$ as shown in the three cases above.

Choose the **correct** option regarding ΔU :

- (A) $\Delta U(\text{Case-III}) > \Delta U(\text{Case-II}) > \Delta U(\text{Case-I})$
 (B) $\Delta U(\text{Case-I}) > \Delta U(\text{Case-II}) > \Delta U(\text{Case-III})$
 (C) $\Delta U(\text{Case-I}) = \Delta U(\text{Case-II}) = \Delta U(\text{Case-III})$
 (D) $\Delta U(\text{Case-I}) > \Delta U(\text{Case-III}) > \Delta U(\text{Case-II})$

Given below are two statements:

Statement I: C1CCCC1 and CCCC=C are isomeric compounds.

Statement II: CCCCCN and CCCCN are functional group isomers.

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

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

Identify correct statements:

- (A) Primary amines do not give diazonium salts when treated with NaNO_2 in acidic condition.
- (B) Aliphatic and aromatic primary amines on heating with CHCl_3 and ethanolic KOH form carbylamines.
- (C) Secondary and tertiary amines also give carbylamine test.
- (D) Benzenesulfonyl chloride is known as Hinsberg's reagent.
- (E) Tertiary amines reacts with benzenesulfonyl chloride very easily.

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

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

Identify the inorganic sulphides that are yellow in colour:

- (A) $(\text{NH}_4)_2\text{S}$
- (B) PbS
- (C) CuS
- (D) As_2S_3
- (E) As_2S_5

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

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

Chemistry Section B · Numerical value

Q42 to Q46

The spin only magnetic moment (μ) value (B.M.) of the compound with strongest oxidising power among Mn_2O_3 , TiO and VO is _____. B.M. (Nearest integer).

Total number of molecules/species from following which will be paramagnetic is _____.

O_2 , O_2^+ , O_2^- , NO , NO_2 , CO , $\text{K}_2[\text{NiCl}_4]$, $[\text{Co}(\text{NH}_3)_6]\text{Cl}_3$, $\text{K}_2[\text{Ni}(\text{CN})_4]$

Electrolysis of 600 mL aqueous solution of NaCl for 5 min changes the pH of the solution to 12. The current in Amperes used for the given electrolysis is _____. (Nearest integer).

A group 15 element forms $d\pi - d\pi$ bond with transition metals. It also forms hydride, which is a strongest base among the hydrides of other group members that form $d\pi - d\pi$ bond. The atomic number of the element is _____.

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Consider the following data:

Heat of formation of $\text{CO}_2(\text{g}) = -393.5 \text{ kJ mol}^{-1}$

Heat of formation of $\text{H}_2\text{O}(\text{l}) = -286.0 \text{ kJ mol}^{-1}$

Heat of combustion of benzene = $-3267.0 \text{ kJ mol}^{-1}$

The heat of formation of benzene is _____ kJ mol^{-1} . (Nearest integer)

Mathematics Section A · Multiple choice

Q47 to Q66

Q47 Three Dimensional Geometry

Step-by-step solution > prepwiser.in/questions/Qy5bjWyhDt

The square of the distance of the point $(\frac{15}{7}, \frac{32}{7}, 7)$ from the line $\frac{x+1}{3} = \frac{y+3}{5} = \frac{z+5}{7}$ in the direction of the vector $\hat{i} + 4\hat{j} + 7\hat{k}$ is:

- (A) 66 (B) 54 (C) 41 (D) 44

Q48 Binomial Theorem

Step-by-step solution > prepwiser.in/questions/wvP11Sbh-J

Let the coefficients of three consecutive terms T_r , T_{r+1} and T_{r+2} in the binomial expansion of $(a+b)^{12}$ be in a G.P. and let p be the number of all possible values of r . Let q be the sum of all rational terms in the binomial expansion of $(\sqrt[4]{3} + \sqrt[3]{4})^{12}$. Then $p+q$ is equal to:

- (A) 295 (B) 283 (C) 299 (D) 287

Q49 Complex Numbers

Step-by-step solution > prepwiser.in/questions/Cilvftol1

If $\alpha + i\beta$ and $\gamma + i\delta$ are the roots of $x^2 - (3-2i)x - (2i-2) = 0$, $i = \sqrt{-1}$, then $\alpha\gamma + \beta\delta$ is equal to:

- (A) 2 (B) -6 (C) 6 (D) -2

Q50 Definite Integration

Step-by-step solution > prepwiser.in/questions/u8hYLVgB2d

Let $f: \mathbb{R} \rightarrow \mathbb{R}$ be a twice differentiable function such that $f(2) = 1$. If $F(x) = xf(x)$ for all $x \in \mathbb{R}$, $\int_0^2 xF'(x)dx = 6$ and $\int_0^2 x^2 F''(x)dx = 40$, then $F'(2) + \int_0^2 F(x)dx$ is equal to:

- (A) 13 (B) 11 (C) 9 (D) 15

Q51 Definite Integration

Step-by-step solution > prepwiser.in/questions/dhRkG8SCTL

Let f be a real valued continuous function defined on the positive real axis such that $g(x) = \int_0^x tf(t)dt$.

If $g(x^3) = x^6 + x^7$, then value of $\sum_{r=1}^{15} f(r^3)$ is:

- (A) 270 (B) 340 (C) 310 (D) 320

Q52 Ellipse

Step-by-step solution > prepwiser.in/questions/0IegB3xmsU

If the midpoint of a chord of the ellipse $\frac{x^2}{9} + \frac{y^2}{4} = 1$ is $(\sqrt{2}, 4/3)$, and the length of the chord is $\frac{2\sqrt{\alpha}}{3}$, then α is:

- (A) 26 (B) 18 (C) 22 (D) 20

Q53 Functions (Advanced)[Step-by-step solution](#) > [prepwisar.in/questions/KkBJYu_Syq](https://www.prepwisar.in/questions/KkBJYu_Syq)

Let $f : [0, 3] \rightarrow A$ be defined by $f(x) = 2x^3 - 15x^2 + 36x + 7$ and $g : [0, \infty) \rightarrow B$ be defined by $g(x) = \frac{x^{2025}}{x^{2025} + 1}$. If both the functions are onto and $S = \{x \in Z; x \in A \text{ or } x \in B\}$, then $n(S)$ is equal to:

- (A) 29 (B) 31 (C) 30 (D) 36

Q54 Inverse Trigonometric Functions[Step-by-step solution](#) > [prepwisar.in/questions/VleXttUenN](https://www.prepwisar.in/questions/VleXttUenN)

Let $[x]$ denote the greatest integer less than or equal to x . Then the domain of $f(x) = \sec^{-1}(2[x] + 1)$ is:

- (A) $(-\infty, \infty)$ (B) $(-\infty, \infty) - \{0\}$ (C) $(-\infty, -1] \cup [0, \infty)$ (D) $(-\infty, -1] \cup [1, \infty)$

Q55 Matrices[Step-by-step solution](#) > [prepwisar.in/questions/XRNuoJuZfU](https://www.prepwisar.in/questions/XRNuoJuZfU)

Let $A = \begin{bmatrix} \frac{1}{\sqrt{2}} & -2 \\ 0 & 1 \end{bmatrix}$ and $P = \begin{bmatrix} \cos \theta & -\sin \theta \\ \sin \theta & \cos \theta \end{bmatrix}$, $\theta > 0$. If $B = PAP^T$, $C = P^T B^{10} P$ and the sum of the diagonal elements of C is $\frac{m}{n}$, where $\gcd(m, n) = 1$, then $m + n$ is:

- (A) 127 (B) 2049 (C) 258 (D) 65

Q56 Probability: Advanced[Step-by-step solution](#) > [prepwisar.in/questions/jMtsnMAbsP](https://www.prepwisar.in/questions/jMtsnMAbsP)

Bag B_1 contains 6 white and 4 blue balls, Bag B_2 contains 4 white and 6 blue balls, and Bag B_3 contains 5 white and 5 blue balls. One of the bags is selected at random and a ball is drawn from it. If the ball is white, then the probability that the ball is drawn from Bag B_2 is:

- (A) $\frac{2}{5}$ (B) $\frac{4}{15}$ (C) $\frac{1}{3}$ (D) $\frac{2}{3}$

Q57 Probability: Basic[Step-by-step solution](#) > [prepwisar.in/questions/Jcg9jBakLP](https://www.prepwisar.in/questions/Jcg9jBakLP)

Let S be the set of all the words that can be formed by arranging all the letters of the word GARDEN. From the set S , one word is selected at random. The probability that the selected word will NOT have vowels in alphabetical order is:

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

Q58 Functions (Advanced)[Step-by-step solution](#) > [prepwisar.in/questions/qsbRk1S602](https://www.prepwisar.in/questions/qsbRk1S602)

Let $f : \mathbf{R} - \{0\} \rightarrow (-\infty, 1)$ be a polynomial of degree 2, satisfying $f(x)f\left(\frac{1}{x}\right) = f(x) + f\left(\frac{1}{x}\right)$. If $f(K) = -2K$, then the sum of squares of all possible values of K is:

- (A) 9 (B) 1 (C) 6 (D) 7

Q59 Sequences & Series[Step-by-step solution](#) > [prepwisar.in/questions/-v_WZV4VHI](https://www.prepwisar.in/questions/-v_WZV4VHI)

For positive integers n , if $4a_n = (n^2 + 5n + 6)$ and $S_n = \sum_{k=1}^n \left(\frac{1}{a_k}\right)$, then the value of $507S_{2025}$ is:

- (A) 540 (B) 675 (C) 1350 (D) 135

Q60 Vectors[Step-by-step solution](#) > [prepwisar.in/questions/YSzbgL-GwF](https://www.prepwisar.in/questions/YSzbgL-GwF)

If the components of $\vec{a} = \alpha\hat{i} + \beta\hat{j} + \gamma\hat{k}$ along and perpendicular to $\vec{b} = 3\hat{i} + \hat{j} - \hat{k}$ respectively, are $\frac{16}{11}(3\hat{i} + \hat{j} - \hat{k})$ and $\frac{1}{11}(-4\hat{i} - 5\hat{j} - 17\hat{k})$, then $\alpha^2 + \beta^2 + \gamma^2$ is equal to:

- (A) 16 (B) 23 (C) 26 (D) 18

Q61 Vectors[Step-by-step solution](#) > prepwiser.in/questions/gZcV_RFOsV

Let A, B, C be three points in xy -plane, whose position vector are given by $\sqrt{3}\hat{i} + \hat{j}$, $\hat{i} + \sqrt{3}\hat{j}$ and $a\hat{i} + (1-a)\hat{j}$ respectively with respect to the origin O . If the distance of the point C from the line bisecting the angle between the vectors $\vec{OA}$ and $\vec{OB}$ is $\frac{9}{\sqrt{2}}$, then the sum of all the possible values of a is:

- (A) 2 (B) 0 (C) $\frac{9}{2}$ (D) 1

Q62 Area Under Curves[Step-by-step solution](#) > prepwiser.in/questions/B_kQnV9_E

The area of the region bounded by the curves $x(1+y^2) = 1$ and $y^2 = 2x$ is:

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

Q63 Straight Lines[Step-by-step solution](#) > prepwiser.in/questions/t7Cq2dLbt1

Two equal sides of an isosceles triangle are along $-x + 2y = 4$ and $x + y = 4$. If m is the slope of its third side, then the sum, of all possible distinct values of m , is:

- (A) $-2\sqrt{10}$ (B) 12 (C) -6 (D) 6

Q64 Straight Lines[Step-by-step solution](#) > prepwiser.in/questions/fV4ho7MV7d

If A and B are the points of intersection of the circle $x^2 + y^2 - 8x = 0$ and the hyperbola $\frac{x^2}{9} - \frac{y^2}{4} = 1$ and a point P moves on the line $2x - 3y + 4 = 0$, then the centroid of $\triangle PAB$ lies on the line:

- (A) $x + 9y = 36$ (B) $9x - 9y = 32$ (C) $4x - 9y = 12$ (D) $6x - 9y = 20$

Q65 Indefinite Integration[Step-by-step solution](#) > prepwiser.in/questions/qen5x7fW3u

If $f(x) = \int \frac{1}{x^{1/4}(1+x^{1/4})} dx$, $f(0) = -6$, then $f(1)$ is equal to:

- (A) $4(\log_e 2 - 2)$ (B) $\log_{e^2} 2 + 2$ (C) $2 - \log e^2$ (D) $4(\log_e 2 + 2)$

Q66 Trigonometric Ratios & Identities[Step-by-step solution](#) > prepwiser.in/questions/tKRppCQhJD

If $\sum_{r=1}^{13} \left\{ \frac{1}{\sin\left(\frac{\pi}{4} + (r-1)\frac{\pi}{6}\right) \sin\left(\frac{\pi}{4} + \frac{r\pi}{6}\right)} \right\} = a\sqrt{3} + b$, $a, b \in \mathbb{Z}$, then $a^2 + b^2$ is equal to:

- (A) 10 (B) 4 (C) 8 (D) 2

Mathematics Section B · Numerical value

Q67 to Q71

Q67 Differential Equations **NUMERICAL**[Step-by-step solution](#) > prepwiser.in/questions/8DiA8naUKD

If $y = y(x)$ is the solution of the differential equation,

$\sqrt{4-x^2} \frac{dy}{dx} = \left(\left(\sin^{-1} \left(\frac{x}{2} \right) \right)^2 - y \right) \sin^{-1} \left(\frac{x}{2} \right)$, $-2 \leq x \leq 2$, $y(2) = \frac{\pi^2-8}{4}$, then $y^2(0)$ is equal to _____.

Q68 Limits **NUMERICAL**[Step-by-step solution](#) > prepwiser.in/questions/4bxtInfj-O

Let $f(x) = \lim_{n \rightarrow \infty} \sum_{r=0}^n \left(\frac{\tan(x/2^{r+1}) + \tan^3(x/2^{r+1})}{1 - \tan^2(x/2^{r+1})} \right)$ Then $\lim_{x \rightarrow 0} \frac{e^x - e^{f(x)}}{(x - f(x))}$ is equal to _____.

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Q69 Parabola **NUMERICAL**[Step-by-step solution](#) › [prepwiser.in/questions/mXaei_7dH0](https://www.prepwiser.in/questions/mXaei_7dH0)

Let A and B be the two points of intersection of the line $y + 5 = 0$ and the mirror image of the parabola $y^2 = 4x$ with respect to the line $x + y + 4 = 0$. If d denotes the distance between A and B , and a denotes the area of $\triangle SAB$, where S is the focus of the parabola $y^2 = 4x$, then the value of $(a + d)$ is _____.

Q70 Permutations & Combinations **NUMERICAL**[Step-by-step solution](#) › [prepwiser.in/questions/nYpZBXC-4f](https://www.prepwiser.in/questions/nYpZBXC-4f)

The number of natural numbers, between 212 and 999, such that the sum of their digits is 15, is _____.

Q71 Sequences & Series **NUMERICAL**[Step-by-step solution](#) › [prepwiser.in/questions/7jKETVGj34](https://www.prepwiser.in/questions/7jKETVGj34)

The interior angles of a polygon with n sides, are in an A.P. with common difference 6° . If the largest interior angle of the polygon is 219° , then n is equal to _____.

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Physics

1. C	2. A	3. B	4. D	5. C	6. B	7. B	8. A	9. C	10. A
11. D	12. B	13. B	14. B	15. B	16. C	17. D	18. D	19. C	20. 2
21. 1	22. 12	23. 50	24. 54						

Chemistry

25. C	26. A	27. C	28. B	29. C	30. D	31. B	32. B	33. C	34. D
35. A	36. A	37. D	38. C	39. B	40. D	41. A	42. 5	43. 6	44. 2
45. 15	46. 48								

Mathematics

47. A	48. B	49. A	50. B	51. C	52. C	53. C	54. A	55. D	56. B
57. B	58. C	59. B	60. C	61. D	62. B	63. D	64. D	65. A	66. C
67. 4	68. 1	69. 14	70. 64	71. 20					

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