# PhysicsByAaryan

CSIR NET . GATE . JEST . BARC - Physics

# CSIR NET Physics - Dec 2025 - Full Paper

Complete question paper with answer key

**75 questions . Answer key included**

**www.physicsbyaaryan.com . www.csirnetphysics.com**
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**Q1. [Dec 2025] . 2.0 marks**

General Aptitude > Mathematical Analysis

| CSIR NET | 2025 Dec | 2M |
|---|---|---|

Suppose $a_1, a_2, \ldots, a_{300}$ are integers such that $a_{i-1} + a_i + a_{i+1} = 2025$ for all $i = 2,3, \ldots, 299$. If $a_7 = -5, a_9 = 37$, then the value of $a_{106}$ is

1. 1993
2. 37
3. -5
4. 2030

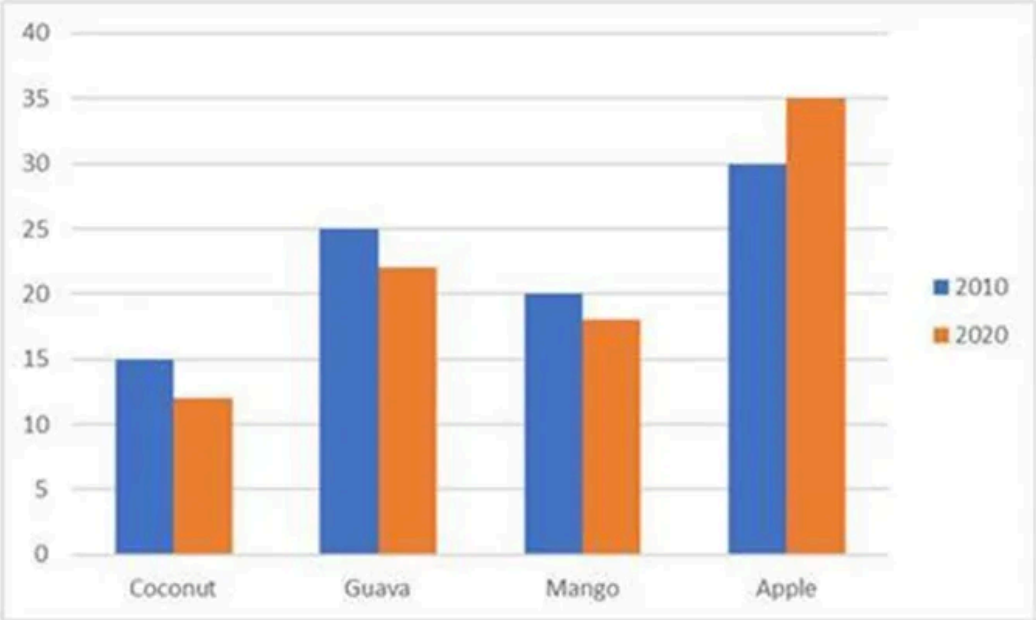
**Q2. [Dec 2025] . 2.0 marks**

General Aptitude > Data Analysis

| CSIR NET | 2025 Dec | 2M |
|---|---|---|

The numbers (in millions) of coconut, guava, mango and apple trees in a region in 2010 and 2020 are shown in the following figure.

The maximum relative change in numbers was for




1. coconut trees
2. guava trees
3. mango trees
4. apple trees

**Q3. [Dec 2025] . 2.0 marks**

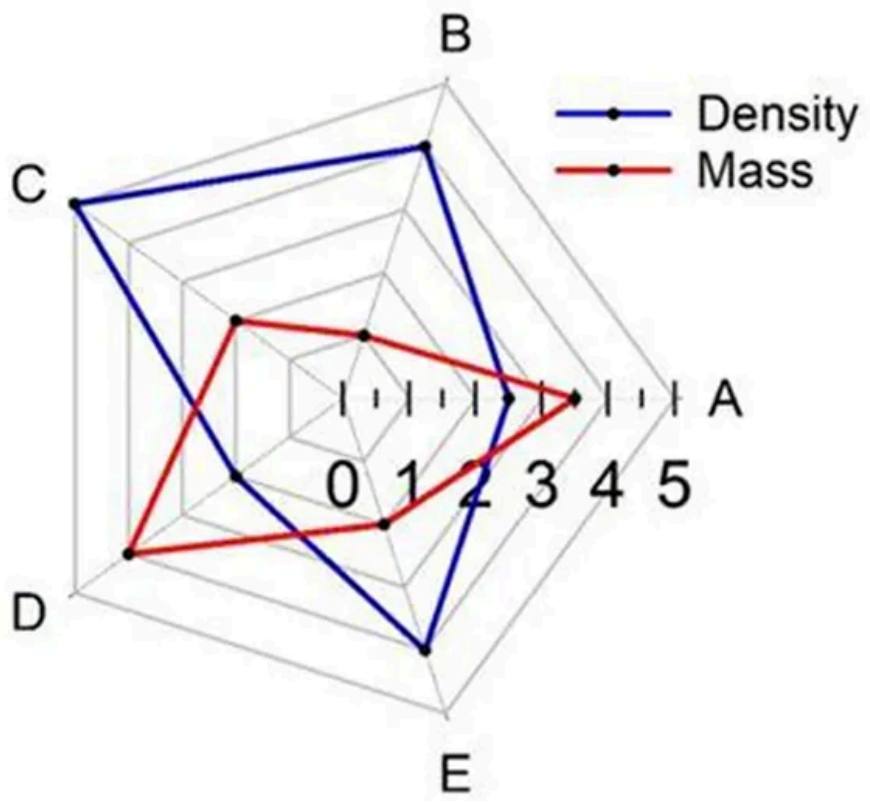
General Aptitude > Data Analysis

| CSIR NET | 2025 Dec | 2M |
|---|---|---|

The following figure shows densities and masses of five objects (A to E).

The object with the largest volume is ___ .

1. A
2. B
3. D
4. E



**Q4. [Dec 2025] . 2.0 marks**

General Aptitude > Mathematical Analysis

| CSIR NET | 2025 Dec | 2M |
|---|---|---|

A lady bought some apples, each costing Rs. 25, and some bananas each costing Rs 6, for a total of Rs. 378. In how many ways could she have chosen the numbers of apples and bananas?

1. 1
2. 2
3. 3
4. 4

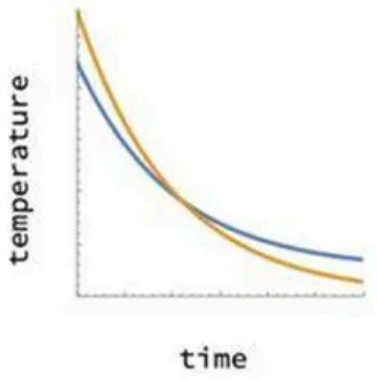
**Q5. [Dec 2025] . 2.0 marks**

General Aptitude > Basic Physics

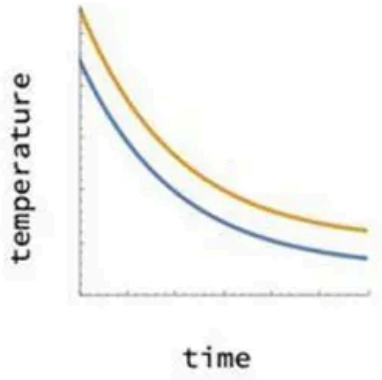
| CSIR NET | 2025 Dec | 2M |
|---|---|---|

Two identical metal bars are heated to different temperatures and allowed to cool in the same surroundings. Which one of the following figures correctly shows their cooling curves?

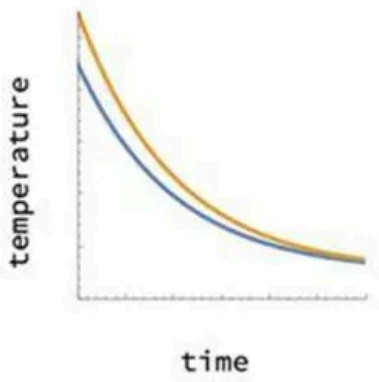
A



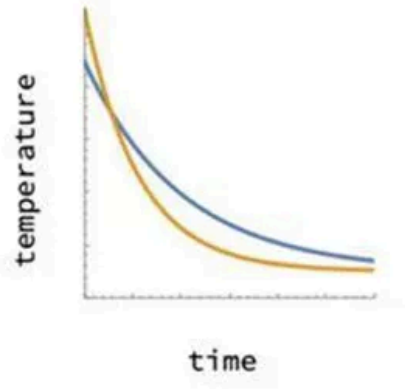

B




C




D



**Q6. [Dec 2025] . 2.0 marks**

General Aptitude > Mathematical Analysis

| CSIR NET | 2025 Dec | 2M |
|---|---|---|

How many 5 -digit numbers can be formed from the digits 0,2,3,4,6,7 and 9 , using each at most once, which are divisible by 5 ?

1. 120
2. 240
3. 360
4. 720

**Q7. [Dec 2025] . 2.0 marks**

General Aptitude > Reasoning

| CSIR NET | 2025 Dec | 2M |
|---|---|---|

In a community, some artists are teachers, no teacher is a painter, all painters are artists, and all teachers are professionals. Then it can be definitely asserted that

1. no painter is a professional
2. all artists are professionals
3. no professionals are teachers
4. some artists are professionals

**Q8. [Dec 2025] . 2.0 marks**

General Aptitude > Mathematical Analysis

| CSIR NET | 2025 Dec | 2M |
|---|---|---|

In an exam, questions of three difficulty levels hard, medium, and easy fetch respectively 7,3 , and 2 marks if correct and 0 if incorrect. Three students got 30 marks each but in three different ways, though the total number of questions correctly answered by each student was the same. Then what could be the total number of questions correctly answered by each of these students?

1. 12
2. 10
3. 9
4. 6

**Q9. [Dec 2025] . 2.0 marks**

General Aptitude > Mathematical Analysis

| CSIR NET | 2025 Dec | 2M |
|---|---|---|

The value of

$$1+\left(\frac{1}{2^1}+\frac{1}{3}\right)+\left(\frac{1}{2^2}+\frac{1}{5}+\frac{1}{6}+\frac{1}{7}\right)+\cdots+\left(\frac{1}{2^9}+\cdots+\frac{1}{1023}\right)$$

lies between

1. 2 and 10
2. 11 and 20
3. 21 and 30
4. 31 and 40

**Q10. [Dec 2025] . 2.0 marks**

General Aptitude > Mathematical Analysis

| CSIR NET | 2025 Dec | 2M |
|---|---|---|

The geometric mean of 100 observations is 25 . If each observation is multiplied by 4 , what will be the new geometric mean?

1. 100
2. 50
3. 25
4. $(25\times 4)^{1/2}$

**Q11. [Dec 2025] . 2.0 marks**

General Aptitude > General Knowledge

| CSIR NET | 2025 Dec | 2M |
|---|---|---|

Which among the following cities can be said most appropriately to bear the same relation to Tamil Nadu that Pune bears to Maharashtra; Surat to Gujarat and Asansol to West Bengal?

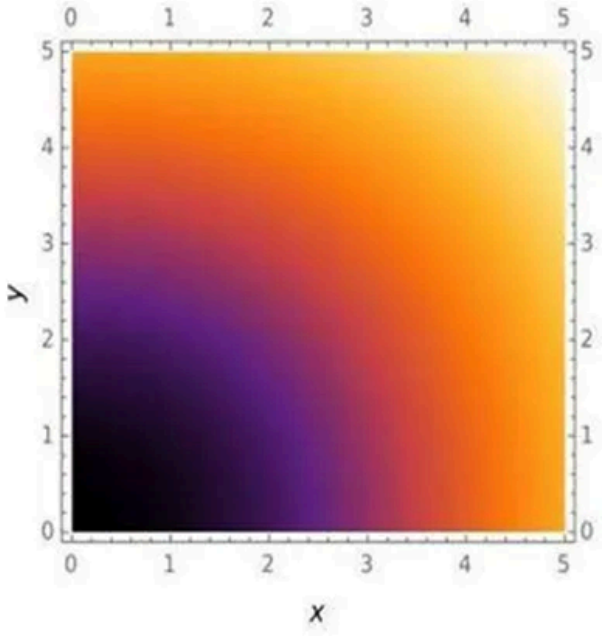
1. Tirupati
2. Mysore
3. Chennai
4. Coimbatore

**Q12. [Dec 2025] . 2.0 marks**

General Aptitude > Data Analysis

| CSIR NET | 2025 Dec | 2M |
|---|---|---|

The following plot shows temperature as a function of $x$ and $y$. Along which path is the temperature change minimum?




1. $x = \text{constant}$ or $y = \text{constant}$
2. $\frac{y}{x^2} = \text{constant}$
3. $y^2 + x^2 = \text{constant}$
4. $yx = \text{constant}$

**Q13. [Dec 2025] . 2.0 marks**

General Aptitude > Basic Physics

| CSIR NET | 2025 Dec | 2M |
|---|---|---|

The minimum height of a plane vertical mirror that will allow a 6-feet tall person to see himself fully in it

1. depends on the distance between the person and the mirror
2. is 3 feet
3. is 4.5 feet
4. is 6 feet

**Q14. [Dec 2025] . 2.0 marks**

General Aptitude > Reasoning

| CSIR NET | 2025 Dec | 2M |
|---|---|---|

Three periodic events repeat every 24 seconds, 54 seconds, and 56 seconds. If they coincide at 10:20:00, when will they next coincide?

1. 10:35:12
2. 10:45:20
3. 10:45:12
4. 10: 35: 20

**Q15. [Dec 2025] . 2.0 marks**

General Aptitude > Reasoning

| CSIR NET | 2025 Dec | 2M |
|---|---|---|

Five students graduated from a college, not all in the same year, after each has studied for four years. If batchmates Jiten and Anwar were between Ramesh and Prakash but senior to Sam while Ramesh had left the college before Jiten took admission, then it is certain that

1. Anwar was the most senior
2. Ramesh was the most senior
3. Sam was the most junior
4. Prakash was the most junior

**Q16. [Dec 2025] . 2.0 marks**

General Aptitude > Reasoning

| CSIR NET | 2025 Dec | 2M |
|---|---|---|

What is the minimum number of pourings required to transfer exactly 6 L of water from a 12 L fully filled container to an 8 L empty container when a 5 L empty container is also available to use?

1. 4
2. 5
3. 6
4. 7

**Q17. [Dec 2025] . 2.0 marks**

General Aptitude > Basic Physics

| CSIR NET | 2025 Dec | 2M |
|---|---|---|

Alloy $A$ is formed by mixing iron (Fe) and nickel (Ni) in the ratio $3:4$, while alloy $B$ is formed by mixing Fe and Ni in the ratio $9:5$. If equal quantities of alloys A and $B$ are melted together to form a new alloy C , what will be the ratio of Fe to Ni in the alloy C ?

1. $4:3$
2. $5:3$
3. $15:13$
4. $13:9$

**Q18. [Dec 2025] . 2.0 marks**

General Aptitude > Mathematical Analysis

| CSIR NET | 2025 Dec | 2M |
|---|---|---|

In a class, 40% and 20% students passed in Mathematics and Physics, respectively, and 10% students passed in both subjects. What is the probability of a randomly selected student to have passed in Physics if the student already passed in Mathematics?

1. $1/2$
2. $1/20$
3. $1/4$
4. $2/25$

**Q19. [Dec 2025] . 2.0 marks**

General Aptitude > General Knowledge

| CSIR NET | 2025 Dec | 2M |
|---|---|---|

A recent survey suggests that the total fertility rate in a country has fallen below 2.1, the population replacement ratio. This necessarily implies that the

1. infant mortality rate has increased reducing the net fertility ratio.
2. total population will decline.
3. population of young people is going to increase with a faster rate in the long run if the same status continues.
4. proportion of elderly people is going to decrease in the long run if the same status continues.

**Q20. [Dec 2025] . 2.0 marks**

General Aptitude > Mathematical Analysis

| CSIR NET | 2025 Dec | 2M |
|---|---|---|

Some, but not all, faces of a six-faced cubical fair die are painted red (R) and the remaining green (G); and the die is thrown until red faces come up on top 4 times. Consider the following sequences of colors listed left to right as they appear on the top.

A: GRRRR

B: GRGRRR

Which one of the following is true?

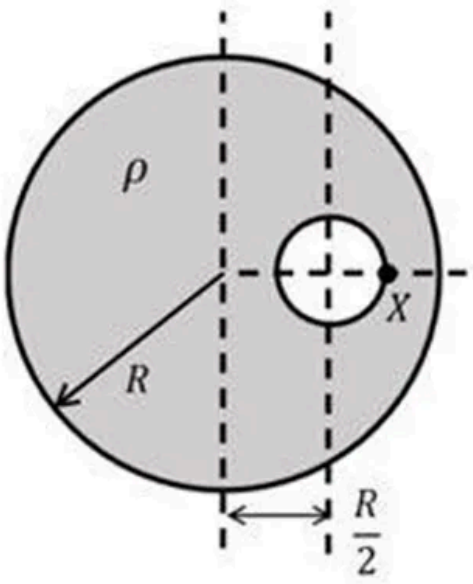
1. A is more probable than B
2. B is more probable than A
3. Both have the same probability
4. Whether A or B is more probable depends upon how many faces are painted green

**Q21. [Dec 2025] . 3.5 marks**

Electromagnetism > Electrostatics

| CSIR NET | 2025 Dec | 3.5M | EMT |
|---|---|---|---|

A solid sphere of radius $R$ has uniform charge density $\rho$. A spherical volume of radius $\frac{R}{4}$ is scooped out from the sphere as shown. The electric field at the point marked $X$ is ( $\hat{r}$ denotes the unit vector along the radially outward direction)




1. $\frac{2\rho R}{9\varepsilon_0}\hat{r}$
2. $\frac{\rho R}{6\varepsilon_0}\hat{r}$
3. $\frac{\rho R}{3\varepsilon_0}\hat{r}$
4. $\frac{\rho R}{9\varepsilon_0}\hat{r}$

**Q22. [Dec 2025] . 3.5 marks**

Mathematical Physics > Probability

| CSIR NET | 2025 Dec | 3.5M | MMP |
|---|---|---|---|

Let $p(x)$ be the probability density function for a positive real variable $x$, and

$g(\alpha) = \int_0^\infty p(x)e^{-\alpha x}dx.$

If $g'(\alpha)$ and $g''(\alpha)$ are respectively first and second derivatives of $g(\alpha)$ with respect to $\alpha$, which of the following gives the variance of $x$ ?

1. $g''(0) - [g'(0)]^2$
2. $g''(0) + [g'(0)]^2$
3. $[g''(0) - g'(0)]^2$
4. $\frac{g''(0)}{g'(0)g(0)}$

**Q23. [Dec 2025] . 3.5 marks**

Statistical Mechanics > Random Walk/Brownian motion/Diffusion

| CSIR NET | 2025 Dec | 3.5M | Stat. Mech. |
|---|---|---|---|

A 1-dimensional random walker's displacement is always positive and is equally likely to be anywhere in the range $[L, L+b]$. After $N$ statistically independent steps the mean distance covered by the walker is

1. $NL$
2. $N\sqrt{L^2+b^2}$
3. $N\left(L+\frac{b}{2}\right)$
4. $NL+b\sqrt{N}$

**Q24. [Dec 2025] . 3.5 marks**

Classical Mechanics > Rotation Motion

| CSIR NET | 2025 Dec | 3.5M | CM |
|---|---|---|---|

A fly of mass $m$ rests on the edge of a uniform horizontal disc of radius $R$ and mass $M$. The disc is free to rotate about the vertical axis through its center. Initially the disc is stationary. The fly starts to walk around the circumference of the disc with speed $v$ relative to the disc. The speed of the fly for a stationary observer is

1. $\frac{mv}{M+2m}$
2. $\frac{Mv}{M-2m}$
3. $\frac{Mv}{M+2m}$
4. $\frac{mv}{M-2m}$

**Q25. [Dec 2025] . 3.5 marks**

Quantum Mechanics > Orbital angular Momentum and Hydrogen atom

| CSIR NET | 2025 Dec | 3.5M | QM |
|---|---|---|---|

If $\hat{\vec{L}}$ is the angular momentum operator for a quantum particle, then $\hat{\vec{L}} \times \hat{\vec{L}}$ is

1. $\hbar^2$
2. $-i\hbar\hat{\vec{L}}$
3. 0
4. $i\hbar\hat{\vec{L}}$

**Q26. [Dec 2025] . 3.5 marks**

Statistical Mechanics > Quantum Statistical Mechanics

| CSIR NET | 2025 Dec | 3.5M | Stat. Mech. |
|---|---|---|---|

$B, C$ and $F$ are three systems which have particles of same mass and same number density kept at the same low temperature $T$. Here $C$ is a classical ideal gas, $F$ is a free Fermi gas and $B$ is a free Bose gas, with pressures $P_C, P_F$ and $P_B$ respectively. Then

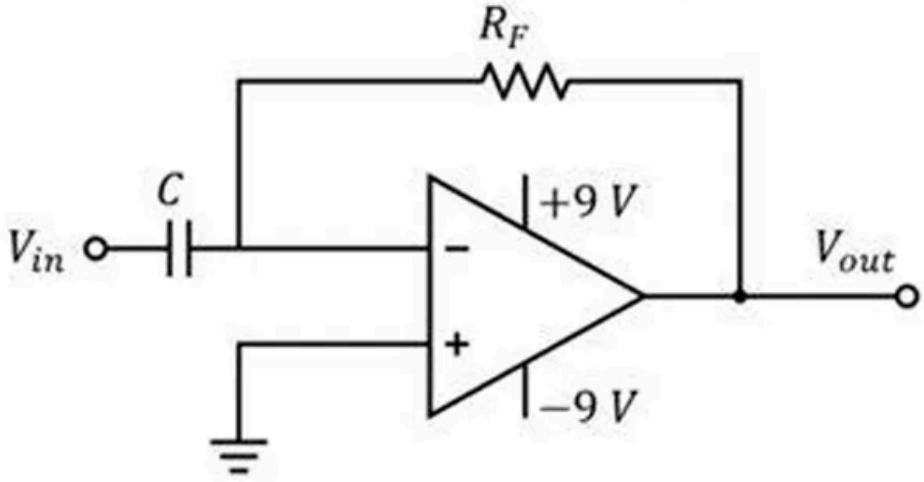
1. $P_B > P_C > P_F$.
2. $P_F > P_C > P_B$.
3. $P_C > P_F > P_B$.
4. $P_c > P_B > P_F$.

**Q27. [Dec 2025] . 3.5 marks**

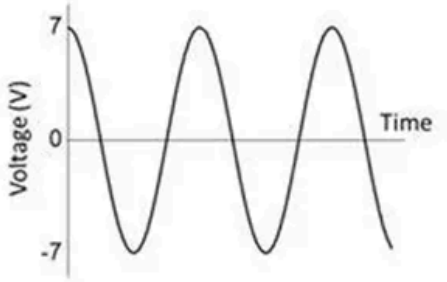
Electronics > OPAMP

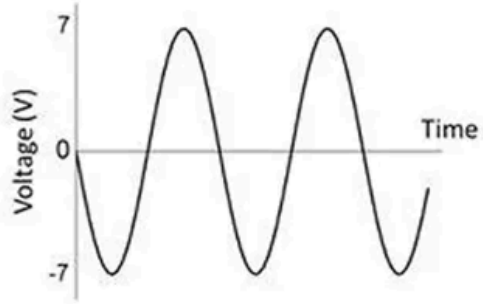
| CSIR NET | 2025 Dec | 3.5M | Electronics |
|---|---|---|---|

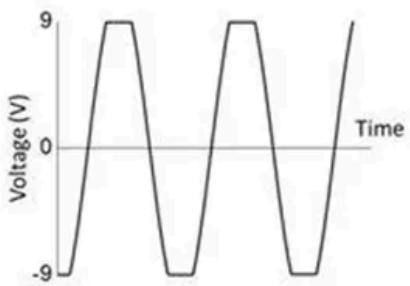
In the circuit shown below, the input voltage is $V_{\text{in}}(t) = 0.3\sin 50t$ (Volts) and $C = 100\mu F$, $R_F = 10k\Omega$.

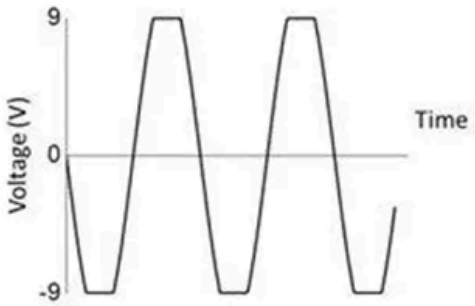



Considering the opamp to be ideal and neglecting the transients, the best representation of the output voltage $V_{\text{out}}(t)$ is

1.



2.



3.


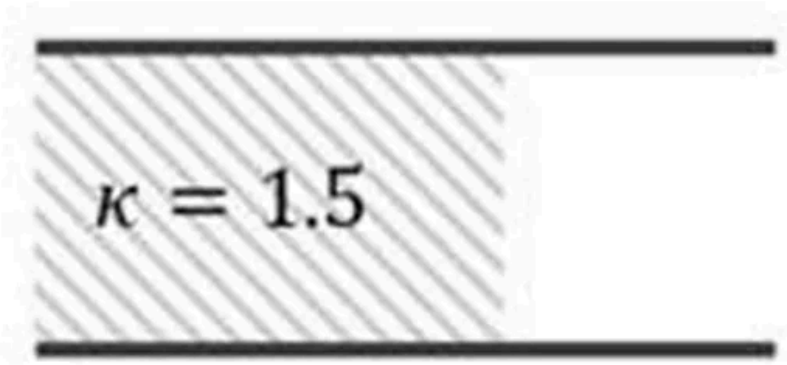

4.


**Q28. [Dec 2025] . 3.5 marks**

Electromagnetism > Capacitors

| CSIR NET | 2025 Dec | 3.5M | EMT |
|---|---|---|---|

A fraction $\frac{2}{3}$ of the volume of a parallel plate capacitor is filled with dielectric of relative permittivity $\kappa = 1.5$ (as shown in the figure). When the filled volume is reduced to $\frac{1}{3}$ of the total volume, the capacitance is smaller by a factor of




1. $\frac{7}{8}$
2. $\frac{5}{6}$
3. $\frac{3}{4}$
4. $\frac{2}{3}$

**Q29. [Dec 2025] . 3.5 marks**

Statistical Mechanics > Canonical Ensemble

| CSIR NET | 2025 Dec | 3.5M | Stat. Mech. |
|---|---|---|---|

Five indistinguishable atoms are sitting on the distinguishable vertices of a pentagon. The atoms can be in one of the two states: $g$ with energy 0 , and $e$ with energy $E$. However neighboring atoms cannot both be in the $e$ state. The partition function of this system at temperature $T$, is

1. $1+5e^{-\frac{E}{k_BT}}+2e^{-\frac{2E}{k_BT}}$
2. $1+5e^{-\frac{E}{k_BT}}+3e^{-\frac{2E}{k_BT}}$
3. $1+5e^{-\frac{E}{k_BT}}+10e^{-\frac{2E}{k_BT}}$
4. $1+5e^{-\frac{E}{k_BT}}+5e^{-\frac{2E}{k_BT}}$

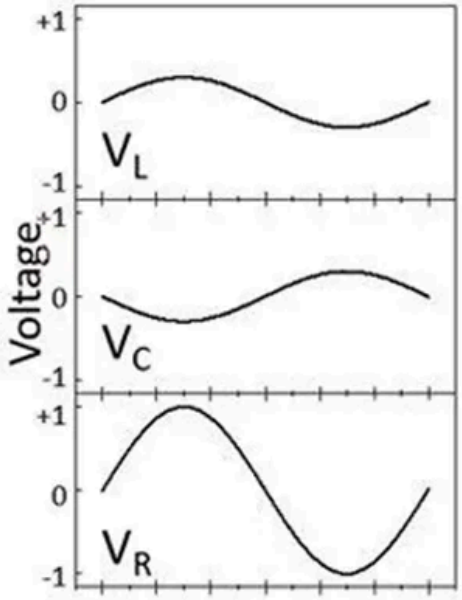
**Q30. [Dec 2025] . 3.5 marks**

Electronics > RLC Circuits

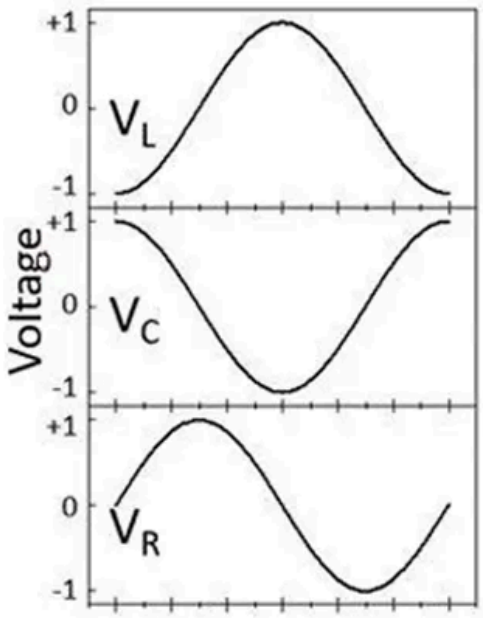
| CSIR NET | 2025 Dec | 3.5M | Electronics |
|---|---|---|---|

In an ideal series $LCR$ circuit, which one of the following best represents the steady-state voltage waveforms $V_L, V_C, V_R$ (only one cycle is shown) across $L, C$ and $R$ as a function of time at resonance frequency

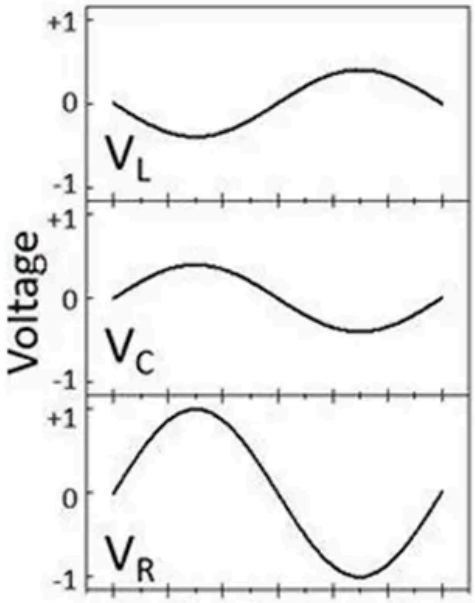
1.



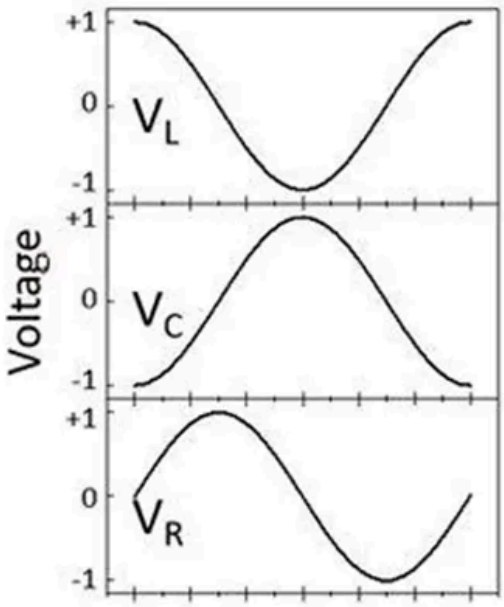

2.




3.




4.



**Q31. [Dec 2025] . 3.5 marks**

Electromagnetism > Electrostatics

| CSIR NET | 2025 Dec | 3.5M | EMT |
|---|---|---|---|

Two well separated conducting spheres ( $A$ and $B$ ) of radii 10 cm and 20 cm carry charges +30 C and -20 C respectively. When they are connected by a thin conducting wire, the final charge on $A$ is $Q_A$ and that on $B$ is $Q_B$. The values of $Q_A$ and $Q_B$ respectively, are closest to

1. 6.7 C and 3.3 C
2. 2.0 C and 8.0 C
3. 3.3C and 6.7 C
4. 8.0 C and 2.0 C

**Q32. [Dec 2025] . 3.5 marks**

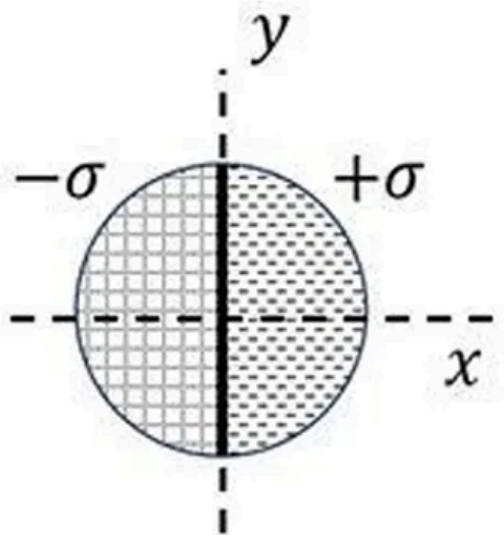
Electromagnetism > Multipoles

| CSIR NET | 2025 Dec | 3.5M | EMT |
|---|---|---|---|

A circular disc of radius $R$ is made of 2 halves (as shown in the figure), separated by a dielectric of negligible thickness (along the $y$ axis.)

If the surface charge density on the right half is $+\sigma$ and that on the left half is $-\sigma$, the dipole moment of the disc is

1. $P_x = 0, P_y = \frac{1}{3}\sigma R^3$
2. $P_x = 0, P_y = \frac{4}{3}\sigma R^3$
3. $P_x = \frac{1}{3}\sigma R^3, P_y = 0$
4. $P_x = \frac{4}{3}\sigma R^3, P_y = 0$




**Q33. [Dec 2025] . 3.5 marks**

Mathematical Physics > Complex analysis

| CSIR NET | 2025 Dec | 3.5M | MMP |
|---|---|---|---|

If $C$ be the unit circle traversed clockwise, then the integral $\oint_C dz|1+2z|^2$ equals

1. $-4\pi i$
2. $-\pi i$
3. 0
4. $-2\pi i$

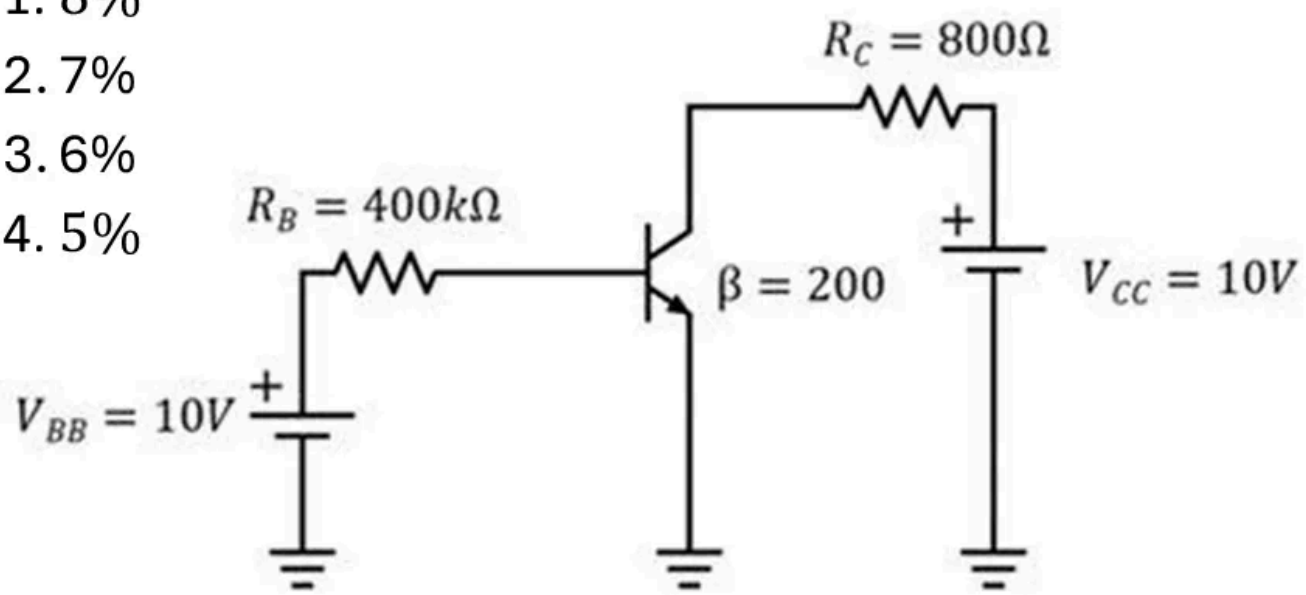
**Q34. [Dec 2025] . 3.5 marks**

Electronics > Transistors

| CSIR NET | 2025 Dec | 3.5M | Electronics |
|---|---|---|---|

In the transistor circuit given below the voltage $V_{CC}$ fluctuates by 5%. Then the fluctuation in $V_{CE}$ would be closest to (take $V_{BE} = 0.7$ V )

1. 8%
2. 7%
3. 6%
4. 5%



**Q35. [Dec 2025] . 3.5 marks**

Thermodynamics > Kinetic theory of Gases

| CSIR NET | 2025 Dec | 3.5M | Thermal |
|---|---|---|---|

A classical mono-atomic ideal gas is in thermal equilibrium at temperature $T$. The velocity of a molecule of this gas, of mass $m$, is $\vec{v} = v_x\hat{x} + v_y\hat{y} + v_z\hat{z}$. The value of the ensemble average $\langle v_x^2 v_y^2 \rangle$ is

1. $\left(\frac{k_B T}{2m}\right)^2$
2. $\left(\frac{k_B T}{m}\right)^2$
3. $\left(\frac{3k_B T}{2m}\right)^2$
4. $\left(\frac{2k_B T}{m}\right)^2$

**Q36. [Dec 2025] . 3.5 marks**

Mathematical Physics > Complex analysis

| CSIR NET | 2025 Dec | 3.5M | MMP |
|---|---|---|---|

The residue of $f(z) = \frac{\cos(\pi z)}{(1-z^2)^3}$ at $z = 1$ is

1. $\frac{\pi^2}{16}$
2. $\frac{3}{16}$
3. $\frac{3+\pi^2}{16}$
4. $\frac{3-\pi^2}{16}$

**Q37. [Dec 2025] . 3.5 marks**

Quantum Mechanics > Two particle System

| CSIR NET | 2025 Dec | 3.5M | QM |
|---|---|---|---|

An isolated two-electron quantum state is described by the orbital angular momentum quantum number $l$ and the total spin $S$. An allowed value of $l$ and $S$ is

1. $S = 1, l = 0$
2. $S = 0, l = 1$
3. $S = 1, l = 1$
4. $S = 1, l = 2$

**Q38. [Dec 2025] . 3.5 marks**

Classical Mechanics > Rotation Motion

| CSIR NET | 2025 Dec | 3.5M | CM |
|---|---|---|---|

The position and velocity vector of a particle changes from $\vec{R}_1$ to $\vec{R}_2$ and $\overrightarrow{V_1}$ to $\vec{V}_2$ as time changes from $t_1$ to $t_2$. If $\vec{r}(t), \vec{a}(t)$ are instantaneous position and acceleration vectors of the particle then the integral

$I = \int_{t_1}^{t_2} dt(\vec{r}(t) \times \vec{a}(t))$ is

1. $\vec{R}_2 \times \vec{V}_1 - \vec{R}_1 \times \vec{V}_2$
2. $\vec{R}_2 \times \vec{V}_2 - \vec{R}_1 \times \vec{V}_1$
3. $\vec{R}_1 \times \vec{V}_1 - \vec{R}_2 \times \vec{V}_2$
4. $\vec{R}_1 \times \vec{V}_2 - \vec{R}_2 \times \vec{V}_1$

**Q39. [Dec 2025] . 3.5 marks**

Quantum Mechanics > Quantum Harmonic Oscillator

| CSIR NET | 2025 Dec | 3.5M | QM |
|---|---|---|---|

A quantum particle of mass $m$ is moving in a potential

$$V(x,y) = \frac{m\omega^2}{8}\left[5\left(x^2+y^2\right)+8xy\right].$$

The lowest energy eigenstate with degeneracy has an energy

1. $\frac{7}{2}\hbar\omega$
2. $\frac{3}{2}\hbar\omega$
3. $4\hbar\omega$
4. $\frac{5}{2}\hbar\omega$

**Q40. [Dec 2025] . 3.5 marks**

Quantum Mechanics > Spin Angular momentum

| CSIR NET | 2025 Dec | 3.5M | QM |
|---|---|---|---|

A spin-$\frac{1}{2}$ particle is in a magnetic field $\vec{B} = B_x\hat{x} + B_y\hat{y}$ for which the spin dependent Hamiltonian is $\hat{H} = -A\hat{\vec{S}} \cdot \vec{B}$ ( $A$ is a positive constant and $\hat{\vec{S}}$ is the spin-operator). The eigenvalues of the Hamiltonian are

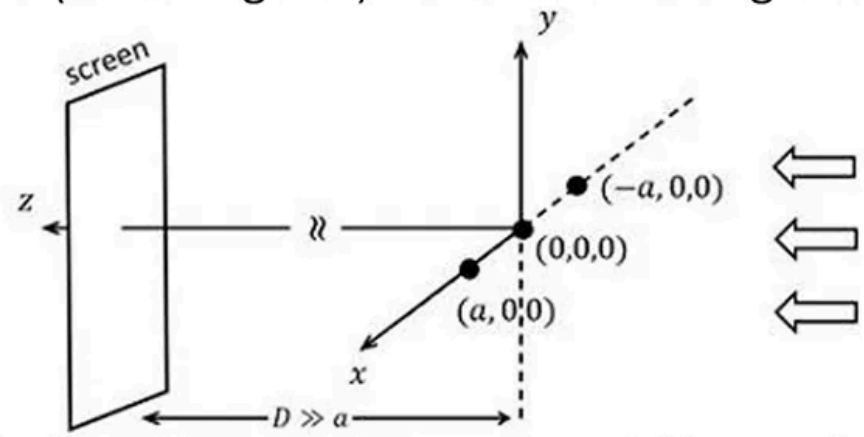
1. $\pm A\frac{\hbar}{2}\left(B_x + B_y\right)$
2. $\pm A\frac{\hbar}{2}\sqrt{B_x B_y}$
3. $\pm A\frac{\hbar}{2}\left(B_x^2 + B_y^2\right)^{\frac{1}{2}}$
4. 0

**Q41. [Dec 2025] . 3.5 marks**

Optics > Interference and diffraction

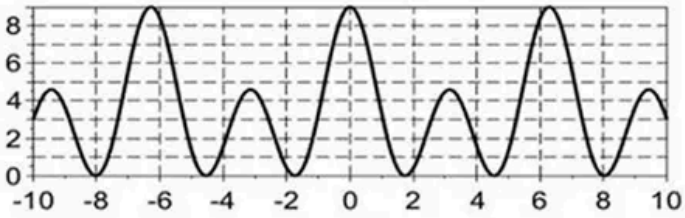
| CSIR NET | 2025 Dec | 3.5M | Wave/Optic |
|---|---|---|---|

Three identical pinholes separated by distance $a$ along the $x$-axis are illuminated by a collimated monochromatic coherent beam of light (wavelength $\lambda$ ) as shown in the figure below.

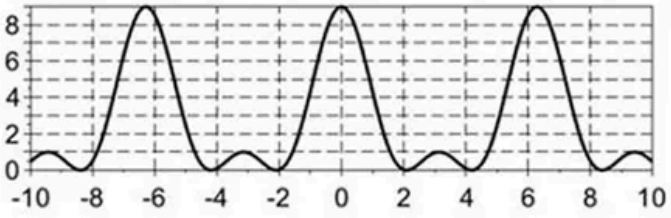



The intensity (in arbitrary units) pattern of fringes obtained on a screen kept at distance $D(D \gg a)$ along the $z$ - axis is best represented by

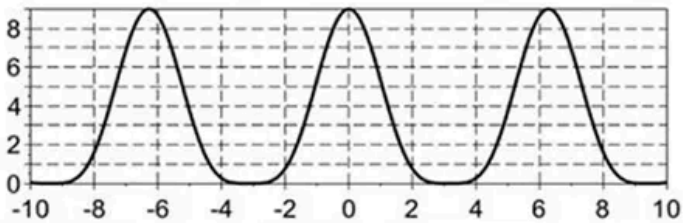
1.



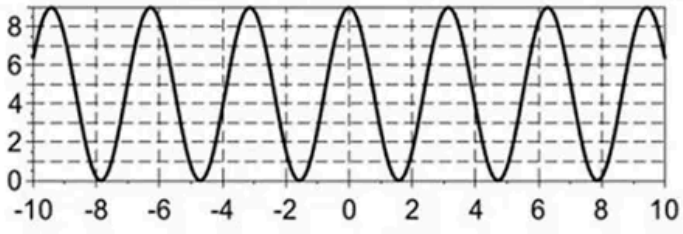

2.




3.




4.

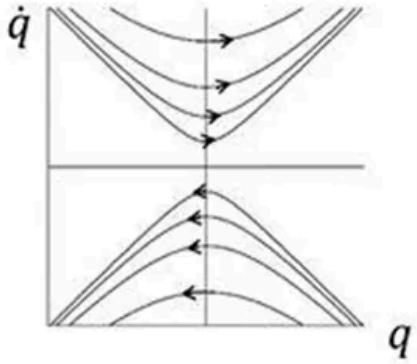


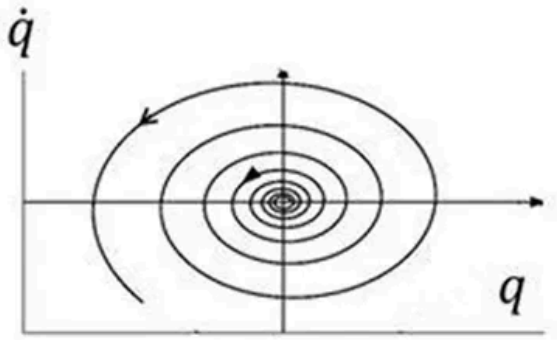
**Q42. [Dec 2025] . 3.5 marks**

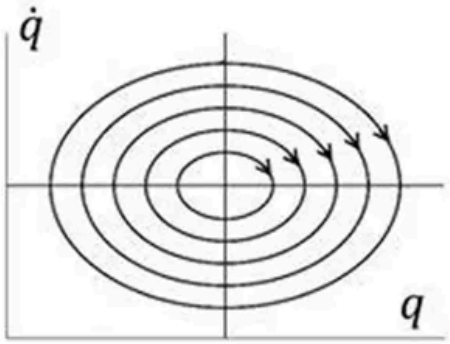
Classical Mechanics > Phase space diagrams

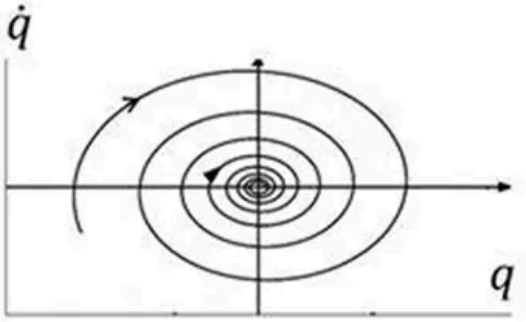
| CSIR NET | 2025 Dec | 3.5M | CM |
|---|---|---|---|

Which of the following figures best represents the motion of an oscillator described by the differential equation $\ddot{q} + \dot{q} + q = 0$ in $q - \dot{q}$ plane?

1. 


2. 


3. 


4. 

**Q43. [Dec 2025] . 3.5 marks**

Mathematical Physics > Matrices and Linear Algebra

| CSIR NET | 2025 Dec | 3.5M | MMP |
|---|---|---|---|

Commutator of two matrices $A$ and $B$ is defined as $[A, B] = AB - BA$ and the anti-commutator as $\{A, B\} = AB + BA$. If $\{A, B\} = 0$. Then we can express $[A, BC]$ as

1. $B\{A, C\}$
2. $-B[A, C]$
3. $-B\{A, C\}$
4. $[A, B]C$

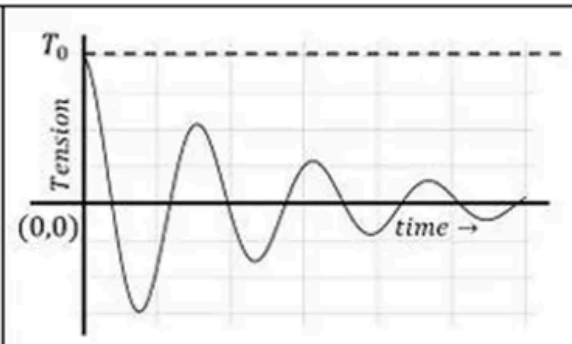
**Q44. [Dec 2025] . 3.5 marks**

Classical Mechanics > Basic Mechanics

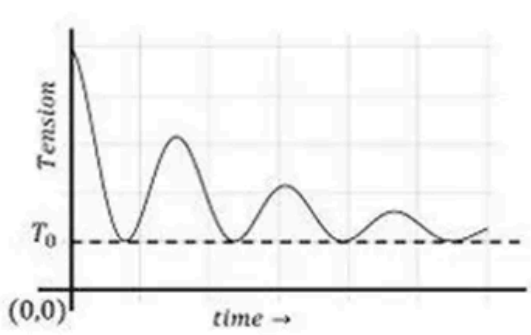
| CSIR NET | 2025 Dec | 3.5M | Wave/Optic |
|---|---|---|---|

A bow has a taut string of tension $T_0$ (when it is at rest). The string is pulled and released at time $t = 0$. Which plot best represents the tension in the bow string as a function of time?

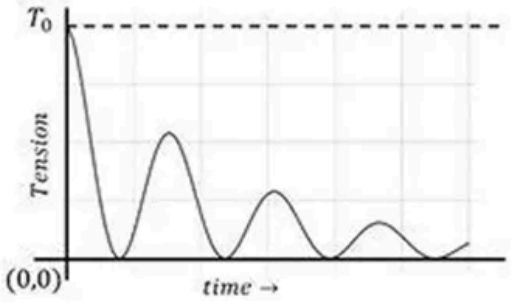
1.



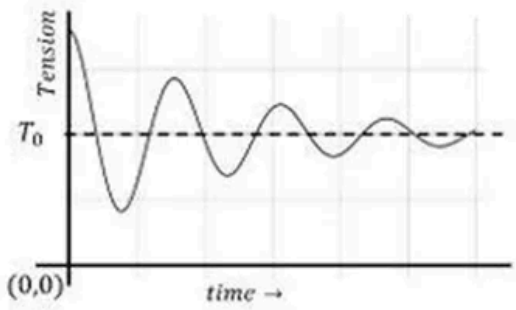

2.




3.




4.



**Q45. [Dec 2025] . 3.5 marks**

Quantum Mechanics > Basic Quantum Mechanics

| CSIR NET | 2025 Dec | 3.5M | QM |
|---|---|---|---|

A quantum mechanical particle in a harmonic potential has the wave function $\frac{1}{\sqrt{2}}[\psi_0(x) + \psi_1(x)]$ at t $= 0$, where $\psi_0(x)$ and $\psi_1(x)$ are the wave functions of the ground state and the first excited state respectively. If the frequency of the oscillator is $\omega$, the probability density of finding the particle at $x$ after time $t = \frac{\pi}{\omega}$ is

1. $\frac{1}{2}|\psi_1(x) - \psi_0(x)|^2$
2. $\frac{1}{2}|\psi_1(x) + \psi_0(x)|^2$
3. $\frac{1}{2}|\psi_1(x) - i\psi_0(x)|^2$
4. $\frac{1}{2}|\psi_1(x)|^2 + \frac{1}{2}|\psi_0(x)|^2$

**Q46. [Dec 2025] . 5.0 marks**

Mathematical Physics > Probability

| CSIR NET | 2025 Dec | 5M | MMP |
|---|---|---|---|

In a heap of 20 biased coins, 17 have a 60% probability of showing heads while the other three special coins have a 90% probability of doing so. A coin is selected at random and tossed. If the result is a head, the probability that it was one of the three special coins is best approximated by

1. 0.18
2. 0.14
3. 0.21
4. 0.26

**Q47. [Dec 2025] . 5.0 marks**

Electronics > "Errors , curve fitting and data analysis"

| CSIR NET | 2025 Dec | 5M | MMP |
|---|---|---|---|

A thermistor measures an object's temperature $T$, by measuring its resistance $R$ according to $R = AT^{-n}$, where $A$ and $n$ are positive constants. The observed resistances for different values of temperature (including environmental and instrumental sources of error) are given in table. The estimated value of the exponent $n$, from the above data, is closest to

1. 2.0
2. 0.8
3. 1.3
4. 2.7

| $T(K)$ | $R(\Omega)$ |
|---|---|
| 250 | 140 |
| 300 | 110 |
| 350 | 90 |

**Q48. [Dec 2025] . 5.0 marks**

Classical Mechanics > Canonical transformations

| CSIR NET | 2025 Dec | 5M | MMP |
|---|---|---|---|

The Lagrangian $L = L(x, y, \dot{x}, \dot{y})$ is invariant under the transformation $x \to x + \epsilon y$ and $y \to y + \epsilon x$, for any infinitesimal real parameter $\epsilon$.

If $P_x, P_y$ denote canonically conjugate momenta corresponding to $x, y$ respectively, then the corresponding conserved quantity is

1. $yP_x - xP_y$
2. $yP_x + xP_y$
3. $xP_x + yP_y$
4. $xP_x - yP_y$

**Q49. [Dec 2025] . 5.0 marks**

Classical Mechanics > Special theory of relativity

| CSIR NET | 2025 Dec | 5M | CM |
|---|---|---|---|

In a high energy scattering experiment involving two identical particles, each of rest mass $m_0$, one particle is initially at rest, while the other one is incident upon it with energy $E$ and momentum $p$. The total energy of the two-particle system in the centre-of-mass frame, in the limit $E \gg m_0c^2$, is approximately given by

1. $E$
2. $2E$
3. $\sqrt{\frac{Em_0c^2}{2}}$
4. $\sqrt{2Em_0c^2}$

**Q50. [Dec 2025] . 5.0 marks**

Solid State Physics > Tight binding model

| CSIR NET | 2025 Dec | 5M | SSP |
|---|---|---|---|

In a one-dimensional chain of atoms, the phonon energy dispersion is given by $E = A|\sin(ka)|$. Here, $A$ is a constant, $k$ is a vector in the reciprocal space and $a$ is lattice spacing. The density of states is proportional to

1. $\frac{1}{\sqrt{A^2-E^2}}$
2. $\frac{1}{\sqrt{A^2+E^2}}$
3. $\frac{1}{\sqrt{A-E}}$
4. $\frac{1}{\sqrt{A+E}}$

**Q51. [Dec 2025] . 5.0 marks**

Solid State Physics > Tight binding model

| CSIR NET | 2025 Dec | 5M | SSP |
|---|---|---|---|

Consider a one-dimensional chain of atoms with lattice constant $a$. The energy of an electron with wave-vector $k$ is $\epsilon(k) = \mu - 2\gamma\cos(ka)$, where $\mu$ and $\gamma$ are constants. If an electric field $\vec{E}$ is applied along the chain, the time dependent velocity of the electron is proportional to (assume initial wave vector $k = k_0$ at $t = 0$ )

1. $\sin^2\left(k_0 a - \frac{eEa}{\hbar}t\right)$.
2. $\cos\left(k_0 a - \frac{eEa}{\hbar}t\right)$.
3. $\sin\left(k_0 a - \frac{eEa}{\hbar}t\right)$.
4. $\cos^2\left(k_0 a - \frac{eEa}{\hbar}t\right)$.

**Q52. [Dec 2025] . 5.0 marks**

Thermodynamics > Laws of thermodynamics

| CSIR NET | 2025 Dec | 5M | Thermal |
|---|---|---|---|

A spherical gaseous ball of radius 15 m was formed with a temperature $T = 3 \times 10^5$ K. The gas expands adiabatically and its temperature drops to $5 \times 10^3$ K. Given $\gamma = \frac{5}{3}$ for this gas, the radius of the ball becomes approximately

1. 212 m
2. 86 m
3. 137 m
4. 116 m

**Q53. [Dec 2025] . 5.0 marks**

Atomic and Molecular Physics > Lasers

| CSIR NET | 2025 Dec | 5M | AMP |
|---|---|---|---|

An optical cavity of a laser, formed by two plane mirrors, is filled up with an active medium. The medium emits radiation at wavelengths 450 nm , 600 nm , and 750 nm . If the medium is continuously pumped, at which cavity length among the following, will all three wavelengths be amplified?

1. $750\mu$ m
2. $1500\mu$ m
3. $600\mu$ m
4. $450\mu$ m

**Q54. [Dec 2025] . 5.0 marks**

Quantum Mechanics > Basic Quantum Mechanics

| CSIR NET | 2025 Dec | 5M | QM |
|---|---|---|---|

A one-dimensional quantum harmonic oscillator with frequency $\omega$ is in its ground state. Its normalized wave function is given by

$$\psi(x) = \left(\frac{m\omega}{\pi\hbar}\right)^{\frac{1}{4}} \exp\left[-\frac{m\omega}{2\hbar}x^2\right].$$

The frequency is suddenly increased to $2\omega$. The probability of finding the particle in its new ground state is

1. $\frac{2\sqrt{2}}{3}$
2. $\left(\frac{2\sqrt{2}}{3}\right)^{\frac{1}{2}}$
3. $\frac{2}{3}$
4. $\left(\frac{3}{2\sqrt{2}}\right)^{\frac{1}{2}}$

**Q55. [Dec 2025] . 5.0 marks**

Mathematical Physics > Special Functions

| CSIR NET | 2025 Dec | 5M | MMP |
|---|---|---|---|

A sequence of polynomial $Q_n(x)[n = 0,1,2 \ldots]$ satisfies the recursion relation

$$Q_{n+1}(x) - 2xQ_n(x) + 2nQ_{n-1}(x) = 0, \text{ for all } n \geq 0$$

$$[\text{ here } Q_{-1}(x) = 0]$$

The generating function for the polynomials,

$g(x,t) = \sum_{n=0}^{\infty} \frac{t^n}{n!} Q_n(x)$, satisfies

1. $\frac{\partial g}{\partial t} = 2(t + x)g$
2. $\frac{\partial g}{\partial t} = 2(x - t)g$
3. $\frac{\partial g}{\partial t} = \frac{2(x-t)}{t} g$
4. $\frac{\partial g}{\partial t} = 2 + (x + t)g$

**Q56. [Dec 2025] . 5.0 marks**

Nuclear and Particle Physics > Particle physics

| CSIR NET | 2025 Dec | 5M | NPP |
|---|---|---|---|

Consider the cross-sections

$$\sigma_1 = \sigma(p + n \to \Delta^+ + n) \text{ and } \sigma_2 = \sigma\left(p + n \to \Delta^0 + p\right)$$

where the ( $\Delta^+, \Delta^0$ ) are part of the baryon decuplet.

Then

1. one of the $\sigma_{1,2}$ vanishes identically.
2. $\sigma_1 \gg \sigma_2$, with both being non-zero.
3. $\sigma_1 \ll \sigma_2$, with both being non-zero.
4. $\sigma_1 \approx \sigma_2$.

**Q57. [Dec 2025] . 5.0 marks**

Quantum Mechanics > Pertubation theory

| CSIR NET | 2025 Dec | 5M | QM |
|---|---|---|---|

Consider the one-dimensional motion of a particle of positive charge $q$ confined to an infinite potential well

$$V(x) = \begin{cases} 0 \text{ for } 0 \leq x \leq \pi \\ \infty \text{ otherwise} \end{cases}$$

which is subjected to a perturbing electric field $\vec{E} = E_0\hat{x}$. The shift in the ground state energy, to the first order in $q$, is

1. $\frac{q\pi E_0}{2}$
2. $-\frac{q\pi E_0}{2}$
3. $q\pi E_0$
4. $-q\pi E_0$

**Q58. [Dec 2025] . 5.0 marks**

Atomic and Molecular Physics > Molecular physics

| CSIR NET | 2025 Dec | 5M | AMP |
|---|---|---|---|

The bond dissociation energy of OH molecule is 4.18 eV with rotational constant $18.8\ \mathrm{cm}^{-1}$. For rotational induced dissociation, the minimum value of rotational quantum number is closest to

1. 114
2. 454
3. 45
4. 90

**Q59. [Dec 2025] . 5.0 marks**

Electromagnetism > Plasma

| CSIR NET | 2025 Dec | 5M | EMT |
|---|---|---|---|

Electromagnetic waves of frequency $\omega$ are incident on an electron gas, whose relaxation time is $\tau$. Let $\sigma_{\text{low}}$ and $\sigma_{\text{high}}$ represent the respective electrical conductivities of the gas in low frequency ($\omega\tau \ll 1$) and high frequency ($\omega\tau \gg 1$) limits. The ratio $\left(\sigma_{\text{low}}/\sigma_{\text{high}}\right)$ is

1. inversely proportional to $\omega^2$.
2. directly proportional to $\omega^2$.
3. independent of $\omega$.
4. directly proportional to $\omega$.

**Q60. [Dec 2025] . 5.0 marks**

Nuclear and Particle Physics > Nuclear properties

| CSIR NET | 2025 Dec | 5M | NPP |
|---|---|---|---|

For a spherical nucleus, consider the interior charge distribution to be

$$\rho(r) = \frac{\rho_0}{1 + \exp[(r - R)/a]}$$

where $\rho_0, R$ and $a$ are constants of appropriate dimensions. In the limit $a \to 0^+$, the number of protons (charge $e$ ) inside a sphere of radius $2R$ is given by

1. $\frac{2\rho_0}{e}\left(\frac{4}{3}\pi R^3\right)$
2. $\frac{\rho_0}{e}\left(\frac{4}{3}\pi R^3\right)$
3. $\frac{8\rho_0}{e}\left(\frac{4}{3}\pi R^3\right)$
4. $\frac{4\rho_0}{e}\left(\frac{4}{3}\pi R^3\right)$

**Q61. [Dec 2025] . 5.0 marks**

Classical Mechanics > Oscillations

| CSIR NET | 2025 Dec | 5M | CM |
|---|---|---|---|

The Lagrangian of a two-particle system is given by

$$L = \frac{1}{2}m\left(\dot{q}_1^2 + \dot{q}_2^2 + \dot{q}_1\dot{q}_2\right) - \frac{1}{2}m\omega^2\left(q_1^2 + q_2^2 + \frac{1}{2}q_1q_2\right).$$

The normal mode frequencies (in units of $\omega$ ) are

1. $\sqrt{\frac{5}{3}}, \frac{1}{2}$
2. $\sqrt{\frac{5}{6}}, \sqrt{\frac{3}{2}}$
3. $\sqrt{\frac{6}{5}}, \sqrt{2}$
4. $\sqrt{\frac{5}{6}}, \sqrt{2}$

**Q62. [Dec 2025] . 5.0 marks**

Statistical Mechanics > Ising model

| CSIR NET | 2025 Dec | 5M | Stat. Mech. |
|---|---|---|---|

A binary alloy consists of $N_A$ number of $A$-type and $N_B$ number of $B$-type atoms. The atoms sit on the sites of a simple cubic lattice and the nearest neighbours interact with each other. Assume an attractive interaction energy $-J(J>0)$ between two like neighbours ( $AA$ or $BB$ pair) and a repulsive interaction energy $+J$ between two unlike neighbours ( $AB$ pair). If $N$ is the total number of sites, then the average energy of the system at a very high temperature ( $k_BT \gg J$ ) is

1. $-3J\frac{(N_A-N_B)^2}{N}$
2. $3JN$
3. $3j\frac{(N_A+N_B)^2}{N}$
4. $-3J(N_A-N_B)$

**Q63. [Dec 2025] . 5.0 marks**

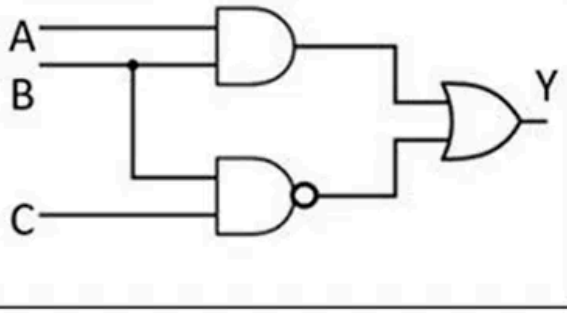
Electronics > Digital Electronics

| CSIR NET | 2025 Dec | 5M | Electronics |
|---|---|---|---|

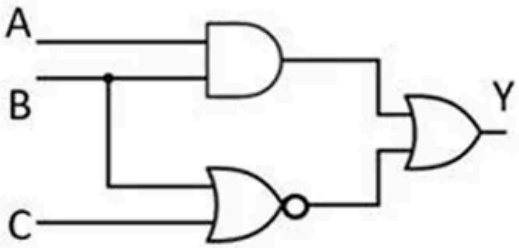
The digital logic circuit that would give the following truth table

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| A | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 |
| B | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 |
| C | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| Y | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 |

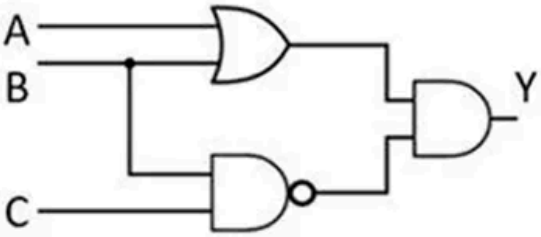
1.




2.




3.

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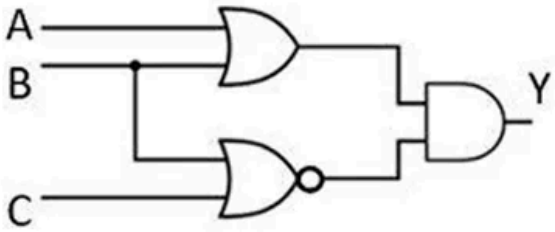


**Q64. [Dec 2025] . 5.0 marks**

Atomic and Molecular Physics > Doppler broadening

| CSIR NET | 2025 Dec | 5M | AMP |
|---|---|---|---|

Consider an emission line of wave length $\lambda = 550$ nm of Argon ( $A = 40, Z = 18$) at a temperature 400 K . The full Doppler width of the emission line will be closest to

*1.* $10^{-2}$ nm

*2.* $10^{-1}$ nm

*3.* $10^{-3}$ nm

*4.* $10^{-5}$ nm

**Q65. [Dec 2025] . 5.0 marks**

Solid State Physics > Lattice vibrations

| CSIR NET | 2025 Dec | 5M | SSP |
|---|---|---|---|

A cubic sample of edge length $L$ is maintained at a temperature of 4 K . The speed of sound in the material of the sample is $5 \times 10^3$ m/s. The minimum value of $L$ required to excite the lowest frequency phonon mode is closest to

1. 10 nm

2. 30 nm

3. 20 nm

4. 5 nm

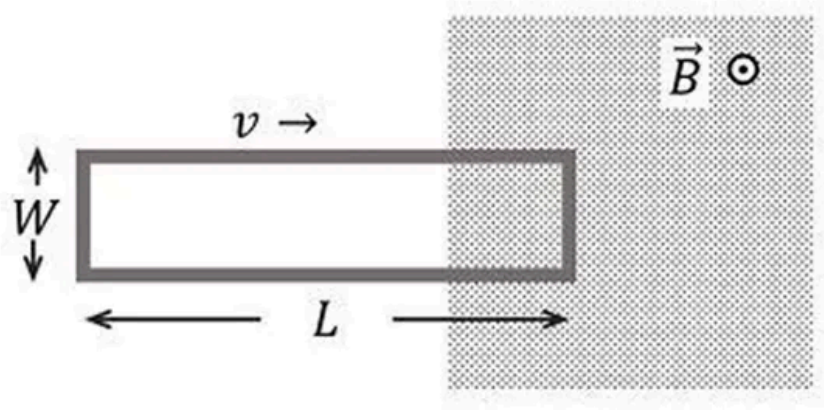
**Q66. [Dec 2025] . 5.0 marks**

Electromagnetism > Electrodynamics

| CSIR NET | 2025 Dec | 5M | EMT |
|---|---|---|---|

A long rectangular metallic loop of width $W$ and length $L(\gg W)$ starts entering a region, where there is a uniform magnetic field $B$ perpendicular to the plane of the loop. The resistance of the loop is $R$ and its mass is $M$. If $v_0$ is the velocity of the loop just before entering the region, then neglecting the self-inductance effect, the velocity at a later time $t$ is

1. $v(t) = \frac{v_0}{1+\frac{B^2W^2}{MR}t}$
2. $v(t) = \frac{v_0}{1+\left(\frac{B^2W^2}{MR}t\right)^2}$
3. $v(t) = v_0 e^{-\frac{B^2W^2}{MR}t}$
4. $v(t) = \frac{v_0}{1+\ln\left(1+\frac{B^2W^2}{MR}t\right)}$



**Q67. [Dec 2025] . 5.0 marks**

Electromagnetism > EM Waves

| CSIR NET | 2025 Dec | 5M | EMT |
|---|---|---|---|

A monochromatic plane wave is incident normally from a dielectric medium $A$ onto another dielectric medium $B$. The indices of refraction satisfy $n_A < n_B$. One-fourth of the incident energy is reflected back into medium $A$. Let $\vec{E}$ be the resultant electric field due to the superposition of the incident wave and the reflected wave. Then, the ratio of the two time-averages $\langle \vec{E}^2 \rangle_{\text{min}} / \langle \vec{E}^2 \rangle_{\text{max}}$ is

1. $\frac{1}{8}$
2. $\frac{1}{9}$
3. $\frac{4}{9}$
4. $\frac{1}{4}$

**Q68. [Dec 2025] . 5.0 marks**

Mathematical Physics > Basic Mathematics

| CSIR NET | 2025 Dec | 5M | MMP |
|---|---|---|---|

Find the curve that extremizes the functional

$$I(y) = \int_0^1 \left[\left(\frac{dy}{dx}\right)^2 + 12xy\right] dx$$

for the given boundary conditions $y(0) = 0$ and $y(1) = 1$

1. $y = x^3$
2. $y = x^2$
3. $y = 2x^2 - x$
4. $y = 3x^3 - 2x^2$

**Q69. [Dec 2025] . 5.0 marks**

Quantum Mechanics > Orbital angular Momentum and Hydrogen atom

| CSIR NET | 2025 Dec | 5M | QM |
|---|---|---|---|

For a particle in the angular momentum state $|l = 4, m_l = 2\rangle$, the expectation value of the operator $L_x L_y$ is

1. $-\hbar^2$
2. $\hbar^2$
3. $-i\hbar^2$
4. $i\hbar^2$

**Q70. [Dec 2025] . 5.0 marks**

Statistical Mechanics > Canonical Ensemble

| CSIR NET | 2025 Dec | 5M | Stat. Mech. |
|---|---|---|---|

Consider a one-dimensional lattice (with lattice spacing $a$ ) along X -axis with sites labelled by $x = 0,1,2 \ldots\ldots L$. A particle carrying a charge $-q$ can occupy any one of these sites. An electric field of strength $E$ is applied in the positive x-direction. The average energy of the particle at a temperature $T$ (in the limit $L \to \infty$) is $\left(\beta = \frac{1}{k_B T}\right)$

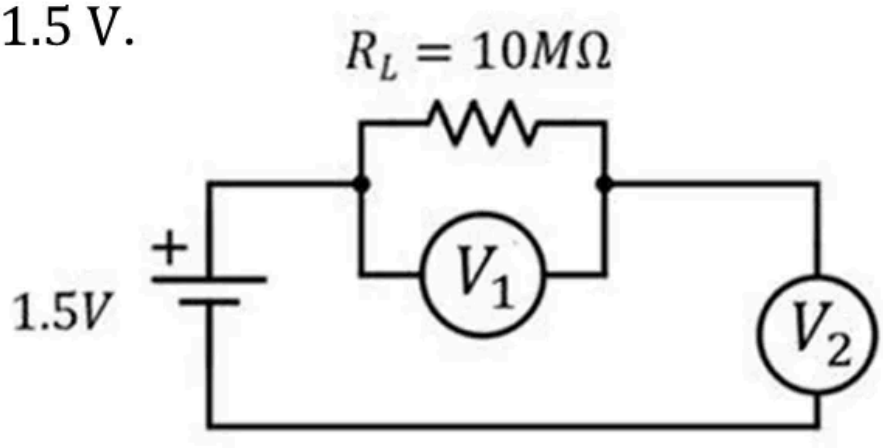
1. $\frac{Eqa}{e^{\beta Eqa}-1}$
2. $\frac{Eqa}{1+e^{\beta Eqa}}$
3. $\frac{Eqa}{2}$
4. $-Eqa$

**Q71. [Dec 2025] . 5.0 marks**

Electronics > Instruments

| CSIR NET | 2025 Dec | 5M | Electronics |
|---|---|---|---|

In the circuit shown below, the input impedance of voltmeters $V_1$ and $V_2$ are $10\text{M}\Omega$. If $R_L = 10\text{M}\Omega$ and $V_{\text{in}} = 1.5\text{ V}$.




The measured voltages by $V_1$ and $V_2$ are closest to

1. 0.5 V and 1.0 V , respectively
2. 0 V and 1.5 V , respectively
3. 1.5 V and 0 V , respectively
4. 1.0 V and 0.5 V , respectively

**Q72. [Dec 2025] . 5.0 marks**

Statistical Mechanics > Quantum Statistical Mechanics

| CSIR NET | 2025 Dec | 5M | Stat. Mech. |
|---|---|---|---|

The excitations of a three-dimensional solid are bosonic in nature and their energy dispersion is given by $\epsilon_k \propto k^2$, in the long wavelength limit. If the chemical potential of the system is zero, the temperature dependence of specific heat of the system at low temperature is proportional to

1. $T^3$
2. $T^{\frac{3}{2}}$
3. $T^{\frac{5}{2}}$
4. $T^{\frac{1}{2}}$

**Q73. [Dec 2025] . 5.0 marks**

Classical Mechanics > Lagrangian and Hamiltonian

| CSIR NET | 2025 Dec | 5M | CM |
|---|---|---|---|

The Hamiltonian of a simple pendulum consisting of mass $m$ attached to a massless string of length $l$ is $H = \frac{P_\theta^2}{2ml^2} + mgl(1 - \cos\theta)$. If $L$ denotes the Lagrangian, then $\frac{dL}{dt}$ is

1. $\frac{g}{l} P_\theta \cos\theta$
2. $\frac{-g}{l} P_\theta \sin\theta$
3. $\frac{-2g}{l} P_\theta \sin\theta$
4. $\frac{g}{l} P_\theta \cos(2\theta)$

**Q74. [Dec 2025] . 5.0 marks**

Nuclear and Particle Physics > Liquid drop Model

| CSIR NET | 2025 Dec | 5M | NPP |
|---|---|---|---|

Suppose that the volume and the surface terms are the most dominant ones in the semi-empirical formula for the binding energy of a nucleus. Let $C_s$ and $C_v$ be the coefficients of the surface and volume terms. Which of the following is a criterion for stability of the nucleus?

1. $A > \left(\frac{C_s}{C_v}\right)^3$
2. $A < \left(\frac{C_s}{C_v}\right)^3$
3. $A > \left(\frac{2C_s}{3C_v}\right)^3$
4. $A < \left(\frac{2C_s}{3C_v}\right)^3$

**Q75. [Dec 2025] . 5.0 marks**

Atomic and Molecular Physics > Zeeman effect

| CSIR NET | 2025 Dec | 5M | AMP |
|---|---|---|---|

A hydrogen atom is in a weak external magnetic field $\vec{B}$. Consider an electron of this atom with $\left(l = 1, s = \frac{1}{2}\right)$ and total $j = \frac{3}{2}$. There are multiple energy levels for this electron due to the magnetic field. The energy spacing between any two adjacent levels (in units of $\mu_B B$ ) is

1. $\frac{1}{2}$
2. $\frac{1}{3}$
3. $\frac{3}{4}$
4. $\frac{4}{3}$

# Answer Key

75 questions . Subject and topic for quick revision

| Q. No | Subject | Topic | Answer |
|---|---|---|---|
| Q1 | General Aptitude | Mathematical Analysis | **3** |
| Q2 | General Aptitude | Data Analysis | **1** |
| Q3 | General Aptitude | Data Analysis | **3** |
| Q4 | General Aptitude | Mathematical Analysis | **2** |
| Q5 | General Aptitude | Basic Physics | **3** |
| Q6 | General Aptitude | Mathematical Analysis | **3** |
| Q7 | General Aptitude | Reasoning | **4** |
| Q8 | General Aptitude | Mathematical Analysis | **2** |
| Q9 | General Aptitude | Mathematical Analysis | **1** |
| Q10 | General Aptitude | Mathematical Analysis | **1** |
| Q11 | General Aptitude | General Knowledge | **4** |
| Q12 | General Aptitude | Data Analysis | **3** |
| Q13 | General Aptitude | Basic Physics | **2** |
| Q14 | General Aptitude | Reasoning | **3** |
| Q15 | General Aptitude | Reasoning | **2** |
| Q16 | General Aptitude | Reasoning | **3** |
| Q17 | General Aptitude | Basic Physics | **3** |
| Q18 | General Aptitude | Mathematical Analysis | **3** |
| Q19 | General Aptitude | General Knowledge | **2** |
| Q20 | General Aptitude | Mathematical Analysis | **1** |
| Q21 | Electromagnetism | Electrostatics | **2** |
| Q22 | Mathematical Physics | Probability | **1** |
| Q23 | Statistical Mechanics | Random Walk/Brownian motion/Diffusion | **3** |
| Q24 | Classical Mechanics | Rotation Motion | **3** |
| Q25 | Quantum Mechanics | Orbital angular Momentum and Hydrogen atom | **4** |
| Q26 | Statistical Mechanics | Quantum Statistical Mechanics | **4** |
| Q27 | Electronics | OPAMP | **3** |
| Q28 | Electromagnetism | Capacitors | **1** |
| Q29 | Statistical Mechanics | Canonical Ensemble | **4** |
| Q30 | Electronics | RLC Circuits | **4** |
| Q31 | Electromagnetism | Electrostatics | **3** |
| Q32 | Electromagnetism | Multipoles | **4** |
| Q33 | Mathematical Physics | Complex analysis | **1** |
| Q34 | Electronics | Transistors | **1** |
| Q35 | Thermodynamics | Kinetic theory of Gases | **2** |
| Q36 | Mathematical Physics | Complex analysis | **4** |
| Q37 | Quantum Mechanics | Two particle System | **3** |
| Q38 | Classical Mechanics | Rotation Motion | **2** |
| Q39 | Quantum Mechanics | Quantum Harmonic Oscillator | **4** |
| Q40 | Quantum Mechanics | Spin Angular momentum | **3** |

# Answer Key (cont.)

| Q. No | Subject | Topic | Answer |
|---|---|---|---|
| Q41 | Optics | Interference and diffraction | **2** |
| Q42 | Classical Mechanics | Phase space diagrams | **4** |
| Q43 | Mathematical Physics | Matrices and Linear Algebra | **3** |
| Q44 | Classical Mechanics | Basic Mechanics | **2** |
| Q45 | Quantum Mechanics | Basic Quantum Mechanics | **1** |
| Q46 | Mathematical Physics | Probability | **3** |
| Q47 | Electronics | "Errors , curve fitting and data analysis" | **3** |
| Q48 | Classical Mechanics | Canonical transformations | **2** |
| Q49 | Classical Mechanics | Special theory of relativity | **4** |
| Q50 | Solid State Physics | Tight binding model | **1** |
| Q51 | Solid State Physics | Tight binding model | **3** |
| Q52 | Thermodynamics | Laws of thermodynamics | **4** |
| Q53 | Atomic and Molecular Physics | Lasers | **4** |
| Q54 | Quantum Mechanics | Basic Quantum Mechanics | **1** |
| Q55 | Mathematical Physics | Special Functions | **2** |
| Q56 | Nuclear and Particle Physics | Particle physics | **4** |
| Q57 | Quantum Mechanics | Pertubation theory | **2** |
| Q58 | Atomic and Molecular Physics | Molecular physics | **3** |
| Q59 | Electromagnetism | Plasma | **4** |
| Q60 | Nuclear and Particle Physics | Nuclear properties | **2** |
| Q61 | Classical Mechanics | Oscillations | **2** |
| Q62 | Statistical Mechanics | Ising model | **1** |
| Q63 | Electronics | Digital Electronics | **2** |
| Q64 | Atomic and Molecular Physics | Doppler broadening | **3** |
| Q65 | Solid State Physics | Lattice vibrations | **2** |
| Q66 | Electromagnetism | Electrodynamics | **3** |
| Q67 | Electromagnetism | EM Waves | **2** |
| Q68 | Mathematical Physics | Basic Mathematics | **1** |
| Q69 | Quantum Mechanics | Orbital angular Momentum and Hydrogen atom | **4** |
| Q70 | Statistical Mechanics | Canonical Ensemble | **1** |
| Q71 | Electronics | Instruments | **1** |
| Q72 | Statistical Mechanics | Quantum Statistical Mechanics | **2** |
| Q73 | Classical Mechanics | Lagrangian and Hamiltonian | **3** |
| Q74 | Nuclear and Particle Physics | Liquid drop Model | **1** |
| Q75 | Atomic and Molecular Physics | Zeeman effect | **4** |

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