



TECHNO INDIA GROUP PUBLIC SCHOOLS

Dt. 10-11-2025

JEE (Main)-XII Monthly Mock Test - 5 (November-2025)

Time Allowed: **3 hours**

Maximum Marks: **300**

General Instructions:

1. There are three subjects in the question paper consisting of Physics (Q. no. 1 to 25), Chemistry (Q. no. 26 to 50), and Mathematics (Q. no. 51 to 75).
2. Each subject is divided into two sections. Section A consists of 20 multiple-choice questions & Section B consists of 5 numerical value-type questions.
3. There will be only one correct choice in the given four choices in Section A. For each question for Section A, 4 marks will be awarded for correct choice, 1 mark will be deducted for incorrect choice questions and zero marks will be awarded for not attempted questions.
4. For Section B questions, 4 marks will be awarded for correct choice, 1 mark will be deducted for incorrect choice questions and zero marks will be awarded for not attempted questions.
5. Any textual, printed, or written material, mobile phones, calculator etc. is not allowed for the students appearing for the test.
6. All calculations/written work should be done in the rough sheet, provided with the Question Paper.

Space For Rough Works



PHYSICS

Section—A (Single Option Correct Type)

1. A block of mass 10kg moving in X direction with constant speed of 10 m/s is subjected to a retreading force $F = 0.1x$ J/m during its travel $x = 20$ m to 30m. Its final kinetic energy will be

① 475J ② 450J ③ 275J ④ 250J
2. The moment of inertia of a solid sphere of density ρ and radius R about its diameter is

① $\frac{105}{176}R^5\rho$ ② $\frac{105}{176}R^2\rho$ ③ $\frac{176}{105}R^5\rho$ ④ $\frac{176}{105}R^2\rho$
3. If radius of the earth becomes half of its present value with the mass remaining the same the duration of one day will become

① 6h ② 12h ③ 48h ④ 96h
4. Two capillary of length 2 & 21 and of radial R & 2R are connected in series. The net rate of flow of fluid through them will be (given rate of flow through a single capillary, $x = \pi R^4/8\eta^2$)

① $\frac{8}{9}x$ ② $\frac{9}{8}x$ ③ $\frac{5}{7}x$ ④ $\frac{7}{5}x$
5. A piece of wood of relative density 0.36 floats in oil of relative density 0.90 the fraction of volume of wood above the surface of oil is

① 0.3 ② 0.4 ③ 0.6 ④ 0.8
6. Boiling water is changing into steam. Under this condition the specific heat of water is

① zero ② one ③ infinite ④ less than one
7. During an adiabatic process, the pressure of gas is found to be proportional to the cube of absolute temperature. The ratio $\frac{c_p}{c_v}$ for the gas is

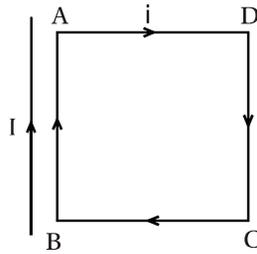
① $\frac{4}{3}$ ② 2 ③ $\frac{5}{3}$ ④ $\frac{3}{2}$
8. Which of the prism is used to see infrared spectrum of light

① Rock salt ② Nicol ③ Flint's ④ Crown
9. In 0.2 s, the current in primary coil increases from 2.5 A to 3.5 A. If the mutual inductance between two coils is 80 mH, then the induced current in secondary coil having resistance of 4 Ω will be

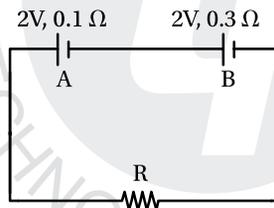
① 2 A ② 1.5 A
③ 1 A ④ 0.1 A
10. A coil having n turns and resistance R Ω is connected with a galvanometer of resistance 4R Ω . This combination is moved for time t second, as a result magnetic flux through the coil changes from w_1 Wb to w_2 Wb. The average induced current in the circuit is

① $\frac{n(w_1 - w_2)}{Rt}$ ② $\frac{n(w_2 - w_1)}{5Rt}$ ③ $\frac{2(w_2 - w_1)}{4Rt}$ ④ $\frac{(w_2 - w_1)}{Rt}$

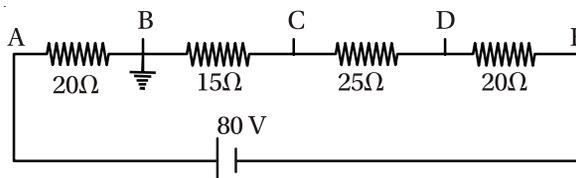
15. A rectangular loop carrying a current 'i' is situated near a long straight wire such that the wire is parallel to one of the sides of the loop. If a steady current I is established in the wire as shown in figure, the loop will



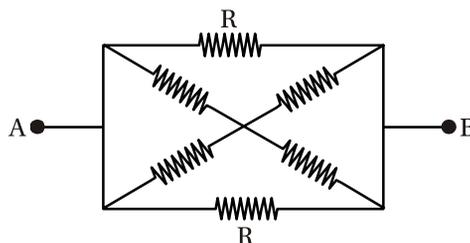
- ① Rotate about an axis parallel to the wire ② Move away from the wire
 ③ Move towards the wire ④ Remain stationary
16. A straight horizontal conducting rod of length 0.5 m and mass 50 g is suspended by two vertical wires at its ends. A current of 5.0 A is setup in the rod through the wires, what horizontal magnetic field should be set up normal to the rod so that the tension in the wires is zero? Ignore the mass of the wires and take $g = 10 \text{ ms}^{-2}$
- ① 0.1 T ② 0.2 T ③ 0.3 T ④ 0.4 T
17. A magnetic needle lying parallel to a uniform magnetic field requires W joule of work to turn it through 60° . The torque (in newton. meter) needed to keep the needle in this position will be -
- ① W ② $\frac{\sqrt{3}}{2}W$ ③ 2W ④ $\sqrt{3}$
18. The internal resistances of two cells shown are 0.1Ω and 0.3Ω . If $R = 0.1 \Omega$, the potential difference across the cell



- ① B will be - 0.4 V ② B will be + 0.4 V ③ A will be 1 V ④ A will be 1.5 V
19. Figure shows a circuit in which the potential difference across the resistances are given in the diagram. If point B is grounded, the potential at point D will be



- ① 10 V ② -10 V ③ 40 V ④ -40 V
20. Six resistors each of resistance R are connected as shown in figure. What is the effective resistance between points A and B?



① $\frac{R}{3}$

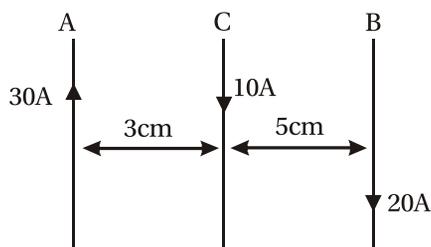
② R

③ 3R

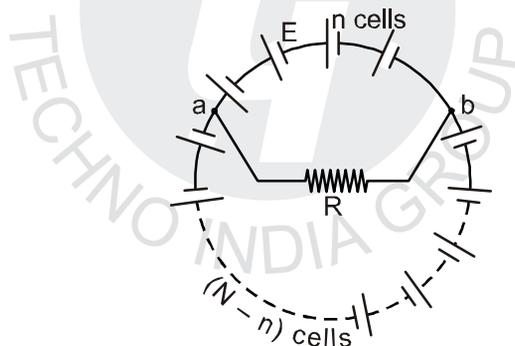
④ 6R

Section—B
(Numerical Answer Type)

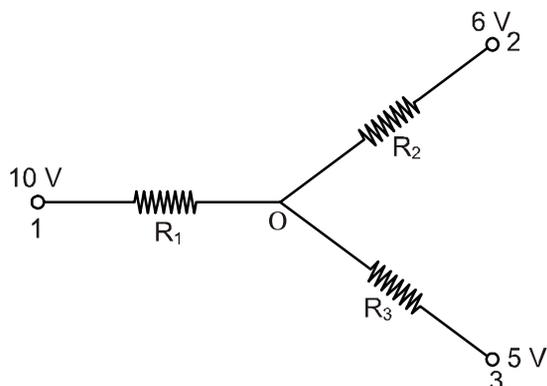
21. Consider three long straight parallel wires as shown in figure. The force experienced by a 25 cm length of wire C is $n \times 10^{-4}$ N. Find the value of n



22. Two concentric coils each of radius 2π cm are placed at right angles to each other. Currents of 3A and 4A are flowing in two coils. The magnetic field induction at the centre of the coils is $2.5 K \times 10^{-5}$ Wb/m². The value of K is _____
23. N cells, each of emf E and internal resistance 'r' are arranged in series forming a ring. Two points a and b including n cells on one arc and (N - n) cells on another arc are connected to a resistor R. The current through R is I. Then I = [Given, E = 2V, r = 1 Ω , N = 100, n = 20, R = 10 Ω]



24. In the given circuit; $R_1 = 10 \Omega$, $R_2 = 40\Omega$, $R_3 = 20\Omega$
The potential of the junction O is 'V' volt. Then V =



25. A current is increasing at a rate of 4 A s^{-1} through a coil of inductance 2 H . When the current is 2 A , the energy stored in the inductor per unit time is $n \text{ watt}$. The value of n is

CHEMISTRY

Section—A (Single Option Correct Type)

26. The Van't Hoff's factor for $0.1 \text{ (M) Ba(NO}_3)_2$ solution is 2.74 . The percentage dissociation of solute is:
 ① 13% ② 74% ③ 91.3% ④ 87%
27. The vapour pressure of pure liquid 'A' is 70 torr at 27°C . It forms an ideal solution with another liquid B. The mole fraction of 'B' is 0.2 and total vapour pressure of the solution is 84 torr at 27°C . The vapour pressure of pure liquid B at 27°C is:
 ① 140 torr ② 50 torr ③ 14 torr ④ 70 torr
28. The molarity of 1 (M) NaNO_3 solution is ($d = 1.25 \text{ g/mL}$):
 ① 0.8 m ② 0.858 m ③ 1.6 m ④ 1 m
29. The e.m.f of the cell involving the following reaction:
 $2\text{Ag}^+ + \text{H}_2 \uparrow \longrightarrow 2\text{Ag} + 2\text{H}^+$ is 0.80V .
 The standard oxidation potential of silver electrode is:
 ① -0.80 V ② $+0.80 \text{ V}$ ③ 0.40 V ④ -0.40 V
30. The molar ionic conductivities of NH_4^+ and OH^- at infinite dilution are 72 and $198 \text{ ohm}^{-1}\text{cm}^2$ respectively. The molar conductivity of a centrinormal NH_4OH solution at the same temperature is found to be $9 \text{ ohm}^{-1}\text{cm}^2$. The percentage dissociation of NH_4OH at this concentration will be:
 ① 3.33% ② 7.14% ③ 12.5% ④ 4.54%

Assertion-Reason Questions (Q.6-Q.10):

- (A) Both (A) and (R) are correct and (R) is the correct explanation of (A)
 (B) Both (A) and (R) are correct but (R) is not the correct explanation of (A)
 (C) (A) is correct but (R) is not correct
 (D) (A) is not correct but (R) is correct
31. **Assertion:** Magnetic moment values of actinoids are lesser than theoretically predicted values.
Reason: Actinoid elements are strongly paramagnetic.
 ① A ② B ③ C ④ D
32. **Assertion:** In transition elements ns orbital is filled up first and $(n - 1) \text{ d}$ afterwards, during ionization ns electrons are lost prior to $(n - 1) \text{ d}$ electron.
Reason: The effective nuclear charge felt by $(n - 1) \text{ d}$ electrons is higher as compared to that by ns electrons.
 ① A ② B ③ C ④ D
33. **Assertion:** The degree of complex formation in actinoids decreases in the order:
 $\text{M}^{4+} > \text{MO}_2^{2+} > \text{M}^{3+} > \text{MO}_2^+$
Reason: Actinoids form complex with π -bonding liquids as alkyl phosphites and thioethers.
 ① A ② B ③ C ④ D

58. If the least positive real number satisfying the equation $|\ln|x|| = |\tan^{-1}x|$, is 'a', then value of [a] is ([.] \rightarrow GIF)
- ① 0 ② 1 ③ 2 ④ 3
59. $\int e^x(2 + \sin 2x - 4\sin^2 x)dx$ is equal to (where C = constant)
- ① $e^x \cdot \sin 2x + C$ ② $e^x \sin x + C$ ③ $e^x \cos 2x + C$ ④ $e^x \cos x + C$
60. If the function $f(x) = 2 - e^{-x}$ and $g(x) = f^{-1}(x)$, then the value of $g''(1)$ is equal to
- ① -1 ② 0 ③ 1 ④ $\frac{1}{2}$
61. The ratio in which plane $\vec{r} \cdot (\hat{i} - 2\hat{j} + 2\hat{k}) = 17$ divides the line joining the points $(-2, 4, 7)$ and $(3, -5, 8)$ is
- ① 3 : 5 ② 1 : 10 ③ 3 : 10 ④ 13 : 12
62. Number of different terms in the expansion of $(1 + 2x - 3x^2 + 4x^4)^{100}$ is equal to
- ① 399 ② 400 ③ 401 ④ 100
63. $\int 2^{2^{2^x}} 2^{2^x} 2^x dx = A \cdot 2^{2^{2^x}} + c$ where A =
- ① 1 ② \log_e^2 ③ $(\log_e^2)^2$ ④ $(\log_e^2)^{-3}$
64. If a matrix $A = \{a_{ij}\}_{n \times m}$ is symmetric as well as skew symmetric, then $\text{Tr}(A)$ (where $\text{Tr}(A)$ denotes trace of matrix A) will be
- ① 1 ② 0 ③ n ④ n^2
65. If the vectors $\vec{a}, \vec{b}, \vec{c}$ are such that each is inclined at an angle $\frac{\pi}{3}$ with the other and $|\vec{a}| = 1, |\vec{b}| = 2, |\vec{c}| = 3$ then $|\vec{a} + \vec{b} + \vec{c}| =$
- ① $3\sqrt{2}$ ② 4 ③ 5 ④ 6
66. The function $f(x) = \frac{\ln(\pi+x)}{\ln(e+x)}$ is
- ① increasing on $(0, \infty)$ ② decreasing on $(0, \infty)$
- ③ increasing on $(0, \frac{\pi}{e})$ and decreasing on $(\frac{\pi}{e}, \infty)$ ④ decreasing on $(0, \frac{\pi}{e})$ and increasing on $(\frac{\pi}{e}, \infty)$
67. If $a > 2b > 0$, then the positive value of m for which $y = mx - b\sqrt{1+m^2}$ is a common tangent of the circles $x^2 + y^2 = b^2$ and $(x-a)^2 + y^2 = b^2$ is
- ① $\frac{2b}{\sqrt{a^2 - 4b^2}}$ ② $\frac{\sqrt{a^2 - 4b^2}}{2b}$ ③ $\frac{2b}{a-2b}$ ④ $\frac{b}{a-2b}$

68. If $f(x)$ is a polynomial such that $f(x).f(y) = f(xy) - f(x) - f(y) \forall x, y$ and $f(2) = 7$, then $f(-2) =$
 ① 8 ② 10 ③ -7 ④ -9
69. If $\sin^{-1}(\cos^{-1}x) < 1$ and $\cos^{-1}(\sin^{-1}x) < 1$ then $x \in$
 ① $(\sin 1, \sin(\sin 1))$ ② $(\cos(\cos 1), \cos(\sin 1))$ ③ $(\cos(\sin 1), \cos(\cos 1))$ ④ None of these
70. The number of real values of K , such that the lines $x - 2y + 3 = 0$, $Kx + 3y + 1 = 0$ and $4x - Ky + 2 = 0$ are concurrent
 ① 0 ② 1 ③ 2 ④ 4

Section—B
(Numerical Answer Type)

71. $f(x) = \begin{cases} ax - \sin x + 1 & ; x \geq 0 \\ a - |x| & ; x < 0 \end{cases}$ is increasing $\forall x \in \mathbb{R}$, then number of integral values of 'a' is
72. If $p^2 + q^2 + r^2 = -2$ and $h(x) = \begin{vmatrix} 1+p^2x & (1+q^2)x & (1+r^2)x \\ (1+p^2)x & 1+q^2x & (1+r^2)x \\ (1+p^2)x & (1+q^2)x & 1+r^2x \end{vmatrix} \forall x \in \mathbb{R}$, then $\int_1^4 h(x) dx$ is
73. Let $P = \begin{bmatrix} 1 & 0 & 0 \\ 4 & 1 & 0 \\ 16 & 4 & 1 \end{bmatrix}$ and I be the identity matrix of order 3. If $Q = [a_{ij}]$ is a matrix such that $P^{50} - Q = I$, then $\frac{q_{31} + q_{32}}{q_{21}} = ?$
74. Let $T > 0$ be a fixed real number. Suppose f is a continuous function such that for all $x \in \mathbb{R}$, $f(x + T) = f(x)$. If $I_1 = \int_0^T f(x) dx$ and $I_2 = \int_3^{3+3T} f(2x) dx$ then the value of $\frac{I_2}{I_1}$
75. Least distance between the curves given by $y = 2\sqrt{x}$ and $y = \sqrt{12x - x^2 - 31}$ is $n\sqrt{5}$ then value of n is