TECHNO INDIA GROUP PUBLIC SCHOOLS

JEE (Main)-XI

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.

PHYSICS

Section—A
(Single Option Correct Type)

1. One gm mol of a diatomic gel (r = 1.4) is compresed adiabatically is that its temperature raises from 27°C to 123°C. The work done will be

   ① 2077.5 Joules   ② 207.5 Joules   ③ 203.5 Joules   ④ None of these

2. If r = 2.5 and vinal volume is equal to 8 times to the initial volume then final pressure is equal to (initial pressure = P)

   ① $P' = P$ ② $P' = 2P$ ③ $P' = P + (2)^{15/2}$ ④ $P' = 7P$

3. The amount of heat required will be minimum when a body is heated through:

   ① 1K   ② 1°C

   ③ 1°F   ④ it will be the same in all the three case

4. At triple point the values of latest heat is

   ① infinite   ② zero   ③ .80 cal/gm   ④ 540 cal/gm

5. If pressure of CO_2 (red gas) in a container is given by $P = \dfrac{RT}{2r - b} - \dfrac{a}{4b^2}$, then mass of the gas in container is

   ① 11 g   ② 12 g   ③ 33 g   ④ 44 g

6. The work done in blowing a soap bubble of 10 cm radius is (surfaces tension of the soap solution is 0.03 H/m)

   ① 37.68×10^{-4} J   ② 75.36×10^{-4} J   ③ 150.72×10^{-4} J   ④ 75.36×10^{-5} J

7. The pressure of the gol in a cilinder chamber is P_0. The veriable force exerted by the gol or in hemispherical end is
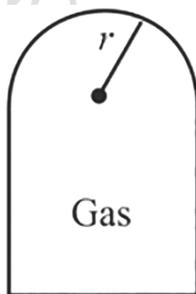

   ① $P_0 r^2$ ② $4P_0 \pi r^2$ ③ $2P_0 \pi r^2$ ④ $P_0 \pi r^2$

8. The moment of inertia of a uniform rectangular does of mass m, length 2s and width l about its length side is

   ① $\dfrac{11ml^2}{24}$ ② $\dfrac{5ml^2}{24}$ ③ $\dfrac{ml^2}{3}$ ④ $\dfrac{ml^2}{12}$

9. A cyclist is moving with a speed of 6 ms⁻¹. As he approaches a circular turn on the road of radius 120 m, he applies brakes and reduces his speed at a constant rate of 0.4 ms⁻². The magnitude of the net acceleration of the cyclist on the circular turn is

   ① 0.5 ms^{-2} ② 1.0 ms^{-2} ③ 2.0 ms^{-2} ④ 4.0 ms^{-2}

10. A uniform rod of Young's modulus Y pushed over a smooth horizontal surface by a constant horizontal force F_0. The area of cross-section of the rod is A. The compressive strain on the rod is

① $\dfrac{F_0}{AY}$ ② $\dfrac{F_0}{2AY}$

③ $\dfrac{2F_0}{AY}$ ④ $\dfrac{2F_0}{3AY}$
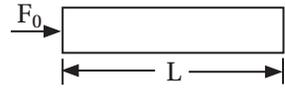
11. The liquid in lower level has specific gravity 16 and the liquid in upper level has density $10^3 \, \text{kg m}^{-3}$. The block is made up of meterial of density $6 \times 10^3 \, \text{kg m}^{-3}$. What fraction of the volume of block is submerged in lower liquid?
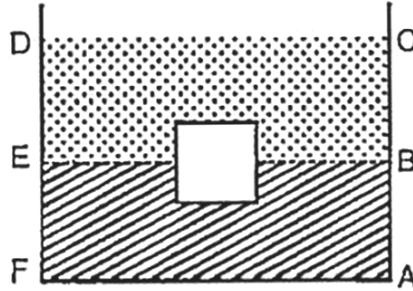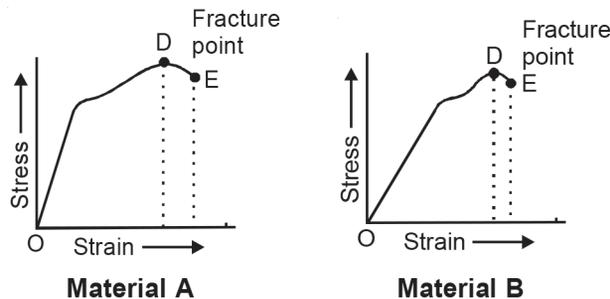
① $\dfrac{2}{3}$ ② $\dfrac{1}{3}$ ③ $\dfrac{1}{2}$ ④ $\dfrac{3}{4}$

12. Two bodies are moving in concentric orbits of radii 2 cm and 4 cm such that their time periods are the same. The ratio of their centripetal accelerations is

① $\dfrac{1}{2}$ ② $\dfrac{1}{8}$ ③ $\dfrac{3}{2}$ ④ $\dfrac{4}{9}$

13. The stress-strain graphs for two materials are shown in figure (assume same scale). Choose the correct statemetn(s)

① A is more elastic and more brittle ② B is more elastic and more brittle

③ A is more elastic and less brittle ④ B is less elastic and less brittle

14. A thin metal disc of radius r floats on water surface and bends the surface downwards along the perimeter making an angle θ with vertical edge of the disc. If the disc displaces a weight of water W and surface tension of water is T, then the weight of metal disc is

① $(2\pi rt + W)$ ② $(2\pi rT \cos\theta - W)$ ③ $(2\pi rT \cos\theta + W)$ ④ $(W - 2\pi RT \cos\theta)$

15. 10 g of ice at –20°C is dropped into a calorimeter containing 10 g of water at 10°C. The specific heat of water is twice that of ice. When equilibrium is reached, the calorimeter will contain (specific heat of ice = 0.5 calorie

g^{-1} °C^{-1})

① 10 g of ice and 10 g water   ② 20 g water

③ 5 g ice and 15 g water   ④ 20 g ice

16. A block of metal is heated to a temperature much higher than the room temperature and allowed to cool in a room free from air currents. Which of the following curves correctly represents the cooling ?

(T = temperature of the block)

①   ②   ③   ④

17. Find the work done during the perfectly circular cyclic process as shown in the diagram.

① $\pi\dfrac{(P_1-P_2)^2}{2}$ ② $\pi\dfrac{(V_2-V_1)^2}{2}$ ③ $\pi\dfrac{(V_2-V_1)}{2}\cdot\dfrac{(P_1-P_2)}{2}$ ④ $\pi\dfrac{(V_2-V_1)}{2}\cdot\dfrac{(P_2-P_1)}{2}$

18. The isothermal bulk modulus of an ideal gas at pressure P is

① P   ② γP ③ $\dfrac{P}{2}$ ④ $\dfrac{P}{\gamma}$

19. A slab of stone of area 0.36 m² and thickness 0.1 m is exposed on the lower surface to steam at 100°C. A block of ice at 0°C rests on the upper surface of the slab. In one hour 4.8 kg of ice is melted. The thermal conductivity of slab is :

(Given, latent heat of fusion of ice = 3.36×10^5 J kg^{-1})

① 1.24 W/m°C   ② 1.29 W/m°C   ③ 2.05 W/m°C   ④ 1.02 W/m°C

20. When a force is applied on a wire of uniform cross-sectional area 3×10^{-6} m² and length 4 m, the increase in length is 1 mm. Energy strored in it will be (Young's modulus = 2×10^{11} N/m²)

① 6250 J   ② 0.177 J   ③ 0.075 J   ④ 0.150 J

SECTION–B

Integer Type Questions (Q.21 – Q.25)

21. A body of mass 'm' is tied to one end of a spring and whirled round in a horizontal plane with a constant angular velocity. The elongation in the spring is one centimeter. If the angular velocity is doubled, the elongation in the spring is 5 cm. The original length (in cm) of the spring is

22. If the equation for the angular displacement of a particle moving on a circle is given by : $\theta = 2t^3 + 0.5$ where θ is in radian and t is in second, then the angular velocity (in rad/sec) of the particle at t = 2s is

23. A body on the earth surface is given an upward velocity $\sqrt{gR}$ and it attains a maximum height H from the earth's surface before coming back to the earth. If h = xR, find the value of x.

$$v = \sqrt{gR}$$

Earth
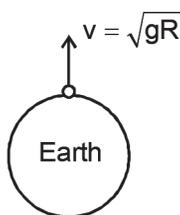
24. Height of oil column = h_3 = 20 cm
    Height of water column = $h_1 + h_2$ = 50 cm
    Height of orifice from bottom = h_1 = 20 cm
    Density of water = 1 g/cm^3

    Density of oil = 0.75 g/cm^3

h_3 Oil

water h_2

h_1
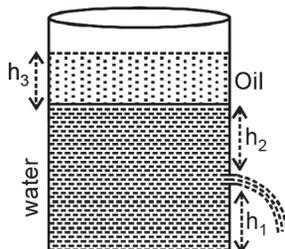
Orifice is very narrow compared to the cylinder. The velocity of efflux is

25. A soap bubble is being blown on a tube of radius 1 cm. The surface tension of the soap solution is 0.05 Nm^{-1} and the bubble makes 60º with the tube as shown in the figure. Find the excess of pressure over the atmospheric pressure in the tube (in Pa)

CHEMISTRY

Section—A
(Single Option Correct Type)

26. The ratio of $\dfrac{K_p}{K_c}$ for the reaction, $CO(g) + \dfrac{1}{2}O_2(g) \rightleftharpoons CO_2(g)$ is

① $\dfrac{1}{\sqrt{RT}}$ ② $(RT)^{\frac{1}{2}}$ ③ RT   ④ 1

27. Ammonium carbamate decomposes as:
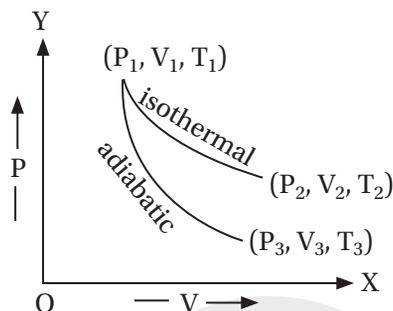
$$NH_2COONH_4(s) \rightleftharpoons 2NH_3(g)+CO_2(g).$$

For this reaction, $K_p = 2.9 \times 10^{-5}$ (atm)^3. If we start with 1 mole of the compound, the total pressure at equilibrium would be:

① 0.0766 atm   ② 0.0581 atm   ③ 0.0388 atm   ④ 0.0194 atm

28. The reversible expansion of an ideal gas under adiabatic and isothermal conditions is shown in the figure. Which of the following statement is incorrect?

① $T_1 = T_2$ ② $T_3 > T_1$ ③ $W_{isotherm} > W_{adiabatic}$ ④ $\Delta U_{isotherm} >$ $\Delta U_{adiabatic}$

29. $C+O_2 \longrightarrow CO_2$; $\Delta H = X$

$CO+\frac{1}{2}O_2 \longrightarrow CO_2$; $\Delta H = Y$

Then, the heat of formation of CO is:

① $X - Y$ ② $Y - 2X$ ③ $X + Y$ ④ $2X - Y$

30. The entropy values [in JK^{-1} (mole)$^{-1}$] of $H_2(g)$ = 130.6, $Cl_2(g)$ = 2230 and HCl (g) = 186.7 at 298K and 1 atm pressure, then entropy change for the reaction.

$H_2(g)+Cl_2(g) \longrightarrow 2HCl(g)$ is :

① +540.3   ② +727.3   ③ –166.9   ④ +19.8

31. Equivalent weight of $KMnO_4$ is basic medium (If M.W of $KMnO_4$ = M) is:

① $\dfrac{M}{5}$ ② $\dfrac{M}{3}$ ③ $\dfrac{M}{4}$ ④ $\dfrac{M}{1}$

32. Calculate the n–factor of underlined reactants:

$$Cl_2 + OH^{\ominus} \longrightarrow Cl^{\ominus} + ClO_3^{\ominus} + H_2O$$

① 3   ② $\dfrac{3}{5}$ ③ $\dfrac{5}{3}$ ④ 5

33. Equivalent weight of Mohr's salt in the titration with $KMnO_4$ is [M = Molecular weight]

① $\dfrac{M}{1}$ ② $\dfrac{M}{4}$ ③ $\dfrac{M}{3}$ ④ $\dfrac{M}{2}$

34. The number of moles of $KMnO_4$ that will be needed to react completely with one mole of ferrous oxalate in acidic solution is:

① $\dfrac{3}{5}$ ② $\dfrac{2}{5}$ ③ $\dfrac{4}{5}$ ④ $\dfrac{1}{5}$

35. The energy required to break 76 g guseous fluorine into free gaseous atom is 180 KCal at 25°C. The bond energy of F–F bond will be:

① 180 KCal   ② 90 KCal   ③ 45 KCal   ④ 104 KCal

36. Compressibility factor (z) for an ideal gas is:

① 1.5   ② 1.0   ③ 2.0   ④ ∞

37. Total numbers of geometrical isomers are possible for:

$\boxed{H_3C} — CH=CH — CH=CH — CH=CH — CH=CH — \boxed{C_2H_5}$

① 4   ② 6   ③ 8   ④ 16

38. Total numbers of geometrical isomers of the following compound are possible for:

$\boxed{Cl} — CH=CH — CH=CH — CH=CH — \boxed{Cl}$

① 2   ② 4   ③ 6   ④ 12

39. Find the possible structural isomers of C_4H_8:

① 2   ② 4   ③ 5   ④ 6

Assertion–Reason Questions (Q.15–Q.20):

(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

40. Assertion: The angular momentum of d-orbitals is $\dfrac{\sqrt{6}h}{2\pi}$

Reason: Angular momentum of electron in orbit is $mvr = \dfrac{nh}{2\pi}$

① A   ② B   ③ C   ④ D

41. Assertion: Line emission spectra useful in the study of electronic configuration.

Reason: Each element has a unique line emission spectrum.

① A   ② B   ③ C   ④ D

42. Assertion: Entropy change in reversible adiabatic expansion of an ideal gas is zero.

Reason: The increase in entropy due to volume increase just componsate the decrease in entropy due to fall in temperature.

① A   ② B   ③ C   ④ D

43. Assertion: All combusion reactions are exothern reaction.

Reason: Enthalpies of products are greater than enthalpies of reactants: $(\Sigma V_P \Delta H_5 CD > \Sigma V_R \Delta_f \Delta H_R)$

① A   ② B   ③ C   ④ D

44. Assertion: pH of $10^{-7}(M)$ HCl is less than 7 at 25°C.

Reason: At very low concentration of HCl, contribution of H^+ from water is considerable.

① A   ② B   ③ C   ④ D

45. Assertion: If water is heated to 50°C then pH will increase.

Reason: Kw increases with increase in temperature.

① A   ② B   ③ C   ④ D

Section—B
(Numerical Answer Type)

46. Find the total numbers of structural isomers of C_5H_{10} _____

47. The minimum number of carbon atoms in alkane molecule to show chain isomerism is _____

48. Total number of geometrical isomers are possible for

$$\text{Me} — CH = CH — CH = CH — CH = CH — CH = CH — \text{Me}$$

are _____

49. Find the degree of unsaturation (u) for $C_{20}H_{21}NO_2$ are _____

50. Oxidation number of Cr in K_3CrO_8 is _____

MATHEMATICS

Section—A
(Single Option Correct Type)

51. Two newspapers A and B are published in a city. It is known that 25% of the city populations reads A and 20% reads B while 8% reads both A and B. Further, 30% of those who read A but not B look into advertisements and 40% of those who read B but not A also look into advertisements. Then the percentage of the population who look into advertisement is

① 13.5   ② 13   ③ 12.8   ④ 13.9

52. Let Z be the set of integers

If $A = \{X \in Z : 2^{(x+2)(x^2-5x+6)} = 1\}$ and

$B = \{X \in Z : -3 < 2x - 1 < 9\}$

then the number of subsets of the set $A \times B$, is

① 2^{12} ② 2^{18} ③ 2^{10} ④ 2^{15}

53. If $\dfrac{\sqrt{2}\sin\alpha}{\sqrt{1+\cos 2\alpha}} = \dfrac{1}{7}$ and $\sqrt{\dfrac{1-\cos 2\beta}{2}} = \dfrac{1}{\sqrt{10}}$ where $\alpha, \beta \in (0, \pi/2)$, then $\tan(\alpha + 2\beta)$ is equal to _____ .

① 0   ② 1   ③ 2   ④ $\sqrt{10}$

54. If $5(\tan^2 x - \cos^2 x) = 2\cos 2x + 9$,

then the value of $\cos 4x$ is

① $\dfrac{1}{3}$ ② $\dfrac{2}{9}$ ③ $-\dfrac{7}{9}$ ④ $-\dfrac{3}{5}$

55. $2\sin\left(\dfrac{\pi}{22}\right)\sin\left(\dfrac{3\pi}{22}\right)\sin\left(\dfrac{5\pi}{22}\right)\sin\left(\dfrac{7\pi}{22}\right)\sin\left(\dfrac{9\pi}{22}\right)$ is equal to

① $\dfrac{3}{16}$ ② $\dfrac{1}{16}$ ③ $\dfrac{1}{32}$ ④ $\dfrac{9}{32}$

56. If the center and radius of the circle $\left|\dfrac{z-2}{z-3}\right| = 2$ are respectively (α, β) and γ, then $3(\alpha + \beta + \gamma)$ is equal to

① 12   ② 10   ③ 11   ④ 9

57. The value of $\left(\dfrac{1+\sin\dfrac{2\pi}{9}+i\cos\dfrac{2\pi}{9}}{1+\sin\dfrac{2\pi}{9}-i\cos\dfrac{2\pi}{9}}\right)^3$ is

① $-\dfrac{1}{2}\left(1-i\sqrt{3}\right)$ ② $-\dfrac{1}{2}\left(\sqrt{3}-i\right)$ ③ $\dfrac{1}{2}\left(1-i\sqrt{3}\right)$ ④ $\dfrac{1}{2}\left(\sqrt{3}+i\right)$

58. Let $S = \left\{x : x \in R \text{ and } (\sqrt{3}+\sqrt{2})^{x^2-4} + (\sqrt{3}-\sqrt{2})^{x^2-4} = 10\right\}$.

Then $n(S)$ is equal to

① 6   ② 4   ③ 0   ④ 2

59. Let $\lambda \neq 0$ be a real number. Let α, β be the roots of the equation

$14x^2 - 31x + 3\lambda = 0$ and α, γ be the roots of the equation

$35x^2 - 53x + 4\lambda = 0$. Then $\dfrac{3\alpha}{\beta}$ and $\dfrac{4\alpha}{\gamma}$ are the roots of the equation

① $7x^2 - 245x + 250 = 0$ ② $49x^2 - 245x + 250 = 0$ ③ $49x^2 + 245x + 250 = 0$ ④ $7x^2 + 245x - 250 = 0$

60. If a, b, c are distinct positive real numbers and $a^2 + b^2 + c^2 = 1$, then $ab + bc + ca$ is

① less than 1   ② equal to 1   ③ greater than 1   ④ any real number

61. The region represented by $\{z = x+iy \in C : |z| - \text{Re}(z) \leq 1\}$ is also given by the inequality

① $y^2 \geq 2(x+1)$ ② $y^2 \leq 2(x+\dfrac{1}{2})$ ③ $y^2 \leq x+\dfrac{1}{2}$ ④ $y^2 \geq x+1$

62. The number of triplets (x, y, z), where x, y, z are distinct non negative integers satisfying $x + y + z = 15$ is

① 136   ② 80   ③ 92   ④ 114

63. If the number of words, with or without meaning, which can be made using all the letters of the word MATHEMATICS in which C and S do not come together, is $(6!)\,k$, then k is equal to

① 5670   ② 1890   ③ 2835   ④ 945

64. Let $(a + bx + cx^2)^{10} = \displaystyle\sum_{i=0}^{20} p_i x^i$, $a, b, c \in N$.

If $p_1 = 20$ and $p_2 = 210$, then $2(a + b + c)$ is equal to

① 15   ② 8   ③ 6   ④ 12

65. If the constant term in the expansion of $\left(\dfrac{\sqrt[5]{3}}{x} + \dfrac{2x}{\sqrt[3]{5}}\right)^{12}$, $x \neq 0$, is $\alpha \times 2^8 \times \sqrt[5]{3}$, then 25α is equal to

① 724   ② 742   ③ 693   ④ 639

66. If $\dfrac{1}{\sqrt{1}+\sqrt{2}} + \dfrac{1}{\sqrt{2}+\sqrt{3}} + \ldots + \dfrac{1}{\sqrt{99}+\sqrt{100}} = m$ and $\dfrac{1}{1.2} + \dfrac{1}{2.3} + \ldots + \dfrac{1}{99.100} = n$, then the point (m, n) lies on the line

① $11(x - 1) - 100y = 0$ ② $11x - 100y = 0$

③ $11(x - 1) - 100(y - 2) = 0$ ④ $11(x - 2) - 100(y - 1) = 0$

67. Let the first three terms 2, p and q, with $q \neq 2$, of a G.P. be respectively the 7th, 8th and 13th terms of an A.P. If the 5th term of the G.P. is the nth term of the A.P., then n is equal to

① 151   ② 177   ③ 163   ④ 169

68. If the locus of the point, whose distances from the point (2, 1) and (1, 3) are in the ratio 5 : 4, is $ax^2 + by^2 + cxy + dx + ey + 170 = 0$, then the value of $a^2 + 2b + 3c + 4d + e$ is equal to

① 37   ② –27   ③ 437   ④ 5

69. Let two straight lines drawn from the origin O intersect the line $3x + 4y = 12$ at the points P and Q such that $\triangle OPQ$ is an isosceles triangle and $\angle POQ = 90°$. If $l = OP^2 + PQ^2 + QO^2$, then the greatest integer less than or equal to l is

① 42   ② 46   ③ 48   ④ 44

70. Let O be the origin and OP and OQ be he tangents to the circle $x^2 + y^2 - 6x + 4y + 8 = 0$ at the points P and Q on it. If the circumcircle of the triangle OPQ passes through the point $\left(\alpha, \dfrac{1}{2} \right)$, then a value of α is

① 1   ② $-\dfrac{1}{2}$ ③ $\dfrac{5}{2}$ ④ $\dfrac{3}{2}$

Section—B
(Numerical Answer Type)

71. If α is a root of the equation $x^2 + x + 1 = 0$ and $\sum\limits_{k=1}^{n} \left(\alpha^k + \dfrac{1}{\alpha^k} \right)^2 = 20$, then n is equal to _____ .

72. A person forgets his 4-digit ATM pin code. But he remembers that in the code all the digits are different, the greatest digit is 7 and the sum of the first two digits is equal to the sum of the last two digits. Then the maximum number of trials necessary to obtain the correct code is _____ .

73. The mean of the coefficients of x, x^2, ..., x^7 in the binomial expansion of $(2 + x)^9$ is _____ .

74. if $8 = 3 + \dfrac{1}{4}(3+p) + \dfrac{1}{4^2}(3+2p) + \dfrac{1}{4^3}(3+3p) + ... \infty,$, then the value of p is _____ .

75. If the variable line $3x + 4y = \alpha$ lies between the two circles $(x - 1)^2 + (y - 1)^2 = 1$ and $(x - 9)^2 + (y - 1)^2 = 4$, without intercepting a chord on either circle, then the sum of all the integral values of α is _____ .