

MHT CET 2025 Memory Based Question Paper PDF(April 25, 2025) (Shift 1)

1. A body of mass 0.2 kg is attached to a light string of length 1 m and revolved in a vertical circle. What is the minimum speed at the lowest point so that the body can complete the circular motion? (Take $g = 10 \text{ m/s}^2$)
 - (a) 2 m/s
 - (b) 4.47 m/s
 - (c) 5 m/s
 - (d) 6.32 m/s
2. A coil of 100 turns, carrying a current of 5A, is placed in a magnetic field of 2T. The area of each turn is 0.01 m^2 . What is the magnetic moment of the coil?
 - (a) 0.5 Am^2
 - (b) 1 Am^2
 - (c) 2 Am^2
 - (d) 5 Am^2
3. The electric field at a point in space is $2 \times 10^3 \text{ N/C}$ and the potential at the same point is 100 V. What is the potential energy of a charge of 5 C placed at that point?
 - (a) 0.5 mJ
 - (b) 1.0 mJ
 - (c) 2.0 mJ
 - (d) 5.0 mJ
4. In an LC circuit, the inductance L is 2 H and the capacitance C is 4 F. What is the frequency of oscillation of the circuit?
 - (a) 100 Hz
 - (b) 50 Hz
 - (c) 25 Hz
 - (d) 200 Hz
5. A body of mass 5 kg is placed on a frictionless inclined plane of angle 30° . What is the component of the weight of the body along the plane?
 - (a) 25 N
 - (b) 50 N
 - (c) 45 N

- (d) 75 N
6. A 0.5 m long solenoid has 100 turns and carries a current of 3A. What is the magnetic field at the center of the solenoid?
- (a) 2×10^{-2} T
(b) 4×10^{-2} T
(c) 6×10^{-2} T
(d) 8×10^{-2} T
7. A particle is moving with a constant velocity of 5 m/s in a circular path of radius 2 m. What is the centripetal acceleration of the particle?
- (a) 1.25 m/s^2
(b) 2.5 m/s^2
(c) 5 m/s^2
(d) 10 m/s^2
8. What is the moment of inertia of a solid sphere of mass M and radius R about its diameter?
- (a) $\frac{2}{5}MR^2$
(b) $\frac{1}{2}MR^2$
(c) $\frac{3}{5}MR^2$
(d) MR^2
9. A galvanometer has resistance $G = 100 \Omega$ and shows full-scale deflection at $I_g = 1 \text{ mA}$. To convert it into a voltmeter of range 5 V, what resistance should be connected in series?
- (a) 400Ω
(b) 4900Ω
(c) 490Ω
(d) 5000Ω
10. A body of mass 2 kg is moving in a circular path of radius 3 m with a constant speed of 6 m/s. What is the centripetal force acting on the body?
- (a) 4 N
(b) 8 N
(c) 24 N
(d) 12 N
11. A force of 20 N is applied to a body at an angle of 30° to the horizontal, moving the body a distance of 5 m. What is the work done by the force?

- (a) 100 J
(b) 50 J
(c) 200 J
(d) 150 J
12. Two point charges $+2\mu\text{C}$ and $-3\mu\text{C}$ are placed 10 cm apart in vacuum. What is the electrostatic force between them?
- (a) 4.5 N
(b) 9 N
(c) 18 N
(d) 2.25 N
13. A body of mass 10 kg is at a height of 5 m above the surface of the Earth. What is the gravitational potential energy of the body? (Take $g = 10\text{m/s}^2$)
- (a) 50 J
(b) 500 J
(c) 100 J
(d) 250 J
14. A gas expands from a volume of 2m^3 to 4m^3 against a constant pressure of 5 atm. How much work is done by the gas during expansion? ($1\text{ atm} = 1.01 \times 10^5\text{ Pa}$)
- (a) $2.02 \times 10^5\text{ J}$
(b) $1.01 \times 10^5\text{ J}$
(c) $5.02 \times 10^5\text{ J}$
(d) $1.02 \times 10^5\text{ J}$
15. A coil has 200 turns and an area of 0.01 m^2 . If the magnetic field changes from 0 to 0.5 T in 0.1 seconds, what is the induced emf in the coil?
- (a) 1 V
(b) 0.5 V
(c) 2 V
(d) 5 V
16. A concave mirror has a focal length of 15 cm. An object is placed 30 cm from the mirror. What is the image distance?
- (a) 30 cm
(b) 45 cm

- (c) 60 cm
(d) 20 cm
17. A water tank is open at the top and has a hole of area 10^{-4} m^2 at the bottom. The height of the water column is 5 m. What is the speed of the water flowing out of the hole? (Take $g = 10 \text{ m/s}^2$)
- (a) 5 m/s
(b) 10 m/s
(c) 15 m/s
(d) 20 m/s
18. If $\mathbf{a} = \frac{1}{\sqrt{10}}(4\hat{i} - 3\hat{j} + \hat{k})$ and $\mathbf{b} = \frac{1}{5}(\hat{i} + 2\hat{j} + 2\hat{k})$, then the value of $(2\mathbf{a} - \mathbf{b}) \cdot [(\mathbf{a} \times \mathbf{b}) \times (\mathbf{a} + 2\mathbf{b})]$
- (a) 5
(b) -3
(c) -5
(d) 3
19. Evaluate the integral: $\int \sqrt{x^2 + 3x} dx$
20. If $P(A \cap B) = \frac{2}{25}$ and $P(A \cup B) = \frac{8}{25}$, then find the value of $P(A)$.
- (a) $\frac{4}{15}$
(b) $\frac{4}{5}$
(c) $\frac{3}{8}$
(d) $\frac{2}{5}$
21. Find the smallest angle of the triangle whose sides are $6 + \sqrt{12}, \sqrt{48}, \sqrt{24}$.
- (a) $\pi/4$
(b) $\pi/2$
(c) $\pi/6$
(d) $\pi/3$
22. Evaluate the integral: $\int \frac{x^2 + 2x}{\sqrt{x^2 + 1}} dx$
- (a) $\frac{1}{3}(x^2 + 1)^{3/2}$
(b) $\frac{1}{2}(x^2 + 1)^{3/2}$
(c) $\frac{1}{2}(x^2 + 1)^{5/2}$
(d) $\frac{1}{3}(x^2 + 1)^{5/2}$

23. Find the value of the following expression: $\sin^2(30^\circ) + \cos^2(60^\circ)$
- (a) $1/2$
 - (b) 1
 - (c) $3/4$
 - (d) $1/4$
24. If two dice are rolled, what is the probability of getting a sum of 7?
- (a) $1/6$
 - (b) $1/36$
 - (c) $5/36$
 - (d) $1/3$
25. If $\mathbf{a} = 3\hat{i} + 4\hat{j}$ and $\mathbf{b} = 2\hat{i} - \hat{j}$, find $\mathbf{a} \cdot \mathbf{b}$ (the dot product).
- (a) 6
 - (b) 4
 - (c) 10
 - (d) 12
26. Find the roots of the quadratic equation $x^2 - 5x + 6 = 0$.
- (a) 2 and 3
 - (b) 3 and -2
 - (c) -2 and -3
 - (d) 1 and 6
27. A bag contains 5 red balls, 7 green balls, and 8 blue balls. One ball is drawn at random. What is the probability that the ball is either red or green?
- (a) $5/20$
 - (b) $7/20$
 - (c) $12/20$
 - (d) $5/10$
28. In the reaction $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$, if 4 moles of hydrogen react with excess oxygen, how many moles of water are produced?
- (a) 2 moles
 - (b) 4 moles
 - (c) 8 moles

- (d) 1 mole
29. What is the pH of a solution with a hydrogen ion concentration of 1×10^{-5} mol/L?
- (a) 5
(b) 10
(c) 7
(d) 4
30. Which of the following elements has the highest electronegativity?
- (a) Fluorine (F)
(b) Oxygen (O)
(c) Nitrogen (N)
(d) Chlorine (Cl)
31. The enthalpy change for the reaction $\text{N}_2(g) + 3\text{H}_2(g) \rightarrow 2\text{NH}_3(g)$ is -92.4 kJ/mol. What is the enthalpy change when 4 moles of nitrogen react?
- (a) -92.4 kJ
(b) -184.8 kJ
(c) -46.2 kJ
(d) -368.4 kJ
32. What is the volume occupied by 2 moles of an ideal gas at standard temperature and pressure (STP)?
- (a) 22.4 L
(b) 44.8 L
(c) 11.2 L
(d) 48.8 L
33. In the reaction $\text{Zn} + 2\text{Ag}^+ \rightarrow \text{Zn}^{2+} + 2\text{Ag}$, what is the oxidation state of zinc in Zn and Zn^{2+} ?
- (a) 0 in Zn, +2 in Zn^{2+}
(b) +2 in Zn, 0 in Zn^{2+}
(c) +2 in Zn, +1 in Zn^{2+}
(d) 0 in Zn, 0 in Zn^{2+}