

MHT CET 2025 Apr 25 Shift 1 Question Paper

Total Time Allowed : 3 hours	Maximum Marks : 200	Total Questions : 200
---------------------------------	------------------------	--------------------------

General Instructions

Read the following instructions very carefully and strictly follow them:

This question paper is divided into three sections:

1. The total duration of the examination is 3 hours (180 minutes).
2. The total number of questions is **200**, carrying a maximum of **200 marks**.
3. The marking scheme is as follows:
 - (i) For Physics, Chemistry, and Mathematics, 1 mark will be awarded for every correct response.
 - (ii) There is **no negative marking** for any incorrect response.
4. No marks will be awarded for unanswered questions.
5. Follow the instructions provided during the exam for submitting your answers.

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 2×10^8 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 $2\ \text{m}^3$ to $4\ \text{m}^3$ 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) $1.02 \times 10^6\ \text{J}$
-

15. A coil has 200 turns and an area of $0.01\ \text{m}^2$. 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 $\mathbf{a}$ and $\mathbf{b}$ are two vectors, then the value of $(2\mathbf{a} - \mathbf{b}) \cdot [(\mathbf{a} \times \mathbf{b}) \times (\mathbf{a} + 2\mathbf{b})]$ is:

- (A) 5
- (B) -3
- (C) -5
- (D) 3

19. Evaluate the integral: $\int \sqrt{x^2 + 3x} \, dx$

20. If $P(A \cap B) = \frac{3}{8}$ and $P(A \cup B) = \frac{5}{8}$, then find the value of $P(A)$.

- (A) $\frac{1}{8}$
- (B) $\frac{1}{4}$
- (C) $\frac{1}{2}$
- (D) $\frac{3}{8}$

21. Find the smallest angle of the triangle whose sides are $6 + \sqrt{12}$, $\sqrt{48}$, $\sqrt{24}$.

- (A) $\frac{\pi}{3}$
 - (B) $\frac{\pi}{6}$
 - (C) $\frac{\pi}{4}$
 - (D) $\frac{\pi}{2}$
-

22. Evaluate the integral: $\int \frac{x^2+2x}{\sqrt{x^2+1}} dx$

- (A) $\frac{1}{3}(x^2 + 1)^{3/2}$
 - (B) $\frac{2}{3}(x^2 + 1)^{3/2}$
 - (C) $\frac{1}{3}(x^2 + 1)^{5/2}$
 - (D) $\frac{2}{3}(x^2 + 1)^{5/2}$
-

23. Find the value of the following expression: $\sin^2(30^\circ) + \cos^2(60^\circ)$

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

24. If two dice are rolled, what is the probability of getting a sum of 7?

- (A) $\frac{1}{6}$
 - (B) $\frac{1}{2}$
 - (C) $\frac{5}{36}$
 - (D) $\frac{1}{3}$
-

25. If $\mathbf{a} = 3\mathbf{i} + 4\mathbf{j}$ and $\mathbf{b} = 2\mathbf{i} - \mathbf{j}$, 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) $\frac{5}{20}$
 - (B) $\frac{7}{20}$
 - (C) $\frac{12}{20}$
 - (D) $\frac{3}{20}$
-

28. In the reaction $2H_2 + O_2 \rightarrow 2H_2O$, 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 $N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$ 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 $Zn + 2Ag^+ \rightarrow Zn^{2+} + 2Ag$, 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+}
-