

MHT CET 20 April Shift 2 PCM Question Paper

Time Allowed :1 Hour 30 Mins	Maximum Marks :120	Total Questions :120
------------------------------	--------------------	----------------------

General Instructions

1. The question paper consists of three sections: Mathematics, Physics, and Chemistry. You must attempt all sections. No section can be skipped.
2. All questions are Multiple Choice Questions (MCQs). Each question has four answer options, of which only one is correct.
3. Marking Scheme:
Mathematics: 2 marks for each correct answer
Physics & Chemistry: 1 mark for each correct answer
No negative marking for wrong or unattempted answers.
4. The medium of the question paper is English. Questions will appear only in the language selected during application.
5. The total duration of the examination is 90 minutes. The timer will start once you click on "Start Test".
6. You may navigate between questions and sections at any time. Use the Next, Previous, and Question Palette options to move through the paper.
7. A question can be marked for review. Questions marked for review will be saved but not considered final unless a response is selected.
8. You must click Save & Next after selecting an answer. Answers not saved will not be recorded.
9. Rough sheets are provided for calculations. They must be returned to the invigilator before leaving.
10. Do not attempt to use any prohibited items. Calculators, mobile phones, smart-watches, written notes, or communication devices are strictly not allowed.
11. You must remain seated until the invigilator announces the end of the session. Leaving the hall before the scheduled time is not permitted.
12. In case of any technical issue, raise your hand immediately. Do not attempt to fix the system yourself.
13. The test will automatically submit when the time ends. You may also submit earlier by clicking the Submit button, after which no changes can be made.

1. Which of the following gases is most soluble in water?

- (A) Oxygen
 - (B) Nitrogen
 - (C) Carbon dioxide
 - (D) Hydrogen
-

2. Which of the following elements does not have a completely filled outermost shell in its ground state?

- (A) Neon
 - (B) Helium
 - (C) Oxygen
 - (D) Argon
-

3. Which of the following is an example of a redox reaction?

- (A) NaCl dissolving in water
 - (B) $2\text{H}_2\text{O}(\text{aq}) \rightarrow 2\text{H}_2(\text{l}) + \text{O}_2(\text{g})$
 - (C) NaOH dissolving in water
 - (D) $\text{CaCO}_3(\text{s}) \rightarrow \text{CaO}(\text{s}) + \text{CO}_2(\text{g})$
-

4. In the reaction $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$, if 4 moles of hydrogen react completely with oxygen, how many moles of water will be produced?

- (A) 2 mol
 - (B) 4 mol
 - (C) 8 mol
 - (D) 1 mol
-

6. What is the volume of oxygen required for complete combustion of 0.25 mole of methane at S.T.P.?

- (A) 22.4 L
 - (B) 5.6 L
 - (C) 11.2 L
 - (D) 7.46 L
-

6. Evaluate the integral: $\int \sin^5 x \, dx$

- (A) $-\frac{1}{5} \cos x (5 - 10 \sin^2 x + \sin^4 x) + C$
 - (B) $-\cos x + \frac{2}{3} \cos^3 x - \frac{1}{5} \cos^5 x + C$
 - (C) $\frac{1}{6} \sin^6 x + C$
 - (D) $\int \sin^5 x \, dx = \int \sin^3 x \cdot \sin^2 x \, dx$
-

7. Evaluate the determinant of the matrix: $\begin{vmatrix} 1 & \tan x \\ -\tan x & 1 \end{vmatrix}$

- (A) $1 - \tan^2 x$
 - (B) $1 + \tan^2 x$
 - (C) $\sec^2 x$
 - (D) 0
-

8. Evaluate the expression: $f(f(f(x))) + (f(f(x)))^2$ **if** $x = 1$

- (A) $f(f(f(1))) + (f(f(1)))^2$
 - (B) $f(f(f(1))) + (f(1))^2$
 - (C) $f(1)^2 + f(1)$
 - (D) Cannot be determined
-

9. A copper ball at 80°C is brought to 60°C in 5 minutes, with surrounding temperature at 20°C . Find the temperature of the ball after 20 minutes.

- (A) 35°C
 - (B) 30°C
 - (C) 25°C
 - (D) 20°C
-

10. Given $f(1) = 3$, $f'(1) = 1$, and $y = f(f(f(x))) + (f(x))^2$, then find $\frac{dy}{dx}$ at $x = 1$.

- (A) 9
 - (B) 12
 - (C) 15
 - (D) 18
-

11. If $y = x^x + x^x$, then find $\frac{dy}{dx}$:

- (A) $x^x(\ln x + 1)$
 - (B) $2x^x(\ln x + 1)$
 - (C) $x^x(\ln x - 1)$
 - (D) $2x^x \ln x$
-

12. Evaluate the definite integral: $\int_{-2}^2 |x^2 - x - 2| dx$

- (A) $\frac{19}{3}$
 - (B) $\frac{17}{3}$
 - (C) $\frac{16}{3}$
 - (D) $\frac{13}{3}$
-

13. Find the value of the integral: $\int \frac{2x^3+1}{x^4+2x} dx$

- (A) $\frac{1}{2} \ln(x^2 + 1) + C$
 - (B) $\frac{1}{2} \ln|x| + \frac{1}{2} \tan^{-1}(x) + C$
 - (C) $\frac{1}{2} \ln|x| + \frac{1}{4} \ln(x^2 + 1) + C$
 - (D) $\frac{1}{2} \ln|x(x^2 + 1)| + C$
-

14. If $\int \frac{2x+3}{(x-1)(x^2+1)} dx = \log_e (|(x-1)^a(x^2+1)^b|) - \frac{1}{2} \tan^{-1} x + C$, then the value of a is:

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