MHT CET 2025 Memory Based Question Paper PDF (April 20, 2025) (Shift 2)

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) $2H_2O_2$ (aq) $\rightarrow$ $2H_2O$ (l) + O_2 (g)

(C) NaOH dissolving in water

(D) $CaCO_3$ (s) $\rightarrow$ CaO (s) + CO_2 (g)

4. In the reaction $2H_2 + O_2 \rightarrow 2H_2O$, 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) $-\cos x+\frac{\cos^3 x}{3}-\frac{\cos^5 x}{5}+C$

(C) $\frac{1}{5}\sin^5 x+C$

(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) $\frac{40}{3}$

(B) $\frac{28}{3}$

(C) $\frac{36}{5}$

(D) $\frac{44}{3}$

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

(A) $\frac{1}{y}\ln(x^2+1) + C$

(B) $\frac{2}{y}\ln|x| + \frac{3}{y}\tan^{-1}(x) + C$

(C) $\frac{2}{y}\ln|x| + \frac{3}{y}\ln(x^2+1) + C$

(D) $\frac{1}{y}\ln|x(x^2+1)| + C$

14. If $\int \frac{2x+3}{(x-1)(x^2+1)}\, dx = \log\{(x-1)^{5/2}(x^2+1)^a\} - \frac{1}{2}\tan^{-1} x + C$, then the value of a is:

(A) $\frac{5}{4}$

(B) $-\frac{5}{3}$

(C) $-\frac{5}{6}$

(D) $-\frac{5}{4}$