



THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED

Q.1. Answer the following short questions: (10x3=30)

- i. Solve $\left| \frac{2t-5}{3} \right| = 4$.
- ii. Find the limit $\lim_{x \rightarrow +\infty} \left(1 + \frac{1}{2x} \right)^{-x}$.
- iii. Solve $\frac{6-x}{4} < \frac{3x-4}{2}$.
- iv. Evaluate $\lim_{x \rightarrow 0} \frac{\sin 6x}{\sin 8x}$.
- v. If $f(x) = 3x^2 - 7x + 5$, what is the domain of function f . Also find $f(x+h)$.
- vi. Find the derivative of $g(x) = \frac{7}{x^7} - 6x^{-8/3} + 8\sqrt{x}$ at $x = 1$.
- vii. If $y = (x^3 + 1) \ln x$, find $\frac{dy}{dx}$.
- viii. Evaluate $\int_{-1}^1 \left(1 - \frac{t}{2} \right) dt$.
- ix. Evaluate $\int \left(1 + \frac{1}{2y} - 3e^y \right) dy$.
- x. Find the values of x , if any, at which $h(x) = \frac{x^2-9}{x^2-5x+6}$ is not continuous.

Answer the following questions:

Q. No. 2: (5 + 5 = 10)

a) Check continuity of the following function at $x = -1$.

$$f(x) = \begin{cases} -\frac{x^2}{2} - 2x & \text{if } x \leq -1 \\ \frac{x}{2} + 2, & \text{if } x > -1 \end{cases}$$

b) Evaluate the limit.

$$\lim_{z \rightarrow 4} \frac{16 - z^2}{2 - \sqrt{z}}$$

Q. No. 3: (5 + 5 = 10)

a) Find $f'(x)$, if

$$f(x) = \sqrt{\frac{x^2 + 1}{x - 1}} + \sqrt{\pi}$$

b) Differentiate the following function.

$$g(t) = (1 + t^5 \csc t)^{-8}$$

Q. No. 4: (5 + 5 = 10)

a) Evaluate the following definite integral.

$$\int_0^1 \frac{x^2 + 1}{\sqrt{x^3 + 3x}} dx$$

b) Evaluate the following indefinite integral.

$$\int x^2 \cos x dx$$