

(b) Let $f(x) = e^{|x|}$.

Find the limit $\lim_{x \rightarrow 0} \frac{f(x) - 1}{x}$.

7. Do the following parts : (9×2)

(a) If: $f(x) = |2x - 3|$, then show that f is integrable on close interval $[-1, 2]$ and hence evaluate

$$\int_{-1}^2 |2x - 3| dx.$$

(b) Evaluate $\int_0^1 (5 - 3\sqrt{1 - x^2}) dx$.

Your Roll No.....

Sr. No. of Question Paper : 786

I

Unique Paper Code : 6332491103

Name of the Paper : Fundamentals of Mathematics

Name of the Course : B.Voc. (Web Designing)

Semester : I

Duration : 3 Hours

Maximum Marks : 90

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt any five questions.

1. Do the following parts : (9×2)

(a) Find the intervals in which $f(x) = -2x^2 - 4x + 4$ is increasing and the intervals on which f is decreasing.

- (b) Find the open interval on which $f(x) = x + 2 \sin x$, $x \in [0, 2\pi]$ is concave up and where it is concave down. Also determine points of inflection, if any.

2. Do the following parts : (9×2)

- (a) If $A = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$ and $B = \begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}$, Show that
 $(aA + bB)(aA - bB) = (a^2 + b^2)A$.

- (b) Use Cramer's rule to solve the linear system:

$$x + y + z = 6$$

$$2x + 3y + 4z = 20$$

$$x + y = z.$$

3. Do the following parts : (9×2)

- (a) Let $f(x) = \frac{x}{|x|}$, find the domain and range of the function.

- (b) Examine the continuity of the function

$$f(x) = \begin{cases} \frac{x-|x|}{x}, & x \neq 0 \\ 2, & x = 0 \end{cases} \text{ at } x = 0.$$

4. Do the following parts : (9×2)

- (a) Show that the function $f(x) = |x - 2| + 1$ is continuous everywhere but not differentiable at $x = 0$.

- (b) Evaluate $\lim_{x \rightarrow 0} \frac{e^{1/x}}{e^{1/x} + 1}$.

5. Do the following parts : (9×2)

- (a) Let us assume that F is a relation on set R real numbers define by $x F y$ if and only if $x - y$ is an integer. Prove that F is an equivalence relation on R .

- (b) If $A = \begin{pmatrix} 1 & 0 & -2 \\ 2 & 2 & 4 \\ 0 & 0 & 2 \end{pmatrix}$ and $f(x) = x^2 - 3x + 2$, show
 that $f(A) = 0$.

6. Do the following parts : (9×2)

- (a) Find all critical points of the function $f(x) = x^3 - 3x + 1$.