2204M196

Candidate's Seat No :_____

FY MBA (O) Semester-2 Examination

Basic Mathematic

April-2024

Time : 2-30 Hours] **[Max. Marks : 70**

Q-1. **(A)** Attempt any **Three** of the following: **[9]**

i) Evaluate $\lim_{x \to 2} \frac{x^n - 2^n}{x-2} = 80$ and n is a positive integer, find n.

ii) Find the roots of the equation $x^2 - 6x + 9 = 0$.

iii) Check whether the limit of the function $\frac{x^2-25}{x-5}$ exists, when $x \to 5$. If exists then find the limit value.

iv) Find the function $g(f(x))$, if $f(x) = 2x + 1$ and $g(x) = x^2$.

(B) Discuss the continuity of the function $f(x)$ in the interval (0,3) at $x = 2$, for **[5]**

$$f(x) = \begin{cases} x^2 & ; 0 < x < 1 \\ x & ; 1 \le x \le 2. \\ x^3 & ; 2 \le x < 3 \end{cases}$$

Q-2. **(A)** Find $\frac{dy}{dx}$, when $y = (1-x)^{-2}$. **[4]**

(B) Find $\frac{dy}{dx}$, when $y = x^3 log x$. **[5]**

(C) If $(x-y)e^{x/(x-y)}$=a, prove that $y\frac{dy}{dx} + x = 2y$, where a is an arbitrary constant. **[5]**

Q-3. (A) If $y = a\,e^{3x} + b\,e^{-3x}$, prove that $\frac{d^2y}{dx^2} - 9y = 0$. **[5]**

(B) For the function $f(x) = x^3 - 3x^2 - 9$, find local maxima or minima, if any. **[5]**

(C) For the demand function $aQ + bp - k = 0$, where a,b and k are positive constants. Determine the point of elasticity of demand when marginal revenue is zero. **[4]**

Q-4. Attempt any **Two** of the following: **[14]**

(A) Given the matrix, $A = \begin{bmatrix} 1 & 3 & 4 \\ 3 & -1 & 6 \\ -1 & 5 & 1 \end{bmatrix}$, prove that $(A^T)^{-1} = (A^{-1})^T$.

(B) Find the matrix X for which $\begin{bmatrix} 1 & -4 \\ 3 & -2 \end{bmatrix} X = \begin{bmatrix} -16 & -6 \\ 7 & 2 \end{bmatrix}$.

(C) Prove that, $\begin{vmatrix} b+c & a+b & a \\ c+a & b+a & b \\ a+b & c+a & c \end{vmatrix} = a^3 + b^3 + c^3 - 3abc$.

Q-5. (A) Solve the following system of simultaneous linear equations using Gauss-Elimination method: **[7]**

$x + y + z = 6,\ x + 2z = 7,\ 3x + y + z = 12.$

(B) Find the Determinant of A and Inverse of a matrix A. **[7]**

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 2 \\ 3 & 3 & 4 \end{bmatrix}.$$