4th Test On Advance Business Mathematics

FM: 50 *~ZerO2INfinitY*
Duration: 2 hours 30 mins.

(Answer any 5 questions from Group A and any 8 questions from Group B. Group C is compulsory.)

Group A

[2x5=10]

1. $\lim_{x\to 0} \frac{\sqrt{2+3x}-\sqrt{2-5x}}{4x}$
2. Express the following into a single matrix:

$$\begin{bmatrix} 3 & -2 \\ 2 & 4 \\ 5 & 0 \end{bmatrix}\begin{bmatrix} -2 & 1 & 5 \\ 1 & -2 & 3 \end{bmatrix} - \begin{bmatrix} 1 & 2 & 4 \\ 2 & 3 & 7 \\ 4 & 7 & 2 \end{bmatrix}$$

3. Show that $4x^3 + 6x^2 - 34x + 11$ decreases in $-2 < x < 1$
4. Verify Euler's theorem for $u = x^3 + y^3 + 3x^2y + 3xy^2$
5. Determine the point of inflexion of the curve $f(x) = 2x^3 - 3x^2 - 12x + 12$
6. Find the domain of $\frac{2x^2-7x+6}{3x^2-7x+2}$

Group B

[3x8=24]

1. Find $\frac{dy}{dx}$ $at\ x = 1\ for\ \ y = \sqrt[3]{8x} + \frac{1}{\sqrt{5x}} - e^{-\frac{2x}{3}}$
2. For what value of x the given function has maximum and minimum value

$$y = \frac{x}{(x-1)(x-4)}$$

3. Solve by Cramer's Rule:

$$x + y + 3 = 5$$
$$2x - y + 7z = 8$$
$$3x + y - z = 3$$

4. Show that the maximum value of $(x + \frac{1}{x})$ is less than its minimum value.
5. Check whether the function is continuous or discontinuous at $x = 0\ for\ f(x) = |x|$
6. If $e^{xy} = 4(1 + xy)$ then show that $\frac{dy}{dx} = -\frac{y}{x}$
7. If $f(x) = x^2 - x$, then show that $f(h + 1) = f(-h)$
8. Find $\frac{d^2y}{dx^2}$ when $y = x^2 \log x$

9. Show that the function $f(x) = x^3 - 3x^2 + 6x + 1$ does not possess any maximum value.

10. For the two matrices A and B prove that $AB \neq BA$ where $A = \begin{bmatrix} 2 & 1 \\ 3 & 4 \end{bmatrix}$

    & $B = \begin{bmatrix} 1 & -2 \\ -1 & 1 \end{bmatrix}$

Group C

[6+4+6=10]

1. The total cost function C for producing *x* units of an article is given by

$$C = Rs.(400 - 16x + 2x^2)$$

   Find the average cost function and the level of output at which this function is minimum.

2. If $x^m y^n = (x + y)^{m+n}$, show that $\frac{dy}{dx} = \frac{y}{x}$

   OR

   Find the values of $a, b, c \text{ and } d$ when $\begin{bmatrix} b + c & c + a \\ 7 - d & 6 - c \end{bmatrix} = \begin{bmatrix} 9 - d & 8 - d \\ a + b & a + b \end{bmatrix}$

3. Solve using Matrix Inversion method:

$$x + 2y + 3z = 6$$
$$2x + 4y + z = 7$$
$$3x + 2y + 9z = 14$$