**MATHEMATICAL METHODS FOR ECONOMICS II**

CORE - 4

Module -1

1. Suppose there are only three industries in an economy and we have to estimate the output of each (sector) industry with the given matrix and final demand as follows.

$$A = \begin{matrix} \\ P \\ Q \\ R \end{matrix}\begin{matrix} \begin{matrix} P & Q & R \end{matrix} \\ \begin{bmatrix} 0.3 & 0.5 & 0.2 \\ 0.2 & 0 & 0.5 \\ 0.1 & 0.3 & 0.1 \end{bmatrix} \end{matrix} \text{ and } f = \begin{bmatrix} 100 \\ 40 \\ 50 \end{bmatrix} \text{ million rupees}$$

or

Let $A = \begin{bmatrix} 1/8 & 1/3 & 1/4 \\ 1/2 & 1/6 & 1/4 \\ 1/9 & 1/6 & 1/4 \end{bmatrix}$ and final demand

Vector be $\begin{bmatrix} 10 \\ 28 \\ 14 \end{bmatrix}$

Find the total output of the 3 sectors. What will be the total output if the final demand for sector 1 has increase by 1?

**Module –II**

2. Find the second order derivative of

$$x^3 + 5x^2y + yx = 5 \text{ find } \frac{dy}{dx}$$

Or

Show that the curve $y = 2x - 3 + \frac{1}{x}$ is convex for all positive values of x

**Module –III**

3. Find the total differentiation of a product

$$z = (x^2 + y)(2x - y^2)$$

Find the total differentiation of

$$z = x^3 - 12x^2 + 36y + 8$$

**Module –IV**

4. Find the relative extrema of the function

$$y = f(x) = x^3 - 12x^2 + 36x + 8$$

Or

Explain the condition of profit maximization.

**Module –V**

5. Find the extremum of $z = xy$ subject to $x + y = 6$ using Lagrange –Multiplier Method.

Or

Find the extremum of

$z = x_1^2 + x_2^2$ subject to

$x_1 + 4x_2 = 2$ (use Lagrange Method)