

**2 0 2 3**

( CBCS )

( 2nd Semester )

**ECONOMICS**

( Honours )

Paper No. : EC2.CC4

**( Mathematical Methods for Economics—II )**

*Full Marks : 75*

*Pass Marks : 40%*

*Time : 3 hours*

*The figures in the margin indicate full marks  
for the questions*

**UNIT—I**

1. (a) If  $A = \begin{bmatrix} x & -2 & y \\ 4 & z & 2 \end{bmatrix}$  and  $B = \begin{bmatrix} 4 & x & z \\ x & y & 2 \end{bmatrix}$ ,

find  $A - 2(B)$ .

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(b) Solve the coefficient matrix for the systems

$$x - 2y + 3z = 1$$

$$3x - y + 4z = 3$$

$$2x + y - 2z = -1$$

10

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OR

2. State the properties of determinants with example. 15

UNIT—II

3. Find the partial derivatives of the following : 4+4+4+3=15

(a)  $U = x^2y + xy^2$

(b)  $U = x^2y^2 + x^5 + y^5$

(c)  $U = e^{x^2+y^3}$

(d)  $U = 4x^2$

OR

4. What is total differentiation? Discuss briefly the applications of total differentiation in economic analysis. 5+10=15

UNIT—III

5. Write notes on the following : 7+8=15

(a) Constrained optimization by substitution method

(b) Lagrange multiplication method

OR

6. A firm has a budget of ₹ 300 to spend on the three inputs  $x$ ,  $y$ ,  $z$  whose prices per unit are ₹ 4, ₹ 1 and ₹ 6 respectively. What combination of  $x$ ,  $y$ ,  $z$  should it employ to maximize output if it faces the production function  $Q = 24x^{0.3}y^{0.2}z^{0.3}$ ? 15

UNIT—IV

7. (a) A firm faces the total revenue schedule  $TR = 600q - 0.5q^2$ .
- (i) What is the marginal revenue when  $q = 100$ ? 3
- (ii) What is the total revenue at its maximum? 2
- (iii) What price should the firm charge to achieve this maximum total revenue? 3
- (b) Find the extreme values of the function  $y = x^3 - 9x^2 + 15x + 20$  7

OR

8. What is profit maximization? The total cost function of a firm is given by  $TC = aq^2 + bq + c$ , where  $q$  is the quantity and

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demand function is given by  $P = \beta - aq^2$ ,  
where  $P$  is the price. Find out the profit  
maximizing output of the firm. 5+10=15

UNIT—V

9. (a) Solve : 5+5=10

(i)  $y(1-x) - x \frac{dy}{dx} = 0$

(ii)  $(x - xy^2) dx + (y - x^2y) dy = 0$

(b) Solve the differential equation

$$\frac{dy}{dx} + 5y = 10$$

with the initial condition  $y(0) = 6$ . 5

OR

10. (a) Explain the solution of first-order  
difference equation by iteration method. 7

(b) Solve  $y_{t+2} + 2y_{t+1} - 3y_t = 16$  with initial  
condition,  $y_0 = 10$  when  $t = 0$  and  $y_1 = 6$   
when  $t = 1$ . 8

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