

S.No.: 134 BATCH: 2017, 2018

Reg.No.:

END OF SEMESTER EXAMINATIONS, NOVEMBER - 2018
 MATHEMATICAL TECHNIQUES IN ECONOMICS
 SUBJECT CODE: 18P3EC03

MAJOR: M.A (ECONOMICS)
 TIME : 3 HOURS

SEMESTER : I
 MAX.MARKS : 70

SECTION - A (5 X 4 = 20)

Answer ALL Questions:

1. a) Draw a graph for the Quadratic function $2x^2 - 4x + 1$.
 (OR)
 b) Solve the following pair of Simultaneous equations

$$4x - 3y - 15 = 0$$

$$3x - 3y - 6 = 0$$
2. a) For the total utility function $U = (x+7)(3x+9y)$ find the marginal utilities of x and y at $x=1$ and $y=2$.
 (OR)
 b) Find first and second order partial derivatives of the following function
 $Z = 2x^3 + 5x^2y + xy^2 + y^2$ and also verify that $\frac{\partial^2 z}{\partial x \partial y} = \frac{\partial^2 z}{\partial y \partial x}$.
3. a) Evaluate $\int (8x^2 - 3x^2 + x - 1) dx$.
 (OR)
 b) Evaluate $\int_1^2 (x^3 - 2x - 3) dx$.
4. a) Solve Graphically
 Maximize $z = 45x + 80y$
 Subject to $5x + 20y \leq 400$
 $10x + 15y \leq 450$
 $x \geq 0$ and $y \geq 0$
 (OR)
 b) List out the basic steps in Mathematical formulation of L.P.P
5. a) Solve the following equations by using Cramer's Rule.
 $2x_1 + 3x_2 = 13$
 $x_1 + 7x_2 = 23$
 (OR)
 b) If $A = \begin{bmatrix} 2 & 1 \\ 4 & 3 \\ 1 & 0 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 3 \\ 2 & 2 \end{bmatrix}$ verify that $AB^T = B^T A^T$.

..2.,

SECTION - B (5 X 10 = 50)**Answer ALL Questions:**

6. a) Solve the following equations

$$x + y + z = 18$$

$$x - y + z = 12$$

$$x + y - z = 6$$

(OR)

- b) Find the elasticity of demand and Marginal Revenue at
- $P = 2$
- , if the demand
- $q = 30 - 5q - p^2$
- .

7. a) Given the utility function
- $U = x^2 + 3xy - 5y^2$
- . Price of commodity
- x
- is Rs. 2, Price of commodity
- y
- is Rs.3 and consumer's money income Rs. 6, find out the equilibrium level of consumption of commodities
- x
- and
- y
- . Also prove the conditions for maximisation.

(OR)

- b) Given the following Revenue (R) and cost (C) functions for a firm
- $R = 20q - q^2$
- and
- $C = q^2 + 8q + 2$
- , find the equilibrium level of output, price, total revenue, total cost and profit.

8. a) The supply function for a commodity
- $P = x^2 + x + 5$
- where
- x
- denotes. Find the Producer's surplus when the price is Rs.11.

(OR)

- b) The demand function for a commodity
- $P = 30 - 2D$
- . The supply function
- $P = 3D$
- . Find consumer's Surplus.

9. a) Using Simplex Method and solve the following Linear Programming Problem.

$$\text{Maximize } z = 10x_1 + x_2 + 2x_3$$

$$\text{Subject to } x_1 + x_2 - 2x_3 \leq 10$$

$$4x_1 + x_2 + x_3 \leq 20$$

$$x_1, x_2, x_3 \geq 0$$

(OR)

- b) Use Simplex Method to show that there is an unbounded solution to the following L.P.P

$$\text{Maximize } Z = x_1 + 5x_2$$

$$\text{Subject to } x_1 - x_2 \leq 1$$

$$2x_1 - x_2 \leq 5$$

$$x_1, x_2 \geq 0$$

10. a) Solve the equations by using Cramer's Rule.

$$2x - 3y + 4z = 5$$

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

$$x - y - z = 1$$

(OR)

$$\text{b) Find the Inverse of } A = \begin{bmatrix} 4 & 0 & 2 \\ 2 & 10 & 2 \\ 3 & 9 & 1 \end{bmatrix}$$