

END OF SEMESTER EXAMINATIONS, APRIL / MAY -2018  
 MATHEMATICAL TECHNIQUES IN ECONOMICS  
 SUBJECT CODE: 16P3EC03

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

SEMESTER : I  
 MAX. MARKS: 70

SECTION - A (6 X 4 = 20)

Answer ALL Questions:

1. a) For the following Demand and Supply equations, find the equilibrium Price and Quantities.  
 $Q_D = 220 - 5P$  and  $Q_S = -20 + 3P$   
 (OR)  
 b) Write down all the rules of Differentiation.
2. a) Write the Product and Quotient rules of Partial derivatives.  
 (OR)  
 b) Find the first and second partial derivatives for  $Z = 6x^4 + 5xy + 3y^6$ .
3. a) Suppose the marginal cost of a product is given by  $25 + 30x - 9x^2$  and fixed cost is known to be 60. Find the total and average cost function.  
 (OR)  
 b) Evaluate the following Definite Integrals.  
 (i)  $\int_1^3 x^4 dx$  (ii)  $\int_0^5 (3x^2 + 4) dx$
4. a) Explain the procedures for the graphical solution to a linear programming problem.  
 (OR)  
 b) What is meant by 'Dual Problem' in linear programming? Formulate the Dual to the following Primal Problem.  
 Minimise:  $C = 40x_1 + 20x_2 + 60x_3$   
 Subject to:  $2x_1 + 4x_2 + 10x_3 \geq 24$   
 $5x_1 + x_2 + 5x_3 \geq 8$   
 Where  $x_1, x_2, x_3 \geq 0$
5. a) Explain any four types of Matrices.  
 (OR)  
 b) Describe the properties of Determinants.

SECTION - B (6 X 10 = 60)

Answer ALL Questions:

6. a) Describe the various functions used in Economics.  
 (OR)  
 b) Estimate the point Elasticity of Demand at the given price level for the following demand function  $Q = f(P)$ , where  $Q = 500 - 4P - P^2$  at  $P = 10$ .
7. a) For the following functions, find the first-order partial derivatives.  
 (i)  $f(x, y) = 7x^3(4x + 9y^2)$  (ii)  $Z = (w^5 + 3x^2)(w^3 - 5x^4 + 4y^2)$   
 (OR)  
 b) Maximise the following utility function subject to the given budgetary constraints.  
 $U = x^7 y^3$ ,  $P_x = 56$ ,  $P_y = 15$ ,  $B = 400$ .
8. a) Find the Consumer's surplus at  $P_o = 75$  and  $Q_o = 10$ , given the demand function  
 $P = 375 - 3Q^2$ .  
 (OR)  
 b) Find the producer's surplus at  $P_o = 85$  and  $Q_o = 5$  for the supply function  
 $P = Q^2 + 4Q + 60$ .
9. a) Solve by graphical method, the following linear programming problem.  
 Maximise  $= 6x_1 + 8x_2$   
 Subject to:  $2x_1 + 2x_2 \leq 20$   
 $2x_1 + 4x_2 \leq 24$   
 Where  $x_1 \geq 0$  and  $x_2 \geq 0$   
 (OR)  
 b) Explain the procedures relating to solving a linear programming problem through simplex method.
10. a) Use Cramer's rule to solve the following system of equations.  
 $7x - y - z = 0$ ;  $10x - 2y + z = 8$ ;  $6x + 3y - 2z = 7$ .  
 (OR)

b) If  $A = \begin{bmatrix} 4 & 1 & -5 \\ -2 & 3 & 1 \\ 3 & -1 & 4 \end{bmatrix}$  find the Inverse of A.