2018
ECONOMICS
ECO: 1.3
MATHEMATICAL ECONOMICS-I

Full Marks: 80
Time: 3 Hours

The figures in the margin indicates full marks for the questions :

1. Answer the following questions. ***2x4=8***

a. Explain integration as a reverse process of differentiation.
b. What do you mean by absolute extrema?
c. When does inverse of a matrix exist? What is adjoint of a matrix?
d. What is pivot element?

2. Answer the following questions. ***5x4=20***

a. The AR function is given by
AR= 100-3q, Find out the elasticity of demand when q=5.
b. Outline the properties of definite integrals
c. Write down the general formulation of input-output analysis.
d. Explain shortly the mathematical technique to find out pivot element in linear programming for a maximization problem.

3. Answer any two (2) of the following questions. ***10x2=20***

a. Analyze the effect of lump sum tax and Profit tax on profit, output and price of monopolist firm. (10)
b. Explain producer's surplus mathematically. Assuming perfect competition, find producer's surplus from the demand and supply function given below (3+7)

$p_d = 3x^2 - 20x + 5$

$p_s = 15 + 9x$

c. Find the demand vector D given; $X = \begin{matrix} 25 \\ 21 \\ 18 \end{matrix}$ $A = \begin{matrix} 0.2 & 0.3 & 0.2 \\ 0.4 & 0.1 & 0.2 \\ 0.1 & 0.3 & 0.2 \end{matrix}$ (10)

d. Outline the general formulation of profit maximization for a production problem using LP technique. (10)

PTO

4. *Answer the following questions.* ***16x2=32***

A. A monopolist discriminates between two markets and the price equation are given below

$P_1=80-5Q_1$

$P_2=180-20Q_2$; Where Q_1 and Q_2 are the amount of output sold in two markets. The total cost function of the monopolist firm is given by $TC=50+20Q$ where $Q= Q_1+Q_2$. Obtain

a) Profit Maximizing output

b) Maximum profit

c) Prices of the two markets

d) Elasticity of demand of the two markets (6+2+4+4)

Or

B. Find the final output goals of each industry to satisfy the specified bill of final consumption. Given the technological coefficient matrix, find also the total labor requirement. (12+4)

	X	Y	Z	Bill of final consumption
X	0.3	0.2	0.2	80
Y	0.2	0.1	0.5	30
Z	0.2	0.4	0.2	50
Labour	0.4	0.3	0.1	

C. The Demand and supply laws are given by $D= (6-q)^2$ and $S=14+q$ respectively. Find consumer's surplus if (i) the demand and supply are determined under pure competition (ii) the demand and supply are determined under monopoly. (8+8)

Or

D. What is linear programming? Elaborate the necessity of slack or dummy variables in solving profit maximization of a LP problem. A

manufacture produces three models of bicycles. The time in hours required for assembling, painting and packaging each model is as follows

	Model A	Model B	Model C
Assembling	2	2.5	3
Painting	1.5	2	1
Packaging	1	.75	1.25

The total time available for assembling, painting and packaging is 4006hrs, 2495hrs and 1500hrs respectively. The profit per model is Rs.45, Rs.50 and Rs.55 for models A, B and C respectively. How many of each type should be produced to obtain a maximum profit. (3+3+10)

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