2019

B.Sc.

2nd Semester Examination

ECONOMICS (Honours)

Paper - C4T

(Mathematical Methods in Economics - I)

Full Marks : 60   Time : 3 Hours

The figures in the margin indicate full marks.
Candidates are required to give their answers
in their own words as far as practicable.

Group - A

Answer any *ten* questions.   10×2

1. (a) What do you mean by eigen values ?

   (b) What are quasi convex functions ?

   (c) Define feasible solution in LPP.

   (d) What are implicit functions ?

   (e) What is convex set ?

[Turn Over]

(f) What do you mean by point of inflexion ?

(g) Set up a non-liner programming problem.

(h) Write the Kuhn-Tucker conditions for minimization problem.

(i) Distinguish between endogenous and exogenous variables.

(j) What do you mean by inverse of a square matrix ?

(k) What are parameters ?

(l) Given the demand function $p = \dfrac{36}{q-36} + 12$ find the maximum revenue.

(m) Find the determinant of the matrix :

$$\begin{bmatrix} 2 & 4 \\ 3 & 1 \end{bmatrix}$$

(n) Prove that the elasticity of substitution for a Cobb-Douglas production function is unity.

(o) If the demand function for a profit maximizing monopolist is $P = 274 - Q^2$ and $MC = 4+3Q$, find consumer surplus.

Group - B

Answer any *four* questions.   4×5

2. Consider the following linear programming porblem (LPP) :

   Maximize Profit $(\pi) = 2x_1 + 5x_2$

   Subject to $x_1 + 4x_2 \leq 24$

   $3x_1 + x_2 \leq 21$

   $x_1 + x_2 \leq 9$

   $x_1 \geq 0, x_2 \geq 0$

   Construct the dual problem.

3. Suppose $u = x_1^{\alpha_1} x_2^{\alpha_2}$ is a utility function. If $x_1 p_1 + x_2 p_2 = M$ is the budget constraint, then find the demand function for x_1.

4. Set up a complete Kynesian model with three markets — labour market, commodity market and money market.

[Turn Over]

5. Solve the following LPP :

$Max\ \pi = 25x_1 + 50x_2$

Subject to $9x_1 + 12x_2 \leq 144$

$$10x_1 + 6x_2 \leq 120$$

$$x_2 \leq 9$$

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

6. Consider the simple utility maximization problem subject to a budget constraint in a 2 good case. Interpret the Lagrangian multiplier used in the maximization exercise.

7. What do you mean by minimum value function ?

Group - C

Answer any *two* questions.   2×10

8. Write a note on Duality theorem in linear programming.

9. Find the own price elesticity, the crossprice elasticity and the income elasticity for the following demand function at point

$$(p_1, p_2, y) = (2, 4, 120),\ Q_1 = 20 - 9p_1 - \frac{1}{2}p_2$$

$$+ \frac{1}{2}p_1\ p_2 + \frac{1}{6}y$$

Also identify whether Good 1 and 2 are complements or substitutes.

10. Assume that a monopolist faces the following linear demand and cost curves :

$p_1 = 80 - 5q_1$, $p_2 = 180 - 20q_2$ and

$C = 50 + 20\ (q_1 + q_2)$

   (i) What will be her profit maximizing level of sales in each market ? Also calculate her profit.

   (ii) Show that if the monopolist could not segregate the two markets and were forced to treat them as one, her profits would have been lower.

6+4

11. Distinguish between slack and surplus variables. How are they used in LPP ?   5+5

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