D6BEC2202 **Reg. No.............................**

Name: ....

SIXTH SEMESTER BA DEGREE EXAMINATION, APRIL 2025

(Regular/Improvement/Supplementary)

ECONOMICS

GECO6B12T: MATHEMATICAL ECONOMICS

Time: 2 ½ Hours **Maximum Marks: 80**

SECTION A: Answer the following questions. Each carries *two* marks.
(Ceiling 25 marks)

1. If C = 200 + 68Y, how much is MPS?
2. Define Matrix of technical coefficients.
3. State the mathematical expression for cross elasticity.
4. What is meant by Constraint optimization?
5. Define homogenous function.
6. What is a demand function?
7. Define utility function.
8. What are the marginal conditions for a firm's equilibrium?
9. Find price elasticity of demand when Q= 2500 – 8P -2P^2 at P= 20.
10. Check if $Q = 10K^{0.7}L^{0.1}$ represent constant returns to scale.
11. If $TR = 600q - 0.5q^2$, What is MR when $q = 100$.
12. What is meant by profit maximization?
13. Define Lagrange multiplier. What is its relevance?
14. Explain what is meant by the dual of a primal problem.
15. What is meant by final demand vector?

SECTION B: Answer the following questions. Each carries *five* marks.
(Ceiling 35 marks)

16. Write a note on the relationship between average cost and marginal cost.
17. Give an account on Production possibility curve.
18. Write the dual of the following linear programming problem

Maximize $Z = 320X_1 + 480X_2$

Subject to $3X_1 + 2X_2 \leq 240$

$10X_1 + 8X_2 \leq 400$

$X_1, X_2 \geq 0$

(PTO)

19. Determine the total demand X for industries 1, 2, and 3, given the matrix of technical coefficients A and the final demand vector B.

$$A = \begin{bmatrix} 0.3 & 0.4 & 0.1 \\ 0.5 & 0.2 & 0.6 \\ 0.1 & 0.3 & 0.1 \end{bmatrix} B = \begin{bmatrix} 20 \\ 10 \\ 30 \end{bmatrix}$$

20. State and prove the Euler's theorem.
21. If a firm faces the demand schedule $p = 150 - 3q$ and the total cost schedule $TC = 150 + 36q + 1.2q^2$ what output levels, if any, the firm:
    a. Will maximize profit?
    b. Will minimize profit?
22. Explain the meaning and significance of Mathematical Economics.
23. Find MRTS if the production function is given as $Q = 20K^{0.5}L^{0.5}$.

SECTION C Answer any *two* questions. Each carries *ten* marks.

24. Mathematically explain the different types of elasticities with suitable examples.
25. Solve the linear programming problem graphically:

    Minimize C= $3X_1 + 4X_2$

    Subject to $2x_1 + 3x_2 \geq 36$

    $2x_1 + 2x_2 \geq 28$

    $8x_1 + 2x_2 \geq 32$

    $\boldsymbol{x_1, x_2 \geq 0}$.
26. Maximize $Q = L^{0.3}24K^{0.7}$ Subject to the budget constraint of $5000 = 18K + 8L$.
27. Illustrate mathematically, how competitive firms maximize their profit.

(2 × 10 = 20 Marks)