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End Semester Examination, December 2024

B.A. (Hons/Hons with Research) Economics – 1st Semester

Mathematical Methods for Economics-I (HUES105)

Time: 2.5 hrs.

Max Marks: **50**

Note: *All Questions are compulsory. Marks are indicated against each question.*

In Part A Attempt five questions from all. Each question carries 2 Marks.

In Part B, Internal Choice is given. each question carries 10 Marks.

PART-A

Q.1 (a) Explain the Idempotent Matrix with example. [CO-1] [L-2] **2**

(b) Solve the following linear equation system

$$4x - y = -2$$

$$3x - 4y = 27$$

[CO-1] [L-] **2**

(c) If $A = \{1, 2, 3\}$ find all subset of A

[CO-1] [L-2] **2**

(d) Logarithmic Function

[CO-1] [L2-] **2**

(e) Find Equilibrium Price and quantity if $Q_d = 220 - 5P$ and $Q_s = -20 + 3P$

[CO-1] [L-2] **2**

(f) State the difference between matrix and determinant.

[CO-1] [L-2] **2**

(g) Upper Triangular Matrix

[CO-1] [L-2] **2**

2x5

PART-B

Q.2 Question Solve the following equations by Cramer's rule:

$$x + y + z = 1$$

$$x + 2y + 3z = 6$$

$$x + 3y + 4z = 6$$

[CO-2] [L-3] 10

OR

- i. State the De-Morgan's laws for two sets A and B.
- ii. Calculate the Difference of two sets for any two sets A and B

[CO-2] [L-3] 10

Q.3 Total cost C is given as

$$C = .005x^3 - .02x^2 - 30x + 3000$$

Find:

- a. Total costs when output (x) = 4
- b. AC when output = 10
- c. MC when output = 3

[CO-3] [L-3] 10

OR

For a firm under perfect competition, total cost function is given by $C = 5 + 10Q - 0.9Q^2 + 0.04Q^3$ the price is Rs. 4 per unit will the firm continue production? [CO-3] [L-3] 10

Q.4 The Production function of the firm is given by $Q = 4L^{3/4}K^{1/4}$, $L > 0$, $K > 0$. Find the marginal productivities of labour L and capital. Does this function satisfy the Euler's theorem.

[CO-3] [L-3] 10

OR

If $Q_1 = 20 - 3P_1 + 4P_2$ be the demand function, then find the values of direct and cross price elasticities when $P_1 = 1$ and $P_2 = 2$ [CO-3] [L-3] 10

Q.5 The total cost function for producing a commodity x is $TC = 60 - 12x + 2x^2$. Find the AC and the level of output at which AC function is minimum. Also verify that $AC = MC$ at the minimum point of AC curve. [CO-4] [L-4] 10

OR

Find the profit maximizing output of the monopolist, demand function given $Q = 200 - 10P$ and $AC = 10 + Q/25$, where Q = quantity and P = price. [CO-4] [L-4] 10