Reg.No………………… Name : ……………………………   **P152**

MA DEGREE END SEMESTER EXAMINATIONS NOVEMBER - 2015

SEMESTER: 1, SUBJECT - ECONOMICS

COURSE: P1ECOT05 - QUANTITATIVE METHODS FOR ECONOMIC ANALYSIS - I

Time: Three Hours   Max. Marks: 75

Part A

(Answer **all**, each question carries 2 marks)

1. Define the following   i) Square matrix   ii) Transpose of a matrix

2. Explain   i) Consumer's surplus   ii) Producer's Surplus

3. Explain CES production function?

4. What is linear programming?

5. What are artificial variables?   (2 x 5 = 10)

Part B

(Each question carries 5 marks. Maximum marks from this part is 35)

6. If A = $\begin{bmatrix} 1 & -1 & 0 \\ 2 & 1 & 3 \\ 4 & 1 & 8 \end{bmatrix}$, B = $\begin{bmatrix} 4 & 1 & 0 \\ 2 & -3 & 1 \\ 1 & 1 & -1 \end{bmatrix}$ then show that $(AB)^T = B^T A^T$

7. Prove that $\begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ b+c & c+a & a+b \end{vmatrix} = 0$

8. Explain briefly input/output models and their uses

9. What are the limitations of linear programming problems?

10. Explain first and second order partial derivatives

11. Find the total differential of dz of the function $z = 2\sqrt{x} \; y^2 + 2 \log x - y^2$

12. Verify Euler's theorem for the production function.

    $Q = A \, L^\alpha \, K^\beta$, $\alpha + \beta = 1$

    where Q is the output, L is the Labour, k is the capital and , α and β are constants .

13. Integrate the following functions

    (i) $\log x$ (ii) $\dfrac{4x+5}{2x^2+5x+2}$

14. Find the dual of the problem

Minimize Z= $4x_1 + 2x_2 + x_3$

Subject to $x_1 + x_2 + 2x_3 \leq 10$

$3x_1 + x_2 + x_3 \geq 23$

$7x_1 - x_2 + 2x_3 \leq 20$

$x_1 \geq 0, x_2 \geq 0, x_3 \geq 0$

15. Explain the step for solving linear programming problem using graphical method.

(5 x 7 = 35)

Part C

(Each question carries 15 marks. Maximum marks from this part is 30)

16. Solve the following system of equations using Cramer's rule

$5x - 6y + 4z = 15$

$7x + 4y - 3z = 19$

$2x + y + 6z = 46$

17. i) If the marginal revenue function for output q is given by

$$MR = \frac{6}{(q+3)^2} - 10 \qquad \text{find the demand function}$$

ii) If the marginal cost of a firm is given by

$MC = 7q^2 - 8q + 6$

Find out total cost function given that fixed cost is Rs 100 when the output is 0

18. Solve the following LP problem by the simplex method

Maximize Z = $10x_1 + 6x_2 + 4x_3$

subject to $x_1 + x_2 + x_3 \leq 100$

$10x_1 + 4x_2 + 5x_3 \leq 600$

$2x_1 + 2x_2 + 6x_3 \leq 300$

$x_1 \geq 0, x_2 \geq 0, x_3 \geq 0$

(15 x 2 = 30)

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