

**M. A. DEGREE END SEMESTER EXAMINATION OCT.2020: FEBRUARY 2021****SEMESTER 1: ECONOMICS (CORE COURSE)****COURSE: 16P1ECOT05 – QUANTITATIVE TOOLS FOR ECONOMIC ANALYSIS***(For Regular - 2020 admission and Supplementary 2019 / 2018 / 2017 / 2016 admissions)*

Time: Three Hours

Max Mark: 75

**PART A*****Answer any eight questions. Each question carries 2 marks***

1. Give any two uses of matrix or determinants in Economics.
2. Define singular matrix and give an example of it.
3. What do you mean by a consistent system of equations?
4. What is Cobb-Douglas production function?
5. Define a definite integral. Give one application of definite integral in Economics.
6. What are the conditions for a function  $f(x,y)$  to be a maximum?
7. How will you obtain the total revenue function from the marginal revenue function?
8. Define consumer's surplus.
9. What is trapezoidal rule?
10. What do you mean by feasible solution in linear programming?
11. What is duality theorem?
12. Mention the uses of input/ output analysis. (2 x 8 = 16)

**PART B*****Answer any Seven questions. Each question carries 5 marks***

13. If  $A = \begin{bmatrix} -4 & 1 & 3 \\ 2 & 5 & -1 \\ 6 & 9 & 3 \end{bmatrix}$  and  $B = \begin{bmatrix} -4 & 2 & 7 \\ -2 & 1 & 5 \\ 3 & 2 & 4 \end{bmatrix}$ , then verify whether  $AB = BA$ .

14. If  $A = \begin{bmatrix} 1 & 0 & -1 \\ 2 & 1 & 3 \\ 3 & 1 & 4 \end{bmatrix}$  then find the inverse matrix of A.

15. Explain the significance of Euler's theorem with the help of an example of a homogeneous production function.
16. The utility function of a consumer is given by  $f(x,y) = 2x^3y + 3xy^2$ . Find the marginal utilities and also show that  $f_{xy} = f_{yx}$ .
17. Find the total differential of  $u = x^3 - 5xy + 2y^3$ .
18. Minimise cost if the cost function of a firm is  $C(x) = 5x^2 + 2xy + 3y^2 + 800$  subject to the production quota  $x + y = 39$ .

19. Integrate the following functions  
 (i)  $8x(x^2 + 1)^3$  (ii)  $x e^{2x}$
20. Explain Simpson's one-third rule.
21. What do you mean by the dual of a linear programming problem? Explain the dual advantages
22. Explain Cobb – Douglas production function. (5 x 7 = 35)

### PART C

**Answer any two questions. Each question carries 12 marks**

23. Solve the following system of equations using matrix inverse method
- $$\begin{aligned} 4x + y + 2z &= 7 \\ 7x - y + z &= 7 \\ 3x + 4y + z &= 8 \end{aligned}$$
24. Explain the various applications of partial derivatives in economics.
25. If total cost function is  $C=5000+1000q-500q^2+(2/3)q^3$ . Find the output at which marginal cost would be equal to the average variable cost.
26. A manufacturing company makes two models A and B of a product. Each piece of Model A requires 7 labour hours for fabricating and 1 labour hour for finishing. Each piece of Model B requires 8 labour hours for fabricating and 2 labour hours for finishing. For fabricating and finishing, the maximum labour hours available are 160 and 25 respectively. The company makes a profit of Rs 6000 on each piece of model A and Rs 10000 on each piece of Model B. How many pieces of Model A and Model B should be manufactured per week to realize a maximum profit? What is the maximum profit per week? (12 x 2 = 24)

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