

Model Question Paper
Semester-1

Complementary Course: Mathematics for Economic Analysis-1

Time: 3 Hours

Max. Mark: 80

PART A

Short Answers/Problems

Answer any ten of the following. 2 marks each

1. Define the terms variables and constants.
2. Differentiate symmetric and skew symmetric matrix.
3. Mention any two properties of determinants.
4. Without calculation, can you say the value of $\begin{vmatrix} 2 & 4 & 3 \\ 3 & 1 & 2 \\ 6 & 2 & 4 \end{vmatrix}$ why?
5. Marginal Revenue function is given as $100-8q$. Calculate total revenue when $q = 10$.
6. Integrate $(x^2 \cdot e^x) dx$.
7. Find the maximum and minimum value of the function $x^2 - 2x^2 - 4x - 1$.
8. Basic assumptions of linear Programming Problem.
9. What are the steps involved in the formulation of an LPP?
10. Distinguish static and dynamic model of input output system.
11. What is the Hawkins – Simon conditions for the viability of the system?
12. Write down a specimen of Leontief's input output table.

(10 × 2 = 20)

PART B

Sort Essay/ Problems

Answer any six of the following. 5 marks each

13. Given $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ $B = \begin{bmatrix} 0 & -1 \\ 6 & 7 \end{bmatrix}$ find $(AB)^T$ and $B^T A^T$, where A^T denotes the transpose A.
14. Find the inverse of $A = \begin{bmatrix} 4 & -2 & 1 \\ 7 & 3 & 3 \\ 2 & 0 & 1 \end{bmatrix}$
15. Use Cramm's rule to solve the system of equations.
 $4x + 3y - 2z = 7$
 $x + y = 5$
 $3x + z = 4$
16. The demand function of a monopolist is $P = 15 - 2x$ and the cost function is $C = x^2 + 2x$. Find the (1) MR (2) MC (3) equilibrium output (4) equilibrium price and (5) AC.
17. Optimize the following functions.
 - a. $Y = 3x^2 + 18x - 36$.
 - b. $Y = x^2 - 4x + 3$.
18. Solve the following problem graphically
Max: $60x + 40y$
s.t $2x + y \leq 60$
 $x \leq 25$
 $y \leq 35$
 $x, y \geq 0$
19. Discuss the applications of LPP.

20. Examine whether the input output system with the following coefficients matrix is feasible $\begin{bmatrix} 0.8 & 0.2 \\ 0.9 & 0.7 \end{bmatrix}$

21. Find the Rank of the matrix $\begin{bmatrix} 4 & 8 & -4 \\ 8 & 0 & 0 \\ 4 & -8 & 4 \end{bmatrix}$ (6 × 5 = 30)

PART C

Essay

Answer any two of the following. 15 marks each

22. Explain the applications of derivatives in economics.

23. a) Differentiate $\frac{2x^2 - 1}{x^2 + 1}$

b) Find $\int 2xe^{-x} dx$

24. Solve the linear programming problem using Simplex method.

Max: $3x + 2y \leq 4$

$X - y \leq 2$

$X \geq 0, y \geq 0$

25. Given the coefficient matrix $C = \begin{bmatrix} 0.4 & 0.1 \\ 0.2 & 0.3 \end{bmatrix}$. Obtain the levels of output X_1 and X_2 to have a final demand for $X_1 = 20$ crores and for $X_2 = 15$ crores. Prepare the input output table.

(15 × 2 = 30)