

PSG COLLEGE OF ARTS & SCIENCE  
(AUTONOMOUS)

BA DEGREE EXAMINATION MAY 2024  
(First Semester)

Branch - ECONOMICS

MATHEMATICAL METHODS-I

Time: Three Hours

Maximum: 75 Marks

SECTION-A (10 Marks)

Answer ALL questions

ALL questions carry EQUAL marks

(10 × 1 = 10)

- 1 Which of the following is an example of a quadratic functions?  
a)  $y=7x+8$                       b)  $y=x^2+6x-5$   
c)  $8x-1$                           d)  $y=\sqrt{x}$
- 2  $\alpha+\beta > 1$  indicates  
a) Constant returns to scale    b) Increasing returns to scale  
c) Decreasing returns to scale    d) None of these
- 3 If  $y=e^{-x}$ ,  $dy/dx$  is \_\_\_\_\_.  
a)  $1/x$                               b)  $-1/x$   
c)  $e^{-x}$                               d)  $-e^{-x}$
- 4 What is the point of intersection of the x-axis and y-axis is called as  
a) Vertex                              b) Focus  
c) Origin                                d) Center
- 5 In Matrices,  $A$  \_\_\_\_\_ is a number associated with a Square matrix.  
a) Addition                              b) Subtraction  
c) Multiplication                      d) Determinant
- 6 Which of the following is an inverse of a square matrix A exists only?  
a) The determinant of a matrix is non-zero  
b) The determinant of a matrix is zero  
c) A is a singular matrix  
d) A is a diagonal matrix.
- 7 If A is the given matrix,  $A^{-1}$  is  
a)  $\text{Adj } A / |A|$                       b)  $\text{cof } A / |A|$   
c)  $|A|/\text{Adj } A$                       d)  $|A|/\text{cof}(A)$
- 8 The transpose of a symmetric matrix A is  
a)  $A^T$                                   b) A  
c)  $A^{-1}$                                 d)  $1/A$
- 9 Input-Output analysis assumes  
a) Constant returns                      b) Constant returns to scale  
c) Diminishing returns                d) Diminishing returns to scale
- 10 Co-efficient matrix notation is  
a)  $X=AY+F$                       b)  $X=AX+F$   
c)  $X=AX-F$                       d) None of these

SECTION - B (35 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks

(5 × 7 = 35)

- 11.a. Outline the Merits of Mathematical methods.  
(OR)
- b. 5kg of sugar and 7kg of rice cost Rs.85 and 3kg of sugar and 9kg of rice cost Rs.75. Find the individual price of sugar and rice per kg.

Cont...

- 12.a. Find the distance between two points (1,-2) and (-3,4).

(OR)

- b. Discuss the application of straight line in Economics.

13. a. Organise the properties of Determinants.

(OR)

- b. If  $A = \begin{bmatrix} 5 & 6 & 2 \\ 7 & 8 & 2 \end{bmatrix}$  and  $B = \begin{bmatrix} 2 & 0 \\ 1 & 5 \\ 3 & 1 \end{bmatrix}$  find AB.

- 14.a. Compute cofactor for the matrix  $A = \begin{bmatrix} 5 & 2 & 1 \\ 2 & 1 & 4 \\ 0 & 5 & 6 \end{bmatrix}$

(OR)

- b. Solve the equations by using Cramer's rule.

$$5x_1 + 3x_2 = 30$$

$$6x_1 - 2x_2 = 8$$

- 15.a. Describe the uses of Input-Output Analysis.

(OR)

- b. Discuss the limitations of Input- Output Analysis

**SECTION -C (30 Marks)**

Answer ANY THREE questions

ALL questions carry EQUAL Marks

(3 × 10 = 30)

16. Given the Utility function  $U = x^2 + 3xy - 5y^2$ , price of commodity x is Rs.2, price of commodity y is Rs.3 and consumer's money income Rs.6, find out the equilibrium level of consumption of commodities x and y. Also prove the conditions for maximisation.

17. Find the slope of the curve  $y = x^3 - 6x + 2$ . Where does it cut the Y-axis?

18. Discuss the properties of Transpose of a matrix with examples.

19. Find the Inverse of the Matrix  $A = \begin{bmatrix} 1 & 3 & -4 \\ -1 & -2 & 1 \\ 2 & 4 & -5 \end{bmatrix}$

20. If an economy of two industries A and B, the data is given below in million of rupees.

		Purchase by		Final demand	Total output
		A	B		
Sales by	A	12	6	6	24
	B	6	3	9	18

Determine the total output, if the final demand changes to 18 for A and 36 for B.

Z-Z-Z

END