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22ECU102N

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BA DEGREE EXAMINATION MAY 2025
(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)

Question No.	Question	K Level	CO
1	What is a linear function in economics? a) A function where the output changes at a constant rate b) A function that increases at an increasing rate c) A function that decreases over time d) A function with a maximum point	K1	CO1
2	If $f(x) = 5x^2 + 4x - 3$, then the value of $f(-1)$ is a) -2 b) -1 c) 0 d) 1	K1	CO1
3	Formula for finding midpoint of the two points (x_1, y_1) and (x_2, y_2) is a) $\left(\frac{x_1+y_1}{2}, \frac{x_2+y_2}{2}\right)$ b) $\left(\frac{x_1-y_1}{2}, \frac{x_2-y_2}{2}\right)$ c) $\left(\frac{x_1-y_1}{2}, \frac{x_2+y_2}{2}\right)$ d) $\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$	K1	CO2
4	Which of the following is the equation of straight line? a) $y = 4x^2$ b) $y = 1 - x$ c) $y = 4x^{-1}$ d) $y^2 = 4x$	K1	CO2
5	Let $A = \begin{pmatrix} -3 & 0 \\ 0 & x \end{pmatrix}$ for what value of x the matrix A is scalar matrix? a) -1 b) 3 c) -3 d) 4	K1	CO3
6	Find the rank of the matrix $\begin{pmatrix} -1 & 1 \\ 2 & -2 \end{pmatrix}$ a) 0 b) 1 c) 2 d) 3	K1	CO3
7	Inverse of the matrix A exist only if a) $\lvert A\rvert \neq 1$ b) $\lvert A\rvert = -1$ c) $\lvert A\rvert = 0$ d) $\lvert A\rvert \neq 0$	K1	CO4
8	The solution of the equation $2x + 3y = 5$ is a) (2,0) b) (0,3) c) (2,3) d) (1,1)	K1	CO4
9	In the Input-Output Table, what does the diagonal represent? a) Interactions between sectors b) Total input c) Inputs used by each sector d) Total output	K1	CO5
10	What is a key assumption of Input-Output Analysis? a) Prices of goods are always rising b) The economy is closed with no trade c) The production process is linear d) All firms have market power	K1	CO5

Cont...

SECTION - B (35 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** Marks (5 × 7 = 35)

Question No.	Question	K Level	CO
11.a.	Explain the uses of the liner functions in economics.	K2	CO1
	(OR)		
11.b.	Briefly explain some key types of curves in economics.		
12.a.	Determine if the points (0, 2), (2, 4) and (– 2, 0) are collinear.	K4	CO2
	(OR)		
12.b.	Find the equation of the circle with center at (3, –1) and radius is 4 units.		
13.a.	If $A = \begin{bmatrix} 1 & -2 & 3 \\ -4 & 2 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 3 \\ 4 & 5 \\ 2 & 1 \end{bmatrix}$, find the matrix AB and BA	K4	CO3
	(OR)		
13.b.	Find the determinant of the matrix $A = \begin{bmatrix} 6 & 4 & 2 \\ 7 & 1 & 3 \\ 0 & -1 & 6 \end{bmatrix}$		
14.a.	Find the inverse of the matrix $A = \begin{bmatrix} 2 & -3 \\ 6 & -1 \end{bmatrix}$	K4	CO4
	(OR)		
14.b.	Solve the equations by Cramer's rule $x + 2y = 6$ and $3x - 4y = 8$		
15.a.	a) Explain the following i) Input output Table ii) Production Matrix iii) Demand matrix	K3 K4	CO5
	(OR)		
15.b.	Consider the input output matrix $\begin{bmatrix} 0.8 & 0.2 \\ 0.9 & 0.7 \end{bmatrix}$ of the economic system. Test whether the system satisfy the Hawkins-Simon conditions.		

SECTION -C (30 Marks)

Answer **ANY THREE** questions

ALL questions carry **EQUAL** Marks (3 × 10 = 30)

Question No.	Question	K Level	CO
16	Briefly explain the Returns to Scale.	K2	CO1
17	Find the center and radius of the circle $x^2 + y^2 - 8x + 6y - 24 = 0$	K4	CO2
18	If $A = \begin{bmatrix} 3 & 1 & 2 \\ 0 & 5 & 7 \\ 9 & 1 & -4 \end{bmatrix}$ and $B = \begin{bmatrix} 7 & 1 & 9 \\ 3 & 0 & -1 \\ 4 & -6 & 2 \end{bmatrix}$ Show that i) $3(A + B) = 3A + 3B$ ii) $AB \neq BA$	K4	CO3
19	Find the adjoint of the matrix $\begin{bmatrix} -4 & -3 & -3 \\ 1 & 0 & 1 \\ 4 & 4 & 3 \end{bmatrix}$	K4	CO4
20	Consider closed three sector economy with industries S_1, S_2 and S_3 corresponding to agriculture, energy and manufacturing, where the input output table is given by Purchased From | Agriculture | Energy | Manufacturing Agriculture | 0.2 | 0.3 | 0.2 Energy | 0.5 | 0.2 | 0.3 Manufacturing | 0.3 | 0.5 | 0.5 Find the production matrix.	K4	CO5

Z-Z-Z END