

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)
BA DEGREE EXAMINATION DECEMBER 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)

Module No.	Question No.	Question	K Level	CO
1	1	Which of the following equation is linear equation? a) $2x + 3$ b) $2x^2 + 3$ c) $2x^3 + 3$ d) $2x^4 + 3$	K1	CO1
	2	In mathematical economics, an equilibrium condition is typically represented by. a) A system of inequalities b) The equality of supply and demand functions c) A utility maximization problem d) A production function	K1	CO1
2	3	Find the distance between origin and the point (1,1) a) 2 b) $\sqrt{2}$ c) $\sqrt{3}$ d) 3	K3	CO2
	4	Find the radius of the circle $x^2 + y^2 = \frac{1}{2}$ a) -2 b) $\frac{1}{2}$ c) 2 d) $\frac{1}{\sqrt{2}}$	K3	CO2
3	5	If the matrix contains only one column is called. a) Row matrix b) Identity matrix c) Diagonal matrix d) Column matrix	K2	CO3
	6	. Let $A = \begin{pmatrix} 2 & 2 \\ 3 & 4 \end{pmatrix}$ then rank the matrix A^T is a) 0 b) 1 c) 2 d) 3	K2	CO3
4	7	Inverse of the identity matrix should be. a) Zero matrix b) Row matrix c) Non-zero matrix d) Column matrix	K1	CO4
	8	If the determinant of a matrix is zero, the matrix is said to be. a) Invertible b) Singular c) Symmetric d) Diagonal	K1	CO4
5	9	Who developed the Input-Output Model in economics? a) John Maynard Keynes b) Adam Smith c) Wassily Leontief d) David Ricardo	K2	CO5
	10	In the Input-Output Model, what is "output" ? a) Goods produced by a sector b) Money spent by the government c) Wages paid to workers d) Taxes collected	K2	CO5

SECTION - B (35 Marks)

Answer **ALL** Questions

ALL Questions Carry **EQUAL** Marks

(5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	What is the significance of the slope of a demand curve?	K2	CO1
		(OR)		
	11.b.	Show the main uses of partial equilibrium analysis.		

Cont...

2	12.a.	Find the distance between the points (1,2) and (−2,1) and coordinates of the mid-point between them.	K3	CO2
	(OR)			
	12.b.	Discover the equation of the circle whose centre is (2,3) and which pass through (1,4).	K4	CO3

3	13.a.	Given that $A = \begin{bmatrix} 1 & -1 \\ 2 & 3 \end{bmatrix}$ verify that $A^2 - 4A + 5I = 0$	K4	CO3														
	(OR)																	
	13.b.	Find rank of the matrix $A = \begin{bmatrix} 1 & 1 & -1 \\ 2 & -3 & 4 \\ 3 & -2 & 3 \end{bmatrix}$																
4	14.a.	Find the minors and cofactors of all the elements of $\begin{vmatrix} 5 & 6 & 7 \\ 0 & 1 & -3 \\ -2 & 4 & 9 \end{vmatrix}$	K4	CO4														
	(OR)																	
	14.b.	Solve the equations $3x + 2y = 8$ and $5x - 3y = 7$ by Cramer's rule.																
5	15.a.	Describe the futures of a closed input output model.	K3	CO5														
	(OR)																	
	15.b.	In an economy there are two industries P_1 and P_2 and the crawling table gives the supply and demand position in crores of rupees. <table><tr><th rowspan="2">Production sector</th><th colspan="2">Consumption sector</th><th rowspan="2">Final demand</th><th rowspan="2">Gross output</th></tr><tr><th>P_1</th><th>P_2</th></tr><tr><td>P_1</td><td>10</td><td>25</td><td>15</td><td>50</td></tr><tr><td>P_2</td><td>20</td><td>30</td><td>10</td><td>60</td></tr></table> Does a solution exist for this system?			Production sector	Consumption sector		Final demand	Gross output	P_1	P_2	P_1	10	25	15	50	P_2	20
Production sector	Consumption sector		Final demand	Gross output														
	P_1	P_2																
P_1	10	25	15	50														
P_2	20	30	10	60														

SECTION -C (30 Marks)

Answer ANY THREE Questions
ALL questions carry EQUAL Marks

(3 x 10 = 30)

Module No.	Question No.	Question	K Level	CO																	
1	16	Explain the importance of the Mathematical Economics.	K2	CO1																	
2	17	Show that $(x+1)(x-2) + y^2 - 1 = 0$ is the equation of circle with the fixed points (-1,1) and (2,-1) at the ends of a diameter.	K4	CO2																	
3	18	If $A = \begin{bmatrix} 3 & 5 \\ 1 & 9 \end{bmatrix}$ and $B = \begin{bmatrix} 0 & 4 \\ 6 & 3 \end{bmatrix}$, show that $(BA)^{-1} = A^{-1}B^{-1}$	K4	CO3																	
4	19	Solve the equations $x + y + 2z = 4$; $2x - y + 3z = 9$; $3x - y - z = 2$	K4	CO4																	
5	20	Consider an economy of two sectors S_1, S_2 whose input output table is given by <table border="1"> <thead> <tr> <th rowspan="2">Production in sectors</th><th colspan="2">Input Industry</th><th rowspan="2">Final Demand</th><th rowspan="2">Total</th></tr> <tr> <th>S_1</th><th>S_2</th></tr> </thead> <tbody> <tr> <td>S_1</td><td>50</td><td>75</td><td>75</td><td>200</td></tr> <tr> <td>S_2</td><td>100</td><td>50</td><td>50</td><td>200</td></tr> </tbody> </table> Find Leontief matrix, verify the Hawkin's Simon conditions and find the solution.	Production in sectors	Input Industry		Final Demand	Total	S_1	S_2	S_1	50	75	75	200	S_2	100	50	50	200	K4	CO5
Production in sectors	Input Industry			Final Demand	Total																
	S_1	S_2																			
S_1	50	75	75	200																	
S_2	100	50	50	200																	

Z-Z-Z

END