

Reg. No.:



Name:

U8977

University of Kerala

Second Semester FYUGP Degree Examination, April 2025

Discipline Specific Core Course

MATHEMATICS

UK2DSCMAT109 - Matrices and Linear Equations

Academic Level: 100-199

Time: 2 Hours(120 Mins)

Max. Marks: 56

Part A.6 Marks:Time 5 Minutes.(Cognitive Level :Remember(RE)/Understand(UN)) Objective Type.1 mark each,
Answer all questions

Qn No.	Question	CL	CO
1	Define orthogonal matrix	RE	4
2	Define a skew-symmetric matrix	RE	1
3	If the eigen values of a 2×2 matrix A are 1 and 3, then eigen value of A^T will be	UN	4
4	If A is a 3×3 matrix with $ A \neq 0$, then the rank of A is _____	UN	3
5	If A is an $n \times n$ matrix and k is any scalar then $\det(kA) = \dots$	UN	2
6	Find the characteristic equation of the matrix $\begin{bmatrix} 1 & 2 \\ 0 & 3 \end{bmatrix}$.	UN	3

Part B.10 Marks.Time:20 Minutes (Cognitive Level:Understand(UN)/Apply(AP))Two-three sentences.2 marks each.Answer all questions

Qn No.	Question	CL	CO
7	Solve the system of equations $5x - 3y = 2$ $2x + 3y = 5$	UN	1
8	If $A = \begin{bmatrix} -5 & -3 \\ 2 & 1 \end{bmatrix}$ then find A^{-1} .	UN	2
9	Solve the matrix equation $\begin{bmatrix} a & 3 \\ -1 & a+b \end{bmatrix} = \begin{bmatrix} 4 & d-2c \\ d+2c & -2 \end{bmatrix}.$	AP	1
10	Let $A = \begin{bmatrix} \lambda-2 & 1 \\ -5 & \lambda+4 \end{bmatrix}$, find all values of λ for which $\det(A) = 0$.	AP	2

Qn No.	Question	CL	CO
11	Find the inverse of the matrix $\begin{bmatrix} 6 & 1 \\ 5 & 2 \end{bmatrix}$.	AP	2

Part C.16 Marks:35 Minutes.(Cognitive Level :Apply(AP)/Analyse(AN))Short Answer.4 marks each, Answer all 4 questions,choosing among options * within each question

Qn No.	Question	CL	CO
12	A) Find the determinant of the matrix $A = \begin{bmatrix} 3 & 1 & 0 \\ -2 & -4 & 3 \\ 5 & 4 & -2 \end{bmatrix}$. OR B) If $A = \begin{bmatrix} 3 & 0 & 1 \\ -2 & 1 & 0 \end{bmatrix}$, $B = \begin{bmatrix} -1 & 0 \\ 0 & 1 \\ 1 & 2 \end{bmatrix}$, then show that $AB \neq BA$.	AP	2, 2
13	A) Express the matrix $A = \begin{bmatrix} 3 & -6 & 9 \\ -2 & 7 & -2 \\ 0 & 1 & 5 \end{bmatrix}$ as the sum of a symmetric and a skew-symmetric matrices. OR B) Find the minors and cofactors of $A = \begin{bmatrix} 3 & 1 \\ 2 & 5 \end{bmatrix}$.	AP	2, 2
14	A) Find the rank of $A = \begin{bmatrix} 0 & 1 & 5 \\ 3 & -6 & 9 \\ 2 & 6 & 1 \end{bmatrix}$. OR B) If $A = \begin{bmatrix} 2 & 5 \\ 3 & 7 \end{bmatrix}$, verify that $(AB)^{-1} = B^{-1}A^{-1}$.	AN	4, 2
15	A) Test the consistency	AN	3, 4

Qn No.	Question	CL	CO
	$x - 2y + 3z = 2$ $2x \quad \quad - 3z = 3$ $x + y + z = 0$ OR B) Find the values of a, b, c such that the system of equations $x_1 - 2x_2 - x_3 = a$ $-4x_1 + 5x_2 + 2x_3 = b$ $-4x_1 + 7x_2 + 4x_3 = c$ is consistent.		

Part D.24 Marks.Time: 60 Minutes.(Cognitive Level :Analyse(AN)/Evaluate(EV)/Create(CR)) Long Answer 6 Marks each.Answer all 4 questions choosing among options * within each question

Qn No.	Question	CL	CO
16	A) Determine the value of a so that the system of equations $x + 2y - 3z = 4$ $3x - y + 5z = 2$ $4x + y = (a^2 - 14)z = a + 2$ has (i) unique solution (ii) infinitely many solution (iii) no solution OR B) Using the matrix $A = \begin{bmatrix} 1 & 0 & 5 \\ 3 & -1 & 2 \end{bmatrix}$ verify that $A^T A$ and AA^T are symmetric matrices.	AN	4, 2
17	A) Diagonalize the matrix $A = \begin{bmatrix} 3 & 4 \\ 4 & -3 \end{bmatrix}$ OR B) Diagonalize the matrix $\begin{bmatrix} 4 & 2 \\ 2 & 1 \end{bmatrix}$	EV	2, 4

Qn No.	Question	CL	CO
18	A) Find the eigen values and corresponding eigen vectors of $\begin{bmatrix} 6 & 2 & -2 \\ 2 & 5 & 0 \\ -2 & 0 & 7 \end{bmatrix}, \text{ given } \lambda = 3.$ OR B) Find the eigen values and eigen vectors $\begin{bmatrix} 3 & 5 & 3 \\ 0 & 4 & 6 \\ 0 & 0 & 1 \end{bmatrix}$	EV	4, 4
19	A) Using Gaussian elimination method, solve the system of linear equations $\begin{aligned} x_1 + 3x_2 - 2x_3 + 2x_5 &= 0 \\ 2x_1 + 6x_2 - 5x_3 - 2x_4 + 4x_5 - 3x_6 &= -1 \\ 5x_3 + 10x_4 + 15x_6 &= 6 \\ 2x_1 + 6x_2 + 8x_4 + 4x_5 + 18x_6 &= 6 \end{aligned}$ OR B) Using Cramer's rule, solve the linear system of equations $\begin{aligned} 3x_1 + 5x_2 &= 7 \\ 6x_1 + 2x_2 + 4x_3 &= 10 \\ -x_1 + 4x_2 - 3x_3 &= 0 \end{aligned}$	CR	1, 2