U8437

Reg. No.: ……..

Name:……...

University of Kerala

First Semester Degree Examination, November 2024

Four Year Under Graduate Programme

Discipline Specific Core Course

MATHEMATICS

UK1DSCMAT110 - MATRICES AND LINEAR EQUATIONS

Academic Level: 100-199

Time:2 Hours **Max.Marks:56**

Part A.

Answer All Questions, Objective Type. 1 Mark Each.

(Cognitive Level: Remember/Understand)

6 Marks. Time: 5 Minutes

Qn. No.	Question	Cognitive Level	Course Outcome (CO)
1.	Define a symmetric matrix.	Remember	CO2
2.	When do we say that a square matrix A is singular?	Remember	CO1
3.	If the order of A is 3 X 2 and order of B is 5 X 2, then what is the order of AB^T ?	Understand	CO1
4.	If A is an n X n matrix and k is any scalar then det(kA)=……..	Understand	CO3
5.	Define norm of a vector in R^n.	Remember	CO4
6.	When do we say that two vectors $\overline{u}$ and $\overline{v}$ are orthogonal ?	Remember	CO4

Part B.

Answer All Questions , Two-Three sentences. 2 Marks Each.

(Cognitive Level: Remember/Understand/Apply)

10 Marks. Time: 20 Minutes

Qn. No.	Question	Cognitive Level	Course Outcome (CO)
7.	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≠BA.	Remember	CO1
8.	If $A = \begin{bmatrix} 3 & 1 \\ 1 & 4 \end{bmatrix}$, find A^{-1}.	Remember	CO2

9.	Express the matrix equation as a system of linear equations $\begin{bmatrix}2 & -1 & 6\\1 & 4 & 5\\7 & 3 & 2\end{bmatrix}\begin{bmatrix}x_1\\x_2\\x_3\end{bmatrix}=\begin{bmatrix}-1\\6\\0\end{bmatrix}$	Remember	CO2
10.	Verify that det (A) = det (A^T),where $A=\begin{bmatrix}-2 & 3\\1 & 4\end{bmatrix}$.	Understand	CO3
11.	Find the distance between$\overline{u}=(1,3,-2,7)\wedge\overline{v}=(0,7,2,2)$.	Apply	CO4

Part C.

Answer all 4 questions, choosing among options within each question.

Short Answer. 4 Marks Each.

(Cognitive Level: Remember/Understand/Apply/Analyse)16 Marks.Time: 35 Minutes

Qn. No.	Question	Cognitive Level	Course Outcome (CO)
12.	A. Find the value of a,b,c,d, given that $\begin{bmatrix}a-b & b+a\\3d+c & 2d-c\end{bmatrix}=\begin{bmatrix}8 & 1\\7 & 6\end{bmatrix}$ OR B. If A is invertible symmetric matrix, then prove that A^{-1} is symmetric.	Understand	CO1 & CO2
13.	A. If $A=\begin{bmatrix}2 & 4\\-1 & 3\end{bmatrix}, B=\begin{bmatrix}-1 & 0\\1 & 4\end{bmatrix}, C=\begin{bmatrix}1 & 2\\-1 & 6\end{bmatrix}$, show that $A(BC)=(AB)C$. OR B. If $A=\begin{bmatrix}1 & 2\\3 & 4\end{bmatrix}$, find $A^2-3A+2I$	Understand	CO1 & CO 2
14.	A. Find the value of k for which the matrix $A=\begin{bmatrix}1 & 2 & 0\\k & 1 & k\\0 & 2 & 1\end{bmatrix}$ is singular. OR B. If $\overline{u}$ and $\overline{v}$ are vectors in R^n,prove that $\|u+v\|\leq\|u\|+\|v\|$	Analyse	CO3 & CO4
15.	A. Let $\overline{u}=(2,-1,3)$ and $\overline{a}=(4,-1,2)$.Find the vector component of $\overline{u}$ along $\overline{a}$ and the vector component of $\overline{u}$orthogonal to $\overline{a}$. OR B. Find the area of the triangle determined by the points $P_1=(2,2,0), P_2=(-1,0,2)\wedge P_3=(0,4,3)$.	Apply	CO 4

Part D.
Answer all 4 questions, choosing among options within each question.Long Answer. 6 Marks Each.
(Cognitive Level: Understand/Apply/Analyse/Evaluate/Create)
24 Marks. Time: 60 Minutes

Qn. No.	Question	Cognitive Level	Course Outcome (CO)
16.	A. If $A = \begin{bmatrix} 2 & -3 \\ 1 & 5 \end{bmatrix}, B = \begin{bmatrix} -4 & 0 \\ 1 & 6 \end{bmatrix}$, show that $(A+B)(A-B) \neq A^2 - B^2$. OR B. Using Gauss Jordan Method, solve $x + y + 2z = 4, 2x - y + z = 2, x - 2y + 2z = 1$	Understand	CO1
17.	A. If $A = \begin{bmatrix} 1 & 2 & 0 \\ -1 & 6 & 5 \end{bmatrix}, B = \begin{bmatrix} 0 & 3 \\ 1 & 1 \\ -1 & 1 \end{bmatrix}. Showthat$ $(AB)^T = B^T A^T$ OR B. Express $A = \begin{bmatrix} 2 & 4 & 9 \\ 1 & 3 & 0 \\ 2 & 1 & 5 \end{bmatrix}$ as a sum of a symmetric and a skew symmetric matrix.	Understand	CO 2
18.	A. Find the inverse of the matrix $A = \begin{bmatrix} 3 & 2 & -1 \\ 1 & 6 & 3 \\ 2 & -4 & 0 \end{bmatrix}$. OR B. Using Cramer's rule, solve $x_1 + 2x_3 = 6$ $-3x_1 + 4x_2 + 6x_3 = 30$ $-x_1 - 2x_2 + 3x_3 = 8$	Analyse	CO4
19.	A. Find the distance between the point $(1, -4, -3)$ and the plane $2x - 3y + 6z = -1$. OR B. Find the distance between the planes $x + 2y - 2z = 3$ and $2x + 4y - 4z = 7$.	Apply	CO4