

18.	A. Reduce the system of equations using the Gauss Elimination Method $\begin{aligned}x_1 + x_2 + x_3 &= 0 \\ -x_1 + x_2 - x_3 &= 0 \\ 10x_2 + 25x_3 &= 90 \\ 20x_1 + 10x_2 &= 80\end{aligned}$ and find solutions of this system if any exists. OR B. Using Cramer's rule calculate the values of x, and y of the following system of equations $\begin{aligned}3x + 4y &= -14 \\ -2x - 3y &= 11\end{aligned}$	Analyse	CO 3
19.	A. Calculate the eigen values and eigen vectors of matrix $A = \begin{bmatrix} 2 & 2 & 3 \\ 2 & 1 & 6 \\ -1 & -2 & 0 \end{bmatrix}$ OR B. Is the matrix A $\begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix}$ diagonalizable? Verify.	Apply	CO 4

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 number of positive integers less than or equal to 2000 and divisible by 3,5 or 7 OR B) Prove that if the square of an integer is odd, then the integer must be odd and if the square of an integer is even, then the integer must be even.	Understand	CO 1
13.	A) Find the canonical decomposition of 2520. OR B) Find all the positive factors of 60.	Understand	CO 1
14.	A) Calculate the rank of matrix $\begin{pmatrix} 3 & 2 & 1 \\ 1 & 4 & 2 \\ 0 & 0 & 4 \end{pmatrix}$ OR B) Solve the system of equations $2x + 3y = 5$, $3x + 8y = 11$	Analyse	CO 3
15.	A) Calculate the eigen values of matrix $\begin{bmatrix} 3 & 1 \\ 4 & 2 \end{bmatrix}$. OR B) Express matrix $A = \begin{bmatrix} 1 & 2 \\ 2 & 4 \end{bmatrix}$ as the sum of a symmetric and a skew-symmetric matrices.	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)****24Marks.Time:60 Minutes**

Qn. No.	Question	Cognitive Level	Course Outcome (CO)
16.	A. Demonstrate $1+2+3+\dots+n = n(n+1)/2$ for every positive integer n using mathematical induction. OR B. Use Euclidean algorithm to find gcd(4076, 2024) and express the gcd as a linear combination of these two numbers.	Understand	CO 1
17.	A. Derive the equation $[a,b] = ab/(a,b)$, where a ,b are positive integers . OR B. Compute the remainder when 3^{181} is divided by 17	Understand	CO 2



U8359

Reg. No.:

Name:.....

**University of Kerala**

First Semester Degree Examination, November 2024

Four Year Under Graduate Programme

Discipline Specific Core Course

MATHEMATICS

UK1DSCMAT106 - NUMBER THEORY AND LINEAR SYSTEM OF 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.	$a \equiv b(mod m)$ if -----	Remember	CO 2
2.	Define prime and composite numbers.	Remember	CO 1
3.	If $\lambda = 1, 3$ are the eigenvalues of the 2×2 square matrix A, then identify the eigen values of A^T ?	Understand	CO 4
4.	State symmetric property of congruence relation	Understand	CO 2
5.	Define the rank of a matrix.	Remember	CO 3
6.	Define symmetric matrix	Remember	CO 3

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.	State the pigeonhole principle.	Remember	CO 1
8.	State the fundamental theorem of arithmetic.	Remember	CO 1
9.	Define the eigen values of the matrix.	Remember	CO 4
10.	Find gcd (25,35).	Understand	CO 1
11.	Compute rank of matrix $\begin{bmatrix} -2 & 4 \\ 5 & 1 \end{bmatrix}$	Apply	CO 3

