

International Islamic University Chittagong (IIUC)  
Department of Electronic and Telecommunication Engineering  
**Midterm Examination**

Program: **B.sc (Engg.)**

Semester: **Spring 2024**

Course Code: **Math-2307**

Course Title: **Metrics, Linear System of Equations and Vector Analysis**

Total Marks: **30**

Time: **1 Hour 30 Minutes**

- (i) Answer all the questions. The figures in the right-hand margin indicate full marks.  
(ii) Course Learning Outcomes (CLOs) and Bloom's Levels are mentioned in additional Columns.

**Course Learning Outcomes (CLOs) of the Questions**

- CLO1** Discuss the basic idea of vector spaces, subspaces, Linear dependence and independence of vectors, Linear mappings, and Inner product spaces and be able to find the eigenvalues and eigenvectors of a square matrix using the characteristic polynomial and will know how to diagonalize a matrix. Applying these to solve the linear algebra in electric network.
- CLO2** Get the basic understanding about scalar and vectors, dot Product, cross product derivative of vectors, vector integration. Analyze complex engineering problems be able to know gradient, divergence, curl and their physical significance and to learn the Greens, Gauss & Stocks theorem and their applications and be familiar with vector components in spherical and cylindrical systems.

**Bloom's Levels of the Questions**

Letter Symbols Meaning	R	U	Ap	An	E	C
	Remember	Understand	Apply	Analyze	Evaluate	Create

Q1	a)	Discuss with example of the followings: i) Row Matrix, ii) Diagonal, iii) Unit Matrix, iv) Transpose Matrix, v) Singular Matrix	CLO1	R	5
	b)	$A = \begin{pmatrix} 3 & 4 & 5 \\ 2 & -2 & 0 \\ 5 & 6 & 6 \end{pmatrix}$ Find the inverse matrix of the above matrix A.	CLO1	Ap	5
Q2	a)	Test the consistency of the following equations: $3x+3y+2z=1; \quad x+2y=4; \quad 10y+3z=-2$	CLO1	Ap	5
	b)	Apply the Inverse rule of the following system of equations: $6x-2y=40; \quad 4x+12y=10;$	CLO1	E	5
Q3	a)	Create the rank of the following matrix: $A = \begin{pmatrix} 1 & 2 & 3 & 2 \\ 2 & 3 & 5 & 1 \\ 1 & 3 & 4 & 5 \end{pmatrix}$	CLO1	C	5
	b)	The sum of three numbers is 20. If we multiply the third number by 3 and add the first number to the result, we get 15. By adding second and third numbers to two times the first number, we get 30. Evaluate the three numbers by using determinants.	CLO1	C	5
<b>OR</b>					
Q3	a)	Apply the Inverse rule of the following system of equations: $5x-2y+3z=5; \quad 4x+3y-2z=6; \quad 2x+4y+5z=8$	CLO1	Ap	5
	b)	Evaluate the characteristic roots of the following matrix: $A = \begin{pmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{pmatrix}$	CLO1	E	5