CLASS: IMSc   **SEMESTER:** I
BRANCH: MATHEMATICS AND COMPUTING   **SESSION:** MO/2022

SUBJECT: MA109 MATRIX THEORY

TIME: 2 HOURS   **FULL MARKS: 25**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates

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			CO	BL

Q.1(a) Show that the determinant of an orthogonal matrix equals ±1.   [2]   CO1   BT4

Q.1(b) Find the value of x so that the matrix $\begin{matrix} 1 & 1 & x \\ 1 & x & x \\ x & x & x \end{matrix}$ is invertible.   [3]   CO1   BT1

Q.2(a) Determine whether the following set $\{(1,-1,1),(1,0,1),(2,1,2)\}$ is linearly independent.   [2]   CO2   BT4

Q.2(b) Find the rank of the matrix $\begin{matrix} 1 & 1 & 2 \\ 2 & -1 & 3 \\ 3 & -1 & -1 \end{matrix}$ [3]   CO1   BT1

Q.3 Find the reduced row echelon form of the matrix $\begin{matrix} -5 & -2 & 2 \\ 3 & 1 & -1 \\ 2 & 2 & -1 \end{matrix}$ [5]   CO1   BT1

Q.4 Show that the diagonal entries of a skew Hermitian matrix are either zero or purely imaginary.   [5]   CO1   BT4

Q.5 Solve the following system of linear equations by Gauss Elimination method: [5]   CO1   BT3
$$2x + 3y + z = -1$$
$$3x + 3y + z = 1$$
$$2x + 4y + z = -2$$

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