Mahindra University Hyderabad
École Centrale School of Engineering
End-semester Regular Examination
(2022-Batch)

Program: B. Tech **Branch: CSE, ECM, ECE, AI, CE, ME, CM, MT, NT**
Year: I **Semester: Spring**
Subject: Mathematics - II (MA 1202)

Date: 05/06/2023 **Start Time: 10:00 AM**
Time Duration: 3 Hours **Max. Marks: 100**

Instructions

1. All questions are compulsory.
2. The order of answers should be same as the order of questions.
3. Justify your answer wherever required. Guesswork will not be considered in evaluation.

Q. 1 **Marks: 20**

Consider the system $\begin{bmatrix} 1 & -1 & 0 \\ 2 & 3 & 5 \\ 0 & -\lambda & 2\lambda \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$. Find the value(s) of λ such that the system has (a) unique solution, and (b) No solution.

Q. 2 **Marks: 20**

Let $A = \begin{pmatrix} 1 & 4 \\ 2 & 3 \end{pmatrix}$. Diagonalize the matrix A and compute e^A.

Q. 3 **Marks: 20**

Expand the function $f(z) = \dfrac{1}{4+z}$ in a Taylor series centered at $z_0 = -i$. Then find its radius of convergence.

Q. 4 **Marks: 20**

Using Cauchy Residue Theorem find the integral

$$\int_C \frac{dz}{z^3(z-2)},$$

where C is the circle $|z| = 3$.

Q. 5

Marks: 20

Using Laplace transform method, solve the following problem

$$y'' + 3y' + 2y = 12e^{2t}, \quad y(0) = 1, \quad y'(0) = -1.$$