Mahindra University, Hyderabad
École Centrale School of Engineering
MINOR II Examinations, October 2024 (2022 Batch)
Program: B. Tech. (Common to CM and NT)
Year: III Semester: I
Subject: Computational Methods for PDE (MA 3115)

Date: 23/10/2024 **Time:** 2:00 PM-03:30 PM
Time Duration: 1.5 hours **Max. Marks:** 15

Instructions:

1. Answer all the questions and marks will not be awarded for guess work.
2. All the answers that belong to a particular question should be answered in one place in your answer booklet.

Q 1:

Marks: 05

Transform the following PDE to canonical form

$$\frac{\partial^2 u}{\partial x^2} - 4\frac{\partial^2 u}{\partial x \partial y} + 4\frac{\partial^2 u}{\partial y^2} = e^y.$$

Q 2:

Marks: 05

Solve the following initial value problem (IVP) for wave equation

$$u_{tt} - c^2 u_{xx} = \sin(x), \quad -\infty < x < \infty, \ t > 0,$$
$$u(x,0) = \cos(x), \ u_t(x,0) = 1 + x, \quad -\infty < x < \infty.$$

Q 3:

Marks: 05

Find the Fourier series representation of $\phi(x)$, $\phi(x) = \phi(x + 2\pi)$,

$$\phi(x) = \begin{cases} -\pi, & -\pi < x < 0, \\ x, & 0 < x < \pi. \end{cases}$$