Mahindra University Hyderabad

École Centrale School of Engineering

Minor I (2023 - Batch)

Program: B. Tech. **Branch:** CSE, AI, CM, ECM, ECE, CE, MT, ME, NT, BTCM

Year: II **Semester:** I

Subject: Mathematics - III (MA2103)

Date: 11/09/2024 **Start Time:** 10:00 AM

Time Duration: 1.5 Hours **Max. Marks:** 20

Instructions:

1) Each question carries 5 marks.
2) All questions are compulsory.
3) Please start each answer on a separate page and make sure to clearly number the responses.
4) It is essential to provide an explanation of each step. Correct outcomes without any description will not be evaluated.

Q 1: 5 marks

A lot of 60 items has 45 good items and 15 defective items. Let X denote the number of defective items in a sample of five items drawn without replacement. Then, compute $P[X = k]$.

Q 2: 5 marks

Let X and Y are two independent events such that P(X) = 0.3 and P(Y) = 0.7. Find P(X and Y), P(X or Y), P(Y not X) and P(neither X nor Y).

Q 3: 5 marks

In a certain city, 30 percent of the people are Conservatives, 50 percent are Liberals, and 20 percent are Independents. Records show that in a particular election, 65 percent of the Conservatives voted, 82 percent of the Liberals voted, and 50 percent of the Independents voted. If a person in the city is selected at random and it is learned that she did not vote in the last election, what is the probability that she is a Liberal?

Q 4: 5 marks

The CDF of the random variable X is given by:

$$F_X(x) = \begin{cases} 0 & \text{for } x < 0, \\ 1 - \frac{1}{4}e^{-2x} & \text{for } x \geq 0. \end{cases}$$

(a) Plot the CDF and identify the type of random variable.

(b) Find: (i) $P(X \leq 2)$, (ii) $P(X = 0)$, (iii) $P(X < 0)$, (iv) $P(2 < X < 6)$, and (v) $P(X > 10)$.
