PRESIDENCY UNIVERSITY
BENGALURU

Department of Research & Development
Mid - Term Examinations - SEPTEMBER 2024

Odd Semester: Ph.D. Course Work	**Date**: 27 /09/2024
Course Code: CSE5016	**Time**: 2:00pm – 3:30pm
Course Name: Essentials for Machine Learning	**Max Marks**: 50
Department: PSCSE	**Weightage**: 25%

Instructions:

(i) Read all questions carefully and answer accordingly.

(ii) Do not write anything on the question paper other than roll number.

Part A

	Answer ALL the Questions. Each question carries 5 marks.	4Qx5M=20M
1	In a survey among few people, 60% read Hindi newspaper, 40% read English newspaper and 20% read both. If a person is chosen at random and if he already reads English newspaper find the probability that he also reads Hindi newspaper.	**5 Marks**
2	Explain the multiplication rule of probability. How is it applied when dealing with independent events? Provide an example to illustrate your explanation.	**5 Marks**
3	Discuss how to calculate the expected value of a discrete random variable using its Probability mass function (PMF). Provide the formula and an example calculation to illustrate your explanation.	**5 Marks**
4	Discuss the significance of the mean and variance in statistical analysis. How do they provide insights into the behavior of a random variable? Provide a real-world example where both mean and variance are crucial.	**5 Marks**

Part B

	Answer ALL Questions. Each question carries 15 marks.	2QX15M=30M
5	**Scenario:** A political pollster finds that 60% of surveyed voters support Candidate X. The pollster estimates that the chance of a voter supporting Candidate X who actually supports Candidate Y (false positive) is 15%. The chance of a voter supporting Candidate Y who is actually a supporter of Candidate Y (true positive) is 85%. 1. If a voter supports Candidate X in the poll, what is the probability that they truly support Candidate X?	**15 Marks**

	2. Analyze how the results would change if the percentage of supporters for Candidate X were to drop to 50%. *Instructions: Use Bayes' theorem for calculations and discuss the reliability of the polling method.*	
6	Calls arrive at a call center according to a Poisson process with an average rate of 5 calls per hour. (a) What is the probability that exactly 3 calls will arrive in a given hour? (b) What is the probability that more than 4 calls will arrive in a given hour? (c) Calculate the mean and variance of the number of calls arriving in one hour.	**15 Marks**