VIT

Vellore Institute of Technology

SCHOOL OF ADVANCED SCIENCES

Fall Semester 2023-2024

Continuous Assessment Test – II

Programme Name & Branch :MCA

Slot:D1+TD1

Course Name & code: PMAT501L-Probability and Statistics

Class Number (s):6404,6405,6406

Faculty Name (s): Dr.G.MOKESH RAYALU, Dr. NALLIAH M, Dr.GOWSALYA M

Exam Duration: 90 Min.   Maximum Marks: 50

General instruction(s): Scientific calculator & Statistical Tables are allowed in the examination

Q.No.	Question	Max Marks
1.	Suppose you are working on a machine learning project to predict the performance of students on an exam based on the number of hours they studied and their previous test scores. You have collected data for 10 students, and you want to calculate the Pearson correlation coefficient between these two variables to understand their relationship.	10

Student	1	2	3	4	5	6	7	8	9	10
Hours studied (X)	2	3	1	4	2.5	3.5	2	5	1.5	4.5
Previous test scores (Y)	80	85	75	90	78	88	82	92	70	95

Calculate the Pearson correlation coefficient (r) between the hours studied (x) and the previous test scores (y) using the Pearson correlation formula. Explain what the value of r indicates in this context

Q.No.	Question	Max Marks
2.	You are a medical researcher studying the relationship between a patient's age (in years) and their blood pressure (in mmhg). You have collected data from 10 patients given below and hence estimate blood pressure of a patient whose age is 50 years .	10

Patient	1	2	3	4	5	6	7	8	9	10
Age(X)	32	45	29	54	40	63	28	59	35	48
Blood Pressure(Y)	120	135	118	142	130	150	116	145	125	138

3.	In a multiple-choice quiz, each question has four answer choices, of which only one is correct. Sarah, who hasn't studied at all, decides to guess on each of the 10 questions. What is the probability that she answers the following: a) Exactly 3 questions correctly. b) More than 7 questions correctly. c) At least 6 questions correctly. d) Less than 2 questions correctly. e) What is the expected number of questions she will answer correctly?	10
4.	A call center receives an average of 20 calls per hour. Let X be the number of calls the call center receives in a given hour, following a Poisson distribution. a) Calculate the probability that the call center receives exactly 15 calls in an hour. b) Determine the probability that the call center receives more than 7 calls in an hour. c) Find the mean and standard deviation of the number of calls received in an hour. d) Determine the probability that the call center receives no calls .	10
5.	Suppose the heights of a population of adults follow a normal distribution with a mean height (μ) of 170 cm and a standard deviation (σ) of 10 cm. a) What is the probability that a randomly selected adult from this Population is shorter than 160 cm? b) What is the probability that a randomly selected adult from this Population is taller than 180 cm? c) If a sample of 50 adults is taken from this population, what is the probability that the sample mean height is greater than 175 cm? d) If a sample of 50 adults is taken from this population, what is the probability that the sample mean height is between 168 cm and 172 cm?	10