(220-CU-211611) Roll No. .....

PAPER ID—10707

B.Tech. EXAMINATION, 2024

(Second Semester)

ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

Code : BSM-102

Mathematics-II

Time : 3 *Hours* *Maximum Marks :* 70

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Five* questions in all. Q. No. **1** (Unit I) is compulsory. Attempt any *four* questions from Unit II.

Unit I

1. (a) Find the probability of drawing a king and an ace in this order from a pack of cards in two successive draws assuming that first card drawn is not replaced.

   (b) Explain Bayes' theorem.

   (c) Probability that a man aged 60 will live to be 70 is 0.65. What is the probability that out of 10 men now 60, at least 7 would live to be 70 ?

   (d) Define Binomial probability distribution.

   (e) Rank differences for 5 pairs of ranks are 5, – 3, –1, 1, K. Find Spearman's rank correlation coefficient.

   (f) What is Skewness ? Define the various measures of skewness.

   (g) Describe Chi-square test. 2×7=14

Unit II

2. (a) Five defective bulbs are accidentally mixed with twenty good ones. It is not possible to just look at a bulb and tell whether or not it is defective. Find the probability distribution of the number of defective bulbs, if four bulbs are drawn at random from this lot. 7

(b) A car hire firm has two cars which it hires out daily. The number of demand for a car on each day is distributed as a Poisson distribution with mean 1.5. Calculate the number of days out of 100 days on which (i) neither car is used (ii) some demand is refused. 7

3. State and prove Chebyshev's Inequality. 14

4. (a) In a bolt factory, there are four machines A, B, C and D manufacturing 20%, 15%, 25% and 40% of the total output respectively. Of their outputs 5%, 4%, 3% and 2% in the same order are defective bolts. A bolt is chosen at random from the factory's production and is found defective. By using Bays' theorem find the probability that the bolt was manufactured by machine A or machine D. 7

(b) Explain continuous random variables and their properties. 7

5. (a) Fit the second degree parabolic trend to the following data : 7

Year	Production (in crore Rs.)
1983	5
1984	7

1985	4
1986	9
1987	12

(b) Calculate Karl Pearson's coefficient of correlation from the following data : 7

X	Y
24	18
27	20
28	22
28	25
29	22
30	28
32	28
33	30
35	27
35	30
40	22

4	59
5	57
6	59

By using Chi-square test whether the die is biased or not. Given that $\chi^2_{0.05}$ at 5 d.f. is 11.09.