PAPER ID—10707

B. Tech. (CSE/AI/IOT/CS All Computer)

EXAMINATION, 2023

(Second Semester)

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 is compulsory. Attempt any *four* questions from Unit II.

Unit I

1. (a) A bag contains 10 white and 5 black balls. Two balls are drawn at random one after the other without replacement. Find the probability that both balls are black.

(b) Define Bayes' theorem.

(c) Ten coins are tossed simulataneously. Find the probability of getting at least seven heads.

(d) Define binomial probability distribution.

(e) Calculate coefficient of rank correlation :

x :	8	7	6	3	2	1	5	4
y :	7	5	4	1	3	2	6	8

(f) What is Kurtosis ? How is it measured ?

(g) What is Chi-square test of independence under what condition it is applicable ?

2×7=14

Unit II

2. (a) A random variable x has the following probability distribution :

x	: 0	1	2	3	4	5	6	7	8
$p(x)$	: a	$3a$	$5a$	$7a$	$9a$	$11a$	$13a$	$15a$	$17a$

(i) Determine the value of a

(ii) Find $P(X \geq 3)$

(iii) What is the smallest value of x for which $P(X \leq x) > 0.5$? 7

(b) Between the hours of 2 pm and 4 pm the average number of phone calls per minute comming into a switch board of a company is 2.5. Find the probability that during one particular minute there will be :

(i) exactly 3 calls

(ii) at least 2 calls. 7

3. State and prove Chebyshev's inequality. **14**

4. (a) In a bulb factory, machine A, B and C manufacture respectively 25%, 35% and 40% of the total. Of their output 5, 4 and 2 percent are defective bolts. A bolt is drawn at random from the product and is found to be defective. What is the probability that it was manufactured by machine B ? 7

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

5. (a) Price of commodity during 1981-1986 are given below. Fit a second degree parabola to the following data and calculate the trend, values and estimate the price of the commodity in 1987 : 7

Year :	1981	1982	1983	1984	1985	1986
Price :	110	114	120	138	152	218

(b) Find the coefficient of Correlation from the following data : 7

X :	10	12	18	16	15	19	18	17
Y :	30	35	45	44	42	48	47	46

6. (a) Calculate first four moments about mean for the following distribution : 7

x :	2.0	2.5	3.0	3.5	4.0	4.5	5.0
y :	5	38	65	92	70	40	10

(b) A manufacturer claims that only 4% of his products supplied by him are defective. A random sample of 600 products contained 36 defectives. Test the claim of the manufacturer. 7

7. (a) Random samples drawn from two countries gave the following data relating to the heights of adult males : 7

	Country A	Country B
Mean height (in inches)	67.42	67.25
Standard deviation	2.58	2.50
Number of Samples	1000	1200

(i) Is the difference between the means significant ?

(ii) Is the difference between the standard deviations significant ?

(b) Verify whether Poisson distribution can be assumed from the data given below and test the goodness of fit :

No. of defects :	0	1	2	3	4	5
Frequency :	6	13	13	8	4	3

Given that χ^2 at 5% level of significance for 4 d.f. is 9.49. 7