

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.

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P.T.O.

- (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 coming 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 ?

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P.T.O.

- (b) Define Bayes' theorem.

- (c) Ten coins are tossed simultaneously. 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

- 7 (a) A random variable x has the following probability distribution :

$x : 0 \ 1 \ 2 \ 3 \ 4 \ 5 \ 6 \ 7 \ 8$

- (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

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

	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.