

FACULTY OF ENGINEERING

**B.E. (AI&DS/ AI&ML) III-Semester (AICTE) (New) (Main & Backlog) Examinations,
February/March-2024**

Subject: Mathematics-III / Mathematics-III (P&S)

Time: 3 Hours

Max. Marks: 70

- Note:** (i) First question is compulsory and answer any four questions from the remaining six questions. Each question carries 14 Marks.
(ii) Answer to each question must be written at one place only and in the same order as they occur in the question paper.
(iii) Missing data, if any, may be suitably assumed.

1. (a) A pair of dice is thrown. Find the probability that the total score on the two dice is neither 7 nor 11.
(b) The mean and variance of Binomial distribution are 4 and $\frac{4}{3}$ then find $p(x \geq 1)$.
(c) Find the mean and variance of uniform distribution.
(d) Write the normal equations of parabola $y = a + bx + cx^2$
(e) Write the applications of chi square test.
(f) Write short notes on control charts for attributes.
(g) Explain the term level of significance with an example.
 2. (a) For any three events A, B and C prove that

$$P(A \cup B)/C = P(A/C) + P(B/C) - P(A \cap B/C).$$
(b) A and B are independent witnesses of an event which is known to have occurred. The probability that they speak the truth are 0.6 and 0.7 respectively. Find the percentage of cases that they are likely to contradict each other.
 3. (a) If the probability that an individual suffers from a bad reaction due to a certain injection is 0.001. Determine the probability that out of 2000 individuals (i) exactly 3 (ii) more than 2 individuals will suffer a bad reaction.
(b) Prove that Poisson distribution is a limiting case of Binomial distribution.
 4. (a) Find the mean and variance of exponential distribution.
(b) In a normal distribution 7% of the items are under 35 and 89% are under 63. Determine the mean and variance of the distribution.
 5. (a) Fit a parabola to the following data:
- | | | | | | | | | |
|-----|---|----|----|----|----|----|----|----|
| x | 0 | 4 | 8 | 12 | 16 | 20 | 24 | 28 |
| y | 8 | 12 | 24 | 34 | 66 | 84 | 96 | 94 |
- (b) A die was thrown 9000 times and throw of 5 or 6 resulted 3240 times. Does the data indicate that the die is unbiased ?

6. (a) Test for goodness of fit of a Poisson distribution at 5% level of significance to the following distribution:

x	0	1	2	3	4	5	6	7	8
f	54	142	134	108	44	14	8	4	2

- (b) Explain the significance of F test.

7. (a) Find the rank correlation coefficient for the following data.

x	42	48	54	58	64	72	74	78	82	88
y	54	58	62	68	78	74	78	82	84	94

- (b) Suppose the measurements of 1000 students are normally distributed with mean 124 units and standard deviation 12 units. Find the number of students whose measurements are (i) between 124 and 138 units (ii) more than 148 units.
