FACULTY OF ENGINEERING

B.E. CSE (AI&DS) / CSE (AI / AI&ML) III - Semester (AICTE) (Main & Backlog) (New) Examination, February/ March 2025

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 questions 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) State and prove addition theorem on probability.

   b) Show that the mean and variance of Poisson distribution are same.

   c) If X is uniformly distributed with mean 1 and variance $\frac{4}{3}$, then find $P(X < 0)$.

   d) Find a straight line of the form $y = a + bx$ to the following data.

x	-1	2	3
y	6	21	30

   e) State any two applications of χ^2 – test.

   f) Show that the correlation coefficient is the geometric mean between the two regression coefficients.

   g) Define exponential distribution and find its mean.

2. a) State and prove Bayes' theorem.

   b) A party of 25 person take their seats at random at a round table. Find the probability that two specified person do not sit together.

3. a) Define binomial distribution. Find its mean, variance and Skewness.

   b) The probability that a bomb dropped from a plane will strike the target is $\frac{1}{5}$, If six bombs are dropped, find the probability that (i) exactly two will strike the target (ii) at least two will strike the target.

4. In a test on 2000 electric bulbs, it was found that the life of a particular make was normally distributed with an average life of 2040 hours and SD of 60 hours. Estimate the number of bulbs likely to burn for
   (a) more than 2150 hours
   (b) less than 1950 hours and
   (c) more than 1920 hours and but less than 2160 hours.

..2..

5. a) Using the method of least squares, fit a curve of the form $y = ax^b$ to the following data.

x	1	2	3	4	5
y	0.5	2	4.5	8	12.5

b) Find the correlation coefficient between x and y from the following data.

x	92	89	87	86	83	77	71	63	53	50
y	86	88	91	77	68	85	52	82	37	57

6. Eleven school students were given a test in drawing . They were given a month's further tuition and a second test of equal difficulty was held at the end of it. Do the marks give the evidence that the students have benefited by extra coaching.

Students	1	2	3	4	5	6	7	8	9	10	11
Marks in Test I	23	20	19	21	18	20	18	17	23	16	19
Marks in Test II	24	19	22	18	20	22	20	20	23	20	17

(Test at 5% level of significance).

7. a) State any two applications of R – charts.

b) Find the rank correlation coefficient for the following data which shows the marks obtained by a student in two exams X and Y.

X	6	5	8	3	7	6	10	4	9	7
Y	6	4	7	10	5	8	10	6	8	6

**