FACULTY OF ENGINEEERING

B.E. (IT, EEE, EIE, AI&DS, AI&ML, IOT) (AICTE) III- Semester (New) (Main) Examination, March / April 2022

Subject: Mathematics - III (Probability & Statistics)

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 Baye's theorem.
  (b) If X is a Poisson variate such that $p(x = 1) = 24p(x = 3)$. Find $p(x = 0)$.
  (c) Write any two properties of normal distribution.
  (d) Define Rank correlation coefficient.
  (e) Write any two conditions of applicability of chi-square test.
  (f) Find the mean of Uniform distribution.
  (g) Write the normal equations to fit a straight line $y = ax + b$.

2 (a) State and prove Theorem of Total probability
  (b) For the continuous probability function $f(x) = kx^2 e^{-x}$ when $x \geq 0$ find
    I) k, ii) Mean iii)Variance.

3 (a) Six dice are thrown 729 times. How many times do you expect at least three dice to show a five or six?
  (b) Data was collected over a period of 10 years, showing number of deaths from horse kicks in each of the 200 army corps. The distribution of deaths was as follows:

No of deaths	0	1	2	3	4
Frequency	109	65	22	3	1

Fit a Poisson distribution to the data and calculate the theoretical frequencies.

4 (a) In a normal distribution, 31% of the items are under 45 and 8% are over 64. Find the mean and standard deviation of the distribution.
  (b) Find the mean and variance of Exponential distribution.

5 (a) Find the correlation coefficient and the equation of regression of x on y for the following data:

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

..2

(b) The average income of persons was Rs.210 with a standard deviation of Rs.10 in sample of 100 people of a city. For another sample of 150 persons, the average income was Rs.220 with S.D of Rs.12. The standard deviation of incomes of the people of the city was Rs.11. Test whether there is any significant difference between the average incomes of the localities.

6 (a) Two samples of size 9 and 8 give the sum of squares of deviations from their respective means equal to 160 and 91 respectively. Can they be regarded as drawn from the two normal populations with same variance? [F for 8 and 7 dof=3.73].

(b) The theory predicts the population of means in the four groups A, B, C, D should be 9:3:3:1. In an experiment among 1600, the numbers in the four groups were 882, 313, 287 and 118. Does the experimental result support the theory? $(\chi^2_{0.05}$ at 3 dof = 7.815).

7 (a) The first four moments of a distribution about x=4 are 1, 4, 10, 45. Find the moments about the mean.

(b) Fit a curve $y = a + bx + cx^2$ to the following data:

x	-1	0	1	2	3	7
y	9	7	7	9	13	49