R20 Regulation *Subject code: 3H4GA*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A' Grade)

B.Tech IV Semester Regular Examinations, July 2022

PROBABILITY & ALGEBRA

(Common to CSE (AI & ML) & CSE(DS))

Maximum Marks: 70 Date:20.07.2022 Duration: 3 hours

Part-A

All the following questions carry equal marks (10x2M=20 Marks)

1 Write down the axioms of the probability.

2 Define event in probability.

3 A continuous random variable X that can assume any value between $X = 2$ and $X = 5$ has a density function given by $f(x) = k(1 + x)$. Find the value of 'k'.

4 Define joint probability density function of (X, Y).

5 If mean and standard deviation of a binomial distribution are 20 and 4, find the parameters of the distribution.

6 Define probability mass function.

7 Define poset.

8 What do you mean by equivalence relation?

9 Define group.

10 Define homomorphism.

Part-B

Answer All the following questions. (5X10M=50Marks)

11 Four persons are chosen at random from a group containing 3 men, 2 women, and 4 children. Show that the chance that exactly two of them will be children is 10/21. [10]

OR

12 The content of three urns 1,2,3 are a follows:

Balls / Urns	White	Red	Black
I	1	2	3
II	2	3	1
II	3	1	2

An urn is chosen at random and from it two balls are drawn at random. The two balls are one red and one white. What is the probability that they come from the second urn. [10]

13 The joint probability distribution of X and Y is given by $P(x,y) = \frac{x+y}{21}$, x = 1,2,3; y = 1,2; Find i) The marginal distributions of X and Y ii) Find whether X,Y are independent or not. [10]

OR

14 The joint probability density function of the random variable (X,Y) is given by $f(x,y) = Kxye^{-(x^2+y^2)}, x > 0, y > 0$). Find the value of K and also prove that X and Y are independent. [10]

15 The number of monthly breakdowns of a computer is a random variable having a Poisson distribution with mean equal to 1.8. Find the probability that this computer will function for a month, (i) without a breakdown (ii)with two breakdowns and (iii) with at least one breakdown. [10]

OR

16 An electrical firm manufactures light bulbs that have a life, before burn out, that is normally distributed with mean equal to 800 hours and a standard deviation of 40 hours. Find (i) the probability that a bulb burns more than 834 hours (ii) the probability that bulb burns between 778 and 834 hours. [10]

17 Three friends A, B, and C live near each other at a distance of 5 km from one another. We define a relation R between the distances of their houses. Is R an equivalence relation? [10]

OR

18 Given f(x) = x^2- 6 and g(x) = 2x + 1, find
i) (f o g)(x) ii) (g o f)(x) [10]

19 State and prove Lagrange's theorem. [10]

OR

20 Show that $(R - \{-1\}, *)$ is an abelian group under the binary operation $*$ defined by $a * b = a + b + ab \; \forall a, b \in R - \{-1\}$. [10]