R20 Regulation *Subject code: 3H4GA*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech IV Semester Supplementary Examinations, December 2024

PROBABILITY &ALGEBRA

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

Maximum Marks: 70 Date: 03.12.2024 Duration: 3 hours

Note: 1.This question paper contains two parts A and B.
2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit which carries 10M.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

	Part-A		
All the following questions carry equal marks (10X2M=20) Marks)		CO	Bloom Tx
1	Define mutually exclusive events with example	1	L1
2	Prove that $P(A^C) = 1 - P(A)$	1	L1
3	If $f(x) = \begin{cases} \frac{1}{2}(x+1) & -1 < x < 1 \\ 0 & \text{elsewhere} \end{cases}$ Then find mean of 'x'	2	L1
4	If f(x) = k(2x + 3) in 0<x<2, then find k?	2	L1
5	If X is a passion variate such that P(X = 0) = P(X = 2)+ 3 P(X = 4) find the mean	3	L1
6	The mean and standard deviation of a normal variate are 8 and 4 respectively, then find $P(5 \leq X \leq 10)$	3	L1
7	If R is a relation on the set A={1,2,3,4} defined by x R y if x exactly divides y .Prove that (A,R) is a poset.	4	L1
8	Let f and g be functions from R to R defined by f(x)=ax+b ,g(x)= 1-x+ x^2 . If (gof) =$9x^2$-9x+3, determine a,b.	4	L1
9	Show that the cube roots of unity forms a group with respect to multiplication.	5	L1
10	Define a) Left coset of subgroup H in G. b) Right coset of subgroup H in G.	5	L1
	Part-B		
Answer All the following questions. (5X10M=50Marks)		CO	Bloom Tx
11	A) State and prove Baye's theorem [5M] B) The machines A, B, C produce 40%, 30%, 30% of the total number of items of factory. The percentage of defective items of these machines are 4%, 2%, 3%. If an item is selected at random and is found to be defective find the probabilities that it is produced from [5M] i) machine A ii) machine C	1	L2
	OR		

12	A) State and prove Addition theorem for two events. [5M] B) A, B, C are aiming to shoot a balloon. A will succeed 4 times out of 5 attempts. The chance of B to shoot the balloon is 3 out of 4 and that of C is 2 out of 3. If the three aim the balloon simultaneously then find the probability that at least two of them hit the balloon. [5M]	1	L2
13	Two –dimensional random variable (X,Y) have the joint density [10M] f(x,y) = 8xy, 0<x<1, 0<y<1, find i) marginal distributions ii) conditional distributions	2	L2
	OR		
14	The cumulative distribution function for a continuous random variable 'x' is $F(x) = \begin{cases} 1 - e^{-2x} & , x \geq 0 \\ 0 & , x < 0 \end{cases}$ Evaluate (i) density function (ii) Mean (iii) Variance [10M]	2	L2
15	A) It has been found that 2% of the tools produced by a certain machine are defective what is the probability that in a shipment of 400 such tools i) 3% of more (ii) 2% or less will prove defective [5M] B) In a binomial distribution consisting of 5 independent trails, probabilities of 1and 2 success are 0.4096 and 0.2048 respectively. Find the parameter 'p' of the distribution [5M]	3	L2
	OR		
16	Show that mean, median, mode of Normal distribution is μ [10M]	3	L2
17	Let A be any finite set and P(A) be the power set of A.$\subseteq$ be the inclusion relation on the elements of P(A). Draw the Hasse diagrams of (P(A),$\subseteq$) for i) A = {a} ii) A = {a,b} iii) A = {a,b,c} iv) A = {a,b,c,d} [10M]	4	L2
	OR		
18	A) Prove that the relation R defined by "a is congruent to b modulo m" on the set of integers is an equivalence relation. [5M] B) Draw the Hasse diagram representing the positive divisors of 45. [5M]	4	L2
19	A) Prove that set of non-singular matrices of order 2 x 2 is a group but not an abelian group under multiplication. [5M] B) If 'G' is a group then prove that $(a^{-1})^{-1} = a$ [5M]	5	L2
	OR		
20	A) Prove that G ={0,1,2,3,4,5,6} is an abelian group of order 7 with respect to addition modulo 7. [5M] B) Define subgroup, normal subgroup, Quotient group, left and right cosets with an example for each. [5M]	5	L2