R20 Regulation *Subject code:3H4GA*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech IV Semester Supplementary Examinations, June 2026

PROBABILITY & ALGEBRA

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

Maximum Marks: 70 Date:08.06.2026 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.
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)		Marks	CO	BTL
1	Prove that $P(A \cap B') = P(A) - P(A \cap B)$	2M	1	L1
2	Define conditional probability.	2M	1	L1
3	Define Marginal probability functions of random variables X and Y.	2M	2	L1
4	If f(x) = k(2x + 3) in 0<x<2, where f(x) is probability density function, then find k?	2M	2	L1
5	If X is a possion variate such that P(X = 0) =[P(X = 2)+ 3 P(X = 4)]find the mean.	2M	3	L1
6	The mean and standard deviation of a normal variate are 8 and 4 respectively, then find P($5 \leq X \leq 10$)	2M	3	L1
7	If A = {1,2,3,4,5,6,7,8,9,10,11,12} and R= { (x,y)/x-y is multiple of 5} find the partition of A.	2M	4	L1
8	Let f(X)=x+2, g(x) = x-2, h(x) =3x find fogoh.	2M	4	L1
9	If aob = a+b+ab ∀ a,b∈Z ,show that (Z,0) is a semi group.	2M	5	L1
10	Define cyclic group with an example.	2M	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
11	State and prove Baye's theorem.	10M	1	L2
	OR			
12	A, B and C in order toss a coin. The first one to toss head wins the game. What are their probabilities of winning, assuming that the game may continue indefinitely?	10M	1	L2
13	Two –dimensional random variable (X,Y) have the joint density f(x,y) = 8xy, 0<x<1, 0<y<1, find conditional distributions.	10M	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) Variance	10M	2	L2

15	Find the mean and S.D of the normal distribution in which 7% of the items are under 35 and 89% are under 63.	10M	3	L2
	OR			
16	If 10% of the rivets produced by a machine are defective, find the probability that out of 5 rivets chosen at random (i)None will be defective (ii) one will be defective	10M	3	L2
17	a) Draw the Hasse diagram representing the positive divisors of 45. b) If R denotes a relation on the set of all ordered pairs of positive integers by (a,b)R(c,d) iff ad=bc show that 'R' is an equivalence relation.	5M 5M	4	L2
	OR			
18	a) Let X= {1,2,3,4,5,} and relation R={(x,y)/x>y}.Find its matrix . b) What is Compatibility relation and Write the procedure to find compatibility blocks.	5M 5M	4	L2
19	Show that Q_1 (rational numbers other than1) is an infinite abelian group with respect to '0' defined by a0b=a+b-ab, where a,b are rational numbers.	10M	5	L2
	OR			
20	Prove that in a group, the identity element and inverse element are unique.	10M	5	L2