



R20 Regulation

Subject code: 3H4GA

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech IV Semester Supplementary Examinations, February 2024

PROBABILITY & ALGEBRA
(Common to CSE (AI&ML) and CSE(DS))

Maximum Marks: 70

Date: 16.02.2024 Duration: 3 hours

Part-A			
All the following questions carry equal marks		(10X2M=20 Marks)	CO Bloom Tx
1	If $\bar{A}$ is the complementary event of A, then show that $P(\bar{A}) = 1 - P(A) \leq 1$.	CO1	L2
2	From a bag containing 3 red and 2 black balls, 2 balls are drawn at random. Find the Probability that they are of the same colour.	CO1	L2
3	Explain about Probability mass function.	CO2	L2
4	If $f(x) = \begin{cases} Kxe^{-x}, & x > 0 \\ 0, & \text{elsewhere} \end{cases}$ is the probability density function of a random variable X, then find 'K'.	CO2	L3
5	Ten coins are thrown simultaneously. Find the probability of getting atleast 7 heads.	CO3	L3
6	Explain about Poisson Distribution.	CO3	L2
7	Explain about Poset.	CO4	L2
8	Explain about composite function?	CO4	L2
9	Prove that the inverse element of a group is unique.	CO5	L2
10	In a group $(G, *)$, if $(a * b)^2 = a^2 * b^2 \forall a, b \in G$, then show that $(G, *)$ is abelian.	CO5	L2
Part-B			
Answer All the following questions.		(5X10M=50Marks)	
11	The first bag contains 3 white balls, 2 red balls and 4 black balls. Second bag contains 2 white, 3 red and 5 black balls and third bag contains 3 white, 4 red and 2 black balls. One bag is chosen at random and from it 3 balls are drawn. Out of three balls two balls are white and one is red. What are the probabilities that they were taken from first bag, second bag and third bag. [10M]	CO1	L3
OR			
12	A lot consists of 10 good articles, 4 with minor defects and 2 with major defects. Two articles are chosen from the lot at random (without replacement). Find the probability that (i) both are good, (ii) both have major defects, (iii) at least 1 is good, (iv) at most 1 is good, (v) exactly 1 is good. [10M]	CO1	L3
13	Find the Covariance between (X, Y) from the joint pdf $f(x, y) = x + y$; $0 < x < 1, 0 < y < 1$. [10M]	CO2	L3

	OR																				
14	A random variable X has the following probability distribution. [10M] <table><tr><td>x</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td></tr><tr><td>P(x)</td><td>0</td><td>β</td><td>2β</td><td>2β</td><td>3β</td><td>β^2</td><td>$2\beta^2$</td><td>$7\beta^2 + \beta$</td></tr></table> Find (i) the value of k (ii) $P(x < 6)$, $P(x \geq 6)$ and $P(0 < x < 3)$ (iii) mean and variance.	x	0	1	2	3	4	5	6	7	P(x)	0	β	2β	2β	3β	β^2	$2\beta^2$	$7\beta^2 + \beta$	CO2	L3
x	0	1	2	3	4	5	6	7													
P(x)	0	β	2β	2β	3β	β^2	$2\beta^2$	$7\beta^2 + \beta$													
15	Out of 800 families with 4 children each, how many families could be expected to have (i) 2 boys and 2 girls (ii) almost 2 girls (iii) at least 1 boy (iv) children of both genders. Assume equal probabilities for boys and girls. [10M]	CO3	L4																		
	OR																				
16	Find the mean, variance of Poisson distribution. [10M]	CO3	L3																		
17	If $f(x) = -4x + 9$ and $g(x) = 2x - 7$, find (i) $(f \circ g)(3)$ (ii) $(g \circ f)(-1)$. [10M]	CO4	L3																		
	OR																				
18	Find the inverse of $f(x) = \frac{2x-3}{5x-7}$. [10M]	CO4	L3																		
19	Show that $(R - \{-1\}, *)$ is an abelian group under the binary operation $*$ defined by $a * b = a + b + ab$ for all $a, b \in R - \{-1\}$. [10M]	CO5	L3																		
	OR																				
20	State and prove Lagrange's theorem. [10M]	CO5	L5																		