

(M19CST1101)

I M. Tech I SEMESTER (R19) Regular Examinations

Model Question Paper

Subject: Mathematical Fndation of Computer Science

(For CST)

Time: 3 Hrs

Max. Marks 75

Answer ONE question from EACH UNIT

All questions carry equal marks

			CO	KL	M
		UNIT - I			
1	a)	Suppose $f(x) = \frac{c}{3^x}$ for $x = 1, 2, 3, \dots, n$ the probability function of a random variable X , then (i) determine the value of c (ii) find the distribution function of X & $P(X \geq 3)$	CO1	K2	7
	b)	The joint probability function of two discrete random variables X and Y is given by $f(x, y) = c(2x + y)$ where X and Y can assume all integers such that $0 \leq x \leq 2, 0 \leq y \leq 3$ and $f(x, y) = 0$ otherwise. Find i) the value of c ii) $E(X)$ iii) $E(Y)$ iv) $Var(X)$ and $Var(Y)$.	CO1	K3	8
		(OR)			
2	a)	Let X and Y have joint density function $f(x, y) = \begin{cases} 2e^{-(x+y)} & \text{for } x \geq 0; y \geq 0 \\ 0 & \text{otherwise} \end{cases}$ Then find conditional expectation of (i) Y on X (ii) X on Y	CO2	K1	8
	b)		CO2	K2	7
		UNIT - II			
3	a)	It has been claimed that in 60% of all solar installations' utility bill reduced to by one-third. Accordingly, what are probabilities utility bill reduced to by at least one-third (i) in fr of five installations and (ii) at least fr of five installations	CO2	K2	8
	b)	Derive the mean, variance, coefficient skewness & kurtosis for Poisson's distribution	CO2	K3	7
		(OR)			
4	a)	If 20% of memory chips made in a certain plant are defective, then what are the probabilities, that a randomly chosen 100 chips for inspection (i) at most 15 will be defective (ii) at least 25 will be defective (iii) in between 16 and 23 will be defective	CO2	K2	8
	b)	Derive the mean and variance of Exponential distribution.	CO2	K3	7

UNIT - III																										
5	a)	The following shows corresponding values of three variables X,Y,Z. Find least square regression equation $Z= a+bx+cy$					CO4	K3	8																	
		<table><tr><td>x</td><td>1</td><td>2</td><td>1</td><td>2</td><td>3</td></tr><tr><td>y</td><td>2</td><td>3</td><td>1</td><td>1</td><td>2</td></tr><tr><td>z</td><td>12</td><td>19</td><td>8</td><td>11</td><td>18</td></tr></table>	x	1	2	1	2	3	y	2	3	1	1	2	z	12	19	8	11	18						
x	1	2	1	2	3																					
y	2	3	1	1	2																					
z	12	19	8	11	18																					
	b)	Explain the procedure for fitting an exponential curve of the form $y = ae^{bx}$.					CO4	K2	7																	
		(OR)																								
6	a)	What the properties of a good estimator. Explain each of them					CO3	K1	7																	
	b)	Suppose that n observations X_1, X_2, \dots, X_n are made from normal distribution and variance is unknown. Find the maximum likelihood estimate of the mean.					CO3	K3	8																	
		UNIT - IV																								
7	a)	Prove that in any non- directed graph there is even number of vertices of odd degree.					CO4	K1	8																	
	b)	State and prove Euler's formula for planar graphs					CO4	K2	7																	
		(OR)																								
8	a)	Prove that a tree with 'n' vertices have 'n-1' edges					CO4	K3	7																	
	b)	If T is a binary tree of n vertices, show that the number of pendant vertices is $\frac{(n+1)}{2}$					CO4	K1	8																	
		UNIT - V																								
9	a)	Using the principles of Inclusion and exclusion find the number of integers between 1 and 100 that are divisible by 2 ,3 or 5					CO5	K3	7																	
	b)	Find the number of integral solutions for $x_1 + x_2 + x_3 + x_4 + x_5 = 50$ where $x_1 \geq 4, x_2 \geq 7, x_3 \geq 14, x_4 \geq 10, x_5 \geq 0$					CO5	K2	8																	
		(OR)																								
10	a)	Solve the recurrence relation $a_n - 7a_{n-1} + 12a_{n-2} = 0$ for $n \geq 2$ using Generating function method.					CO5	K2	8																	
	b)	Solve $a_n - 7a_{n-1} + 10a_{n-2} = 4^n$ for $n \geq 2$.					CO6	K2	7																	