(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 $f(x) = \frac{c}{3^x} for x = 1,2,3 \dots\dots n$ 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 Ycan assume all integers such that $0 \leq x \leq 2$, $0 \leq y \leq 3$ and f(x,y) =0 other wise. 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 $f(x,y) = \begin{cases} 2e^{-(x+y)} for x \geq 0; y \geq 0 \\ 0 \quad otherwise \end{cases}$ 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 defective (ii) at least25 will be defective (iiiin 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 x: 1, 2, 1, 2, 3 y: 2, 3, 1, 1, 2 z: 12, 19, 8, 11, 18	CO4	K3	8
	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 then	CO3	K1	7
	b)	Suppose that n observations $X_1, X_2 \ldots X_n$ *aremade* 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