(M19IT1101)

I M.Tech I SEMESTER (R19) Regular Examinations
DISCRETE MATHEMATICAL STRUCTURES
Department of Information Technology

Time: 3 Hrs **Max. Marks 75**

Answer ONE question from EACH UNIT
All questions carry equal marks

			CO	KL	M
		UNIT - I			
1	a)	Solve for the value of c, distribution function of X and $P(X \geq 3)$, given $f(x) = \frac{c}{3^x} for x = 1,2,3 \ldots \ldots \ldots n$ as the probability function of the random variable X.	CO1	K3	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 other wise. Solve for 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	K3	7
		UNIT - II			
3	a)	It has been claimed that in 60% of all solar installations, 'utility bill reduced to by one- third. Identify the probabilities for the utility bill reduce by at least one- third (i) in fr of five installations and (ii) at least fr of five installations	CO2	K3	8
	b)	Utilize probability mass function of Poisson's distribution to determine its mean, variance, coefficient skewness & kurtosis.	CO2	K3	7
		(OR)			
4	a)	If 20% of memory chips made in a certain plant are defective, then **identify** the probabilities, that a randomly chosen 100 chips for inspection (i) at most 15 will defective (ii) at least25 will be defective (iii in between 16 and 23 will be defective	CO2	K3	8
	b)	Make use of pdf of the Exponential distribution to find its mean and variance	CO2	K3	7

		UNIT - III			
5	a)	The following table shows corresponding values of three variables X, Y,Z . Model the 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 $y = a e^{bx}$.	CO4	K5	7
		(OR)			
6	a)	What the properties of a good estimator. Explain each of them	CO3	K1	7
	b)	Suppose that n observations $X_1, X_2 \ldots\ldots X_n$ *aremade* from normal distribution and variance is unknown. Identify the maximum likelihood estimate of the mean.	CO3	K3	8
		UNIT – IV			
7	a)	Show 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)			7
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)	Make use of 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)	Identify 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	K3	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	K3	8
	b)	Solve $a_n - 7a_{n-1} + 10a_{n-2} = 4^n$ for $n \geq 2$.	CO5	K3	7