Model Question Paper-II (CBCS Scheme)

USN										

Third Semester B.E Degree Examination

MATHEMATICS FOR CS ENGINEERING STREAM (BCS301)

TIME: 03 Hours **Max.Marks:100**

Note: (i) Answer any **FIVE** full questions, choosing at least **ONE** question from each **MODULE**
(ii) Statistical tables and Mathematics Formula handbooks are allowed.

		Module -1	M	L	C
Q.01	a	A random variable X has the following probability function for various values of x x: 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 $P(x)$: 0 | K | $2k$ | $2k$ | $3k$ | k^2 | $2k^2$ | $7k^2+k$ *(i)* Find the value of k (ii) Evaluate $P[X<6]$, $P[0<X<5]$, $and\ P[X\geq 6]$	**6**	**L2**	**CO1**
	b	Find the mean and variance of Poisson distribution.	**7**	**L2**	**CO1**
	c	In a certain town the duration of a shower is exponentially distributed with mean 5 minutes. What is the probability that a shower will last for? (i) 10 minutes or more (ii) less than 10 minutes (iii) between 10 and 12 minutes.	**7**	**L3**	**CO1**
		OR			
Q.02	a	Determine the value k, so that the function $f(x)=k(x^2+4), for\ x=0,1,2,3$ can serve as a probability distribution of the discrete random variable X: Also, find (i) $P[0<X\leq 2]$ & (ii) $P[X\geq 1]$	**6**	**L2**	**CO1**
	b	Out of 800 families with 5 children each, how many would you expect to have (i) 3 $boys$ (ii) At least one boy (iii) At most two boys, assuming equal probabilities for boys and girls.	**7**	**L3**	**CO1**
	c	In a normal distribution, 31% of the items are under 45 and 8% are over 64. Find the mean and Variance of the distribution.	**7**	**L3**	**CO1**
		Module-2			
Q. 03	a	If the joint probability distribution of X and Y is given by $$f(x,y)=\frac{x+y}{30}\ , for\ x=0,1,2,3; y=0,1,2$$ Find (i) $P[X\leq 2, Y=1]$, (ii) $P[X>2, Y\leq 1]$ (iii) $P[X>Y]$	**6**	**L2**	**CO2**

	b	Find the unique fixed probability vector for the regular stochastic matrix $$A = \begin{bmatrix} 0 & 1 & 0 \\ \frac{1}{6} & \frac{1}{2} & \frac{1}{3} \\ 0 & \frac{2}{3} & \frac{1}{3} \end{bmatrix}$$	**7**	**L2**	**CO2**
	c	A gambler's luck follows' a pattern. If he wins a game the Probability of winning the next game is 0.6. However, if he loses a game, the probability of losing the next game is 0.7. There is an even chance of the gambler winning the first game. (i) What is the probability of he winning the second game? (ii) What is the probability of he winning the third game? (iii) In the long run, how often he will win?	**7**	**L3**	**CO2**
		OR			
Q.04	a	Determine the value of k so that the function $f(x,y) = k\|x-y\|, for\ x = -2, 0, 2; y = -2, 3$ represents joint probability distribution of the random variables X and Y. Also determine $Cov(X,Y)$.	**6**	**L2**	**CO2**
	b	Show that the matrix $\begin{bmatrix} 0 & 0 & 1 \\ \frac{1}{2} & 0 & \frac{1}{2} \\ 0 & 1 & 0 \end{bmatrix}$ is a regular stochastic matrix	**7**	**L2**	**CO2**
	c	Three boys A, B and C are throwing a ball to each other. A is just as likely to throw the ball to B as to C. B always throws the ball to A, and C is just as likely to throw the ball to A as to B. Find the probability that C has the ball after three throws if now A has the ball.	**7**	**L3**	**CO2**
		Module-3			
Q. 05	a	Explain the following terms (i) Standard error (ii) Statistical hypothesis (iii) Critical region of a statistical test (iv) Test of significance	**6**	**L1**	**CO3**
	b	In 324 throws of a six faced die, an odd number turned up 181 times. Is it reasonable to think that the die is unbiased one at 5% level of significance?	**7**	**L3**	**CO3**
	c	In an examination given to students at a large number of different schools the mean grade was 74.5 and S.D grade was 8. At one particular school where 200 students took the examination the mean grade was 75.9. Discuss the significance of this result at both 5% and 1% level of significance.	**7**	**L3**	**CO3**
		OR			
Q. 06	a	Define (i) Alternative hypothesis (ii) A statistic (iii) Level of significance and (iv) Two-tailed test	**6**	**L1**	**CO3**

	b	A coin is tossed 1000 times and head turns up 540 times. Decide on the hypothesis that the coin is unbiased at 1% level of significance.	**7**	**L3**	**CO3**
	c	One type of air craft is found to develop engine trouble in 5 flights out of a total of 100 and another type in 7 flights out of a total of 200 flights. Is there a significance difference in the two types of air craft's so far as engine defects are concerned? Test at 5% significance level.	**7**	**L3**	**CO3**
Module-4					
Q. 07	a	An unknown distribution has a mean of 90 and a standard deviation of 15. Samples of size $n = 25$ are drawn randomly from the population. Find the probability that the sample mean is between 85 and 92.	**6**	**L2**	**CO4**
	b	The heights of a random sample of 50 college students showed a mean of 174.5 centimeters and a standard deviation of 6.9 centimeters. Construct a 99% confidence interval for the mean height of all college students.	**7**	**L2**	**CO4**
	c	A die was thrown 60 times and the following frequency distribution was observed: Faces: 1 | 2 | 3 | 4 | 5 | 6 frequency: 15 | 6 | 4 | 7 | 11 | 17 Test whether the die is unbiased at 5% significance level.	**7**	**L3**	**CO4**
OR					
Q. 08	a	In a recent study reported on the Flurry Blog, the mean age of tablet users is 34 years. Suppose the standard deviation is 15 years. Take a sample of size $n = 100$. Using central limit theorem, find the probability that the sample mean age is more than 30 years.	**6**	**L2**	**CO4**
	b	Suppose that 10, 12, 16, 19 is a sample taken from a normal population with variance 6.25. Find a 95 percent confidence interval for the population mean.	**7**	**L2**	**CO4**
	c	A random sample of 10 boys had the following I.Q.: 70, 120, 110, 101, 88, 83, 95, 98, 107, 100. Do these data support the assumption of a population mean I.Q. of 100 (at 5% level of significance)?	**7**	**L3**	**CO4**
Module-5					
Q. 09	a	Three types of fertilizers are used on three groups of plants for 5 weeks. We want to check if there is a difference in the mean growth of each group. Using the data given below apply a one-way ANOVA test at 0.05 significant level Fertilizer-1: 6 | 8 | 4 | 5 | 3 | 4 Fertilizer-2: 8 | 12 | 9 | 11 | 6 | 8 Fertilizer-3: 13 | 9 | 11 | 8 | 7 | 12	**10**	**L3**	**CO5**

	b	Present your conclusions after doing analysis of variance to the following results of the Latin-square design experiment conducted in respect of five fertilizers which were used on plots of different fertility A 16 | B 10 | C 11 | D 9 | E 9 E 10 | C 9 | A 14 | B 12 | D 11 B 15 | D 8 | E 8 | C 10 | A 18 D 12 | E 6 | B 13 | A 13 | C 12 C 13 | A 11 | D 10 | E 7 | B 14	**10**	**L3**	**CO5**
		OR			
Q. 10	a	A trial was run to check the effects of different diets. Positive numbers indicate weight loss and negative numbers indicate weight gain. Check if there is an average difference in the weight of people following different diets using an ANOVA Table. Low Fat | Low Calorie | Low protein | Low carbohydrate 8 | 2 | 3 | 2 9 | 4 | 5 | 2 6 | 3 | 4 | -1 7 | 5 | 2 | 0 3 | 1 | 3 | 3	**10**	**L3**	**CO5**
	b	The following data show the number of worms quarantined from the GI areas of four groups of muskrats in a carbon tetrachloride anthelmintic study. Conduct a two-way ANOVA test. I | II | III | IV 33 | 41 | 12 | 38 32 | 38 | 35 | 43 26 | 40 | 46 | 25 14 | 23 | 22 | 13 30 | 21 | 11 | 26	**10**	**L3**	**CO5**