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CBCS SCHEME

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BCS/BAD/BAI/BDS301

Third Semester B.E./B.Tech. Degree Examination, June/July 2026
Mathematics for Computer Science

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.
3. VTU Mathematics Formula Hand Book is permitted.

		Module – 1	M	L	C
Q.1	**a.**	Find the value of K such that the following distribution represent a finite probability distribution. Hence find $P(x \le 1)$, $P(x > 1)$ and $P(-1 < x \le 2)$. x: -3, -2, -1, 0, 1, 2, 3 P(x): k, 2k, 3k, 4k, 3k, 2k, k	**06**	**L2**	**CO1**
	b.	Find the mean and variance of Binomial Distribution.	**07**	**L2**	**CO2**
	c.	The marks of 1000 students in an examination follows a normal distribution with mean 70 and standard deviation 5. Find the number of students whose marks will be (i) less than 65 (ii) more than 75 (iii) between 65 and 75. [$\phi(1) = 0.3413$].	**07**	**L3**	**CO2**
		OR			
Q.2	**a.**	Find the constant k such that $f(x) = \begin{cases} kx^2 & 0 < x < 3 \\ 0 & \text{otherwise} \end{cases}$ is a P.d.f. Also find (i) $P(1 < x < 2)$ (ii) $P(x \le 1)$ (iii) $P(x > 1)$	**06**	**L2**	**CO1**
	b.	The probability that a pen manufactured by a factory be defective is 1/10. If 12 such pens are manufactured what is the probability that (i) exactly 2 defective. (ii) atleast 2 are defective (iii) none of them are defective.	**07**	**L3**	**CO2**
	c.	If the probability of a bad reaction from a certain injection is 0.001. Determine the chance that out of 2000 individuals, more than two will get a bad reaction.	**07**	**L3**	**CO2**
		Module – 2			
Q.3	**a.**	The joint probability distribution of two random variables X and Y is X/Y: -4, 2, 7 1: 1/8, 1/4, 1/8 5: 1/4, 1/8, 1/8 Find the marginal distribution and covariance of X and Y.	**06**	**L2**	**CO2**
	b.	Find the unique probability vector for the regular stochastic matrix $\begin{bmatrix} 0 & 3/4 & 1/4 \\ 1/2 & 1/2 & 0 \\ 0 & 1 & 0 \end{bmatrix}$	**07**	**L2**	**CO3**

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	c.	Three boys A, B, C are throwing ball to each other. A always throws the ball to B and B always throws the ball to C. C is just or likely to throw the ball to B or to A. If C was the first person to throw the ball find the probabilities that after three throws, A has the ball.	07	L3	CO3
		OR			
Q.4	a.	The joint probability distribution table for 2 random variables X and Y as follows: $x \setminus y$ | -2 | -1 | 4 | 5 1 | 0.1 | 0.2 | 0 | 0.3 2 | 0.2 | 0.1 | 0.1 | 0 Find covariance of X and Y.	06	L2	CO2
	b.	Find the unique fixed probability vector for the regular stochastic matrix $A = \begin{bmatrix} 0 & 1 & 0 \\ 1/6 & 1/2 & 1/3 \\ 0 & 2/3 & 1/3 \end{bmatrix}$	07	L2	CO3
	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 losses a game, the probability of losing the next game is 0.7. There is an even chance of gambler winning the first game. i) What is the probability of he winning the second game? ii) In the long run, how often he will win?	07	L3	CO3
		Module – 3			
Q.5	a.	Define Null Hypothesis, Type I and Type II Error in a statistical test.	06	L1	CO4
	b.	A coin was tossed 400 time and head turned up 216 times. Test the hypothesis that the coin is unbiased at 5% level of significance.	07	L3	CO4
	c.	A survey was conducted in a slum locality of 2000 families by selecting a sample of size 800. It was revealed that 180 families were illiterates. Find the probable limit of the illiterate families in the population of 2000 at 10% level of significance.	07	L3	CO5
		OR			
Q.6	a.	A coin is tossed 1000 times and head turns up 540 times. Decide on the hypothesis that the coin is unbiased at 10% level of significance.	06	L2	CO4
	b.	In a sample of 500 men, its was found that 60% of them had over weight. What can we infer about the proportion of people having over weight in the population (For $Z_{0.1} = 2.58$)	07	L2	CO4
	c.	One type of aircraft 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 aircrafts so far as engine defects are concerned at 5% LOS?	07	L3	CO4

Module – 4

Q.7	**a.**	Use the theorem to evaluate $P[50 < \bar{x} < 56]$ where $\bar{x}$ represents the mean of a random sample of size 100 from an infinite population with mean $\mu = 53$ and variance $\sigma^2 = 400$ $[\phi(1.5) = 0.4332]$	**06**	**L2**	**CO5**
	b.	Ten individuals are chosen at random from a population and their height inches are found to be 63, 63, 66, 67, 68, 69, 70, 70, 71, 71. Test the hypothesis that mean height of the universe is 66 inches. [$t_{0.05} = 2.262$ for 9 df].	**07**	**L2**	**CO4**
	c.	A die is thrown 264 times and the number appearing on the face (x) follows the following frequency distribution. x: 1, 2, 3, 4, 5, 6 y: 40, 30, 26, 56, 52, 60 Calculate the value of χ^2 at 5% of LOS.	**07**	**L3**	**CO4**

OR

Q.8	**a.**	The two independent samples of 8 and 7 items respectively had the following values of the variables: Sample 1 : 9 11 13 11 15 9 12 14 Sample 2 : 10 12 10 14 9 8 10 Do the two estimates of population variance differ significantly at 5% LOS? (F at 5% ($V_1 = 7$; $V_2 = 6$) = 4.21).	**06**	**L2**	**CO4**
	b.	The nine items of a sample have the following values 45, 47, 50, 52, 48, 47, 49, 53, 51. Does the mean of these differ significantly from the assumed mean of 47.5 at 5% significance level?	**07**	**L3**	**CO4**
	c.	The number of accidents per day (x) as recorded in a textile industry over a period of 400 days is given below. Test the goodness of fit in the respect of Poisson distribution of fit to the given data $\{\chi^2_{0.05} = 9.49$ for 4 df $\}$. x: 0, 1, 2, 3, 4, 5 y: 173, 168, 37, 18, 3, 1	**07**	**L3**	**CO4**

Module – 5

Q.9	**a.**	Three type of fertilizer are used on three groups of plants for 6 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**	**CO6**

	b.	Analyze and interpret the following statistics concerning output of wheat for field obtained as result of experiment conducted to test for four varieties of wheat viz, A, B , C and D under Latin Square design. C 25 | B 23 | A 20 | D 20 A 19 | D 19 | C 21 | B 18 B 19 | A 14 | D 17 | C 20 D 17 | C 20 | B 21 | A 15	10	L3	CO6
		OR			
Q.10	a.	Three different kinds of food are tested on three groups of rats for 6 weeks. The objective is to check the difference in mean weight (in grams) of the rats per week. Apply one-way ANOVA using a 0.05 significance level to the following data : Food 1 | 8 | 12 | 19 | 8 | 6 | 11 Food 2 | 4 | 5 | 4 | 6 | 9 | 7 Food 3 | 11 | 8 | 7 | 13 | 7 | 9	10	L3	CO6
	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	CO6

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