



Question Paper Code:

MA303BS

ACE-R20

**Semester End Examination**  
**II B. Tech- I Semester- MARCH-2022**  
**Computer Oriented Statistical Methods**  
**(Common to CSE, IT,CSO)**

Time: 3 Hours

Max. Marks: 70

H. T. No

*Answer any 5 Questions out of 8 Questions from the following*

Q.No	Question	Marks														
1. a)	Box A contains 5 red and 3 white marbles and Box B contains 2 red and 6 white marbles. If a marble is drawn from each box, what is the probability that they are both of same colour?	4														
b)	Of the three men, the chances that a politician, a business man or an academician will be appointed as a vice-chancellor (V.C) of a university are 0.5, 0.3, 0.2 respectively. Probability that research is promoted by these persons if they are appointed as V.C are 0.3, 0.7, 0.8 respectively. (i) determine the probability that the research is promoted (ii) if research is promoted, what is the probability that V.C is an academician?	10														
2. a)	A random variable X has the following probability function: <table border="1" style="margin-left: 20px;"> <tr> <td>X</td> <td>-2</td> <td>-1</td> <td>0</td> <td>1</td> <td>2</td> <td>3</td> </tr> <tr> <td>P(x)</td> <td>0.1</td> <td>K</td> <td>0.2</td> <td>2K</td> <td>0.3</td> <td>K</td> </tr> </table> Then find (i) k (ii) mean (iii) variance (iv) $P(0 < x < 3)$	X	-2	-1	0	1	2	3	P(x)	0.1	K	0.2	2K	0.3	K	7
X	-2	-1	0	1	2	3										
P(x)	0.1	K	0.2	2K	0.3	K										
b)	Out of 800 families with 5 children each, how many would you expect to have (i) 3 boys (ii) 5 girls (iii) either 2 or 3 boys? Assume equal probabilities for boys and girls.	7														
3. a)	If X is a normal variate with mean 30 and standard deviation 5. Find the probabilities that (i) $26 \leq X \leq 40$ and (ii) $X \geq 45$ .	7														
b)	In a Normal distribution, 7% of the item are under 35 and 89% are under 63. Find the mean and standard deviation of the distribution.	7														
4. a)	Let X denote the sum of the two numbers that appear when a pair of fair dice is tossed. Determine the (i) distribution function (ii) mean and (iii) variance.	7														
b)	2% of items of a factory are defective. The items are packed in boxes. What is the probability that there will be (i) 2 defective items (ii) at least three defective items in a box of 100 items?	7														
5. a)	A population consists of five members 2,3,6,8 and 11. Consider all possible samples of size two which can be drawn with replacement from this population. Find (a) The mean of the population. (b) The standard deviation of the population. (c) The mean of the sampling distribution of means. (d) The standard deviation of the sampling distribution of the means.	7														
b)	A random sample of size 100 is taken from an infinite population having the mean 76 and variance 256. What is the probability that $\bar{x}$ will be between 75 and 78?	7														

6. a)	What is the size of the smallest sample required to estimate an unknown proportion to within error of 0.06 with at least 95% confidence? ( Hint : $Z_{\alpha/2} = 1.96$ )	4
b)	An ambulance service claims that it takes on the average less than 10 minutes to reach its destination in emergency calls. A sample of 36 calls has a mean of 10 minutes and the variance of 16 minutes. Test the claim at 0.05 level significance.	10
7. a)	It is desired to estimate the mean number of hours of continuous use until a certain computer will first repairs. If it can be assumed that $\sigma = 48$ hours, how large a sample be needed so that one will be able to assert with 90% confidence that the sample mean is off by at most 10 hours. ( Hint : $Z_{\alpha/2} = 1.645$ )	4
b)	The means of two large samples of sizes 1000 and 2000 members are 67.5 inches and 68.0 inches respectively. Can the samples be regarded as drawn from the same population of S.D. 2.5 inches?	10
8. a)	Find periodic and aperiodic states in each of the following transition probability matrices. <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="text-align: center;">a) <math>\begin{bmatrix} 0 &amp; 1 \\ 1 &amp; 0 \end{bmatrix}</math></div> <div style="text-align: center;">b) <math>\begin{bmatrix} 1/4 &amp; 3/4 \\ 1/2 &amp; 1/2 \end{bmatrix}</math></div> </div>	4
b)	A fair die is tossed repeatedly. if $X_n$ denotes the maximum of the numbers occurring in the first n tosses, find the transition probability matrix P of the Markov chain $\{ X_n \}$ . Find also $P^2$ and $P(X_2 = 6)$ .	10