Code No.: MA302BS | R20 | H.T.No. | | | 8 | R | | | | | |

CMR ENGINEERING COLLEGE:: HYDERABAD
UGC AUTONOMOUS
II–B. TECH–I–Semester End Examinations (Supply) – August - 2023
COMPUTER ORIENTED STATISTICAL METHODS
(CSD)

[Time: 3 Hours] **[Max. Marks: 70]**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 20 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART-A **(20 Marks)**

1. a) If the probability is 0.05 that a certain kind of measuring device will show excessive drift, what is the probability that the sixth measuring device tested will be the first to show excessive drift? [2M]
   b) State Baye's theorem. [2M]
   c) A random variable X has the following probability distribution. [2M]

X	0	1	2	3	4	5	6	7	8
P(X)	a	3a	5a	7a	9a	11a	13a	15a	17a

   Find the value of a.
   d) If the mean of Binomial distribution is 3 and variance is 9/4, obtain the value of n. [2M]
   e) If X is normal distributed with mean 2 and variance 0.1, then find $P(|X-2|) \geq 0.01$? [2M]
   f) A sample size 10 was taken from a population S.D. of samples 0.03, find the maximum error with 99% confidence. [2M]
   g) Define unbiased estimator. [2M]
   h) Write about type I error and type II error. [2M]
   i) Define the Stochastic Process. [2M]
   j) Write Advantages of Markov Analysis. [2M]

PART-B **(50 Marks)**

2.a) If two dice are thrown, what is the probability that the sum is [5M]
   i. greater than 8
   ii. neither 7 nor 11?
   b) There are three boxes. [5M]
   I contains- 14 light bulbs out of which 8 are defective
   II contains- 10 light bulbs out of which 4 is defective
   III contains- 12 light bulbs out of which 5 are defective.
   A box is chosen at random and a bulb is selected. If it is defective, find the probability that it is from
   i. Box- I ii. Box-II iii. Box-III

OR

3.a) Three students A, B, C are running race. A and B have the same probability of winning and each is twice as likely to win as C. Find the probability that B or C wins. [5M]
   b) Define discrete probability distribution, continuous probability distribution. Give an example of each. [5M]

4.a) The probability density f(x) of a continuous random variable is given by $f(x) = c\, e^{-|x|}$, $-\infty < x < \infty$. Show that c = ½ and find the mean of the distribution. [5M]

b) Ten coins are thrown simultaneously. Find the probability of getting at least [5M]
i. Seven heads ii. Six heads iii. one head

OR

5.a) A sample of 4 items is selected at random from a box containing 12 items of which 5 are defective. Find the expected number E of defective items. [5M]

b) A coin is biased in a way that a head is twice as likely to occur as a tail. If the coin is tossed 3 times, find the probability of getting 2 tail and one head. [5M]

6. In normal distribution, 7% of the items are under 35 and 89% are under 63. Determine the mean and variance of the distribution. [10M]

OR

7.a) The claim that the variance of a normal population is $\sigma^2 = 21.3$ is rejected if the variance of random sample of size 15 exceeds 39.74. What is the probability that the claim will be rejected even though $\sigma^2 = 21.3$? [5M]

b) A random sample of size 100 is taken from an infinity population having the mean $\mu = 76$ and variance $\sigma^2 = 256$. What is the probability that $\bar{x}$(sample mean) will be between 75 and 78. [5M]

8.a) Among the items produced by a factory out of 800, 65 were defective. In another sample out of 300, 40 were defective. Test the significance between the difference of two proportion at 1% level. [5M]

b) From the following data, find whether there is any significance likely in the habit of taking soft drinks among the categories of employees. Use Chi-Square distribution test with level of significance 0.05 [5M]

	Employees		
Soft drinks	Clerks	Teachers	Officers
Pepsi	10	25	65
Thumsup	15	30	65
Fanta	50	60	30

OR

9.a) 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 11 minutes and variance of 16 minutes. Test the claim at 0.05 level of significance. [5M]

b) The blood pressures of 5 women before and after intake of a certain drug are given below. Test whether there is significant change in blood pressure at 1% level of significance. [5M]

Before	110	120	125	132	125
After	120	118	125	136	121

10. Suppose an urn A contains 2 white marbles and urn B contains 4 red marbles. At each step of the process, a marble is selected at random from each urn and the two marbles selected are interchanged. Let Xn denote the number of red marbles in urn A after n interchanges. [10M]
i. Find the transition matrix P.
ii. What is the probability that there are 2 red marbles in urn A after 3 steps.

OR

11. The transition probability matrix of Markov chain $\{ X_n \}$; [10M]

n = 1,2,3..... having 3 states 1,2 and 3 is $P = \begin{bmatrix} 0.1 & 0.5 & 0.4 \\ 0.6 & 0.2 & 0.2 \\ 0.3 & 0.4 & 0.3 \end{bmatrix}$. Is the matrix irreducible.

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