Code No.: MA402BS

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CMR ENGINEERING COLLEGE: : HYDERABAD
UGC AUTONOMOUS
II–B.TECH–II–Semester End Examinations (Regular) - August- 2023
COMPUTER ORIENTED STATISTICAL METHODS
(Common to CSE, IT, CSM)

[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) A coin is tossed thrice. What is the chance of getting all heads? [2M]

b) The length of time (in minutes) that a certain lady speaks on the telephone is found to be random phenomenon, with a probability function specified by the function $f(x)=\begin{cases} Ae^{-x}, & for\, x\geq 0 \\ 0, & elsewhere \end{cases}$, find the value of A. [2M]

c) If X is a discrete random variable, prove that $V(aX+b)a=a^2V(X)$. [2M]

d) The mean and variance of a binomial distribution are 4 and $\frac{4}{3}$ respectively. Determine the binomial distribution. [2M]

e) If X is uniformly distributed over $(0,5)$ find $P(X>3)$. [2M]

f) State Central limit theorem.. [2M]

g) Define type-I and type-II errors. [2M]

h) A sample of size 64 is taken from a population whose variance is 2 with probability 0.99, find the maximum error. [2M]

i) Define Stochastic matrix. Give one example. [2M]

j) If $A=\begin{bmatrix} 0 & x & 0.3 \\ y & 0.2 & 0.5 \\ 0.1 & 0.2 & z \end{bmatrix}$ is Transition probability matrix, then find the values of x, y and z. [2M]

PART-B **(50 Marks)**

2. State Baye's theorem. The probabilities of x, y and z becoming managers are $\frac{4}{9}, \frac{2}{9}$ and $\frac{1}{3}$ respectively. The probabilities that the Bonus Scheme will be introduced x, y and z becomes managers are $\frac{3}{10}, \frac{1}{2}$ and $\frac{4}{5}$ respectively. (i) What is the probability that Bonus Scheme will be introduced and (ii) If the Bonus Scheme has been introduced, what is the probability that the manager appointed was X? [10M]

OR

3. X is a continuous random variable with probability density function given by $f(x)=\begin{cases} Kx^2e^{-x}, x\geq 0 \\ 0 \quad otherwise \end{cases}$. Find the value of (i) K (ii) Mean (iii) Variance of X. [10M]

4.a) A random variable X has a mean $\mu = 10$ and variance $\sigma^2 = 4$. Using Chebyshev's theorem, find (i) $P(|X-10| \geq 3)$; (ii) $P(|X-10| < 3)$. [5M]

b) If two cards are drawn from a pack of 52 cards which are diamonds. Using Poisson distribution, find the probability of getting two diamonds at least 3 times in 51 consecutive trails of two cards drawing each time. [5M]

OR

5. Four coins are tossed 160 times. The number of times x heads occur is given below. Fit a poison Distribution to the following data. [10M]

x	0	1	2	3	4
No. of times	8	34	69	43	6

6. In a 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. Samples of size 2 are taken from the population 3, 6, 9, 12, 15, 18. Which can be drawn with replacement? Find [10M]

   i. The mean of the population.
   ii. The standard deviation of the population.
   iii. The mean of the sampling distribution of means.
   iv. The standard deviation of the sampling distribution of means.

8. A sample of 400 items is taken from a population whose standard deviation is 10. The mean of the sample is 40. Test whether the sample has come from a population with mean 38. Also calculate 95% confidence interval for the population. [10M]

OR

9. Two independent samples 8 items and 7 items respectively had the following values. [10M]

Sample-I	11	11	13	11	15	9	12	14
Sample-II	9	11	10	13	9	8	10	--

Is the difference between means of the samples significant?

10.a) A train process is considered as a two state Markov chain. If it rains, is considered to be in state 0 and it does not, the chain is in the state of 1. The transition probability of the Markov chain is defined by $\begin{bmatrix} 0.6 & 0.4 \\ 0.2 & 0.8 \end{bmatrix}$. Find the probability that it will rain for 3 days from today assuming that it is raining today. Assume that the mutual probabilities of state 0 or state 1 as 0.4 and 0.6 respectively. [5M]

b) The transition probability matrix of a Markov chain is given by $\begin{bmatrix} 0.3 & 0.7 & 0 \\ 0.1 & 0.4 & 0.5 \\ 0 & 0.2 & 0.8 \end{bmatrix}$ .Is this matrix irreducible? Explain. [5M]

OR

11. Three boys A, B, C are throwing a ball to each other. A always throws the ball to B, B always throws the ball to C, but C is just as likely to throw the ball to B as to A. Show that the process is Morkovian. Find the transition matrix and classify the states. Do all the states are ergodic? [10M]

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