CMR ENGINEERING COLLEGE: : HYDERABAD
UGC AUTONOMOUS
II–B.TECH–I–Semester End Examinations (Regular) - February- 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) Define random variable with suitable example.   [2M]
   b) Define i) Equally likely events   ii) Mutually exclusive events.   [2M]
   c) If K is a constant, then what is the value of $V(2X+K)$?   [2M]
   d) The mean and variance of a binomial distribution are 6 & 3 respectively find $P(X>1)$?   [2M]
   e) If $\mu = 5$ and $\sigma = 2$ then find the equation of the normal distribution?   [2M]
   f) What is the relationship between probability mass function and continuous density function?   [2M]
   g) What is mean by level of significance?   [2M]
   h) Write the test statistic of single proportion in large samples.   [2M]
   i) Find periodic and aperiodic states in the following transition probability matrix?   [2M]

$$\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$$

   j) Write a short note about Transition Probability matrix.   [2M]

PART-B   (50 Marks)

2. A continuous random variable 'X' is defined by   [10M]

$$f(x) = \begin{cases} \frac{1}{16}(3+x)^2, & \text{if } -3 \leq x \leq -1 \\ \frac{1}{16}(6-2x^2), & \text{if } -1 \leq x < 1 \\ \frac{1}{16}(3-x)^2, & \text{if } 1 \leq x \leq 3 \\ 0 & \text{elsewhere} \end{cases}$$

Verify that $f(x)$ is a density function & also find the Mean of 'x'

OR

3. State and prove Addition theorem for 2 &3 events.   [10M]

4. Derive the mean and variance of binomial distributions.   [10M]

OR

5. If 10% of the rivets produced by a machine are defective, find the probability that out of 5 rivets chosen of random (i)Non will be defective (ii) one will be defective (iii) at most two rivets will be defective.   [10M]

6. 1000 students has written an examination the mean of normal distribution is 35 and **[10M]** standard deviation is 5. Assuming the distribution to be normal find
   (i) How many students to marks lie between 25 and 40?
   (ii) How many get more than 40?
   (iii) How many students get below 20?

OR

7. Derive the Normal distribution areas under the normal curve. **[10M]**

8. In a city A 20% of a random sample of 900 school boys has certain slight physical **[10M]** defect .In another city B 18.5% of a random sample of 1600 school boys has the same defect. Is the difference between the proportion significance at 5% level of significance?

OR

9.a) A sample of size 300 was taken whose variance is 225 and mean 54. Construct 95% **[5M]** confidence interval for the mean. And find maximum error of mean at 95% **[5M]** confidence?

   b) A sample of size 16 was taken whose standard deviation 100 and mean 53. Construct 99% confidence interval for the mean. And find maximum error of mean at 99% confidence?

10. A gambler has Rs.2. He bets Rs.1 at a time and wins Rs.1 with probability ½. He **[10M]** stops playing if he loses Rs.2 or wins Rs.4.
   i. What is the tpm of the related markov chain?
   ii. What is the probability that he has lost his money at the end of 5 players?
   iii. What is the probability that the game loss more than 7 plays?

OR

11. Define stochastic processes and Markov chain and Classify its states. **[10M]**

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