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

CMR ENGINEERING COLLEGE: : HYDERABAD
UGC AUTONOMOUS
II–B.TECH–I–Semester End Examinations (Supply)- June- 2022
COMPUTER ORIENTED STATISTICAL METHODS
(CSD)

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

Note: 1. Answer *any FIVE questions. Each question carries 14 marks.*
2. All questions carry equal marks.
3. Illustrate your answers with NEAT sketches wherever necessary.

5X14=70

1. a) In a bolt factory machines A, B, C manufacture 20%, 30% and 50% of the total of their output and 6%, 3% and 2% are defective. A bolt is drawn at random and found to be defective. Find the probabilities that it is manufactured from i) Machine A ii) Machine B iii) Machine C. [7M]

   b) A random variable X has the following probability function [7M]

x	0	1	2	3	4	5	6	7
P(x)	0	k	2k	2k	3k	k^2	$2k^2$	$7k^2+k$

   i) Determine K

   ii) Evaluate $P(X<6)$, $P(X\geq 6)$, $P(0<X<5)$ and $P(0\leq X\leq 4)$

   iii) if $P(X\leq K)>(1/2)$, find the minimum value of K and

   iv) Determine the distribution function of X

   v) Mean.

2. a) Two dice are thrown five times. Find the probability of getting 7 as sum i) at least once ii) exactly two times iii) $P(1<X<5)$. [7M]

   b) If X is a Poisson Variate Such that $3\,P(x = 4) = 1/2\,P(x = 2) + P(x = 0)$, find (i) the mean of x (ii)$P(x\leq 2)$. [7M]

3. a) In a test on 2000 electrical bulbs, it was found that the life of a particular make was normally distributed with an average life of 2040 hours and standard deviation of 40hours. Estimate the number of bulbs likely to burn for i) more than 2140 hours ii) between 1920 and 2080 hours iii)less than 1960 hours. [7M]

   b) A population consists of five numbers 2,3,6,8 and 11. Consider all possible samples of size two which can be drawn with replacement from this population. Find [7M]

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

4. a) 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. [7M]

   b) In a city A, 20% of a random sample of 900 school boys has a certain slight physical defect. In another city B, 18.5% of a random sample of 1600 school boys has the same defect. Is the difference between the proportions significant at 0.05 level of significance. [7M]

5. a) Define markov chain and classify its states. [7M]

   b) Three boys A, B and C are throwing a ball to each other. A always throws the ball to B and 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 Markovian. Find the transition matrix and classify the states. [7M]

6. a) Two marbles are drawn in succession from a box containing 10 red, 30 white, 20 blue and 15 orange marbles, with replacement being made after each draw. Find the probability that [7M]

      i) Both are white ii) First is red and second is white.

   b) A fair coin is tossed until a head or five tails occurs. Find the expected number E of tosses of the coin. [7M]

7. a) If X is a continuous random variable and k is a constant, then prove that [7M]

      a)Var (X+k) = Var (X) b)Var (kX) = k^2 Var (X).

   b) Prove that Poisson distribution is limiting case of Binomial distribution. [7M]

8. a) If the masses of 300 students are normally distributed with mean 68kgs and standard deviation 3 kgs, how many students have masses a) Greater than 72 kgs b) less than or equal to 64 kgs. c) Between 65 and 71 kgs inclusive. [7M]

   b) Define degrees of freedom. Write the properties of t – distribution. [7M]

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