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Code No.: R22MA305BS   R22   H.T.No. [ ][ ][ ][8][R][ ][ ][ ][ ]

CMR ENGINEERING COLLEGE: : HYDERABAD
UGC AUTONOMOUS
II–B.TECH–I–Semester End Examinations (Regular) - February- 2024
COMPUTER ORIENTED STATISTICAL METHODS
(Common for IT, CSC, CSD)

[Time: 3 Hours]   [Max. Marks: 60]

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 10 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   (10 Marks)

1. a) Define sample space with an example   [1M]
   b) If two dice are rolled ,what is the probability of getting sum of the two dice is 7   [1M]
   c) Define Poisson distribution.   [1M]
   d) If the mean and variance of a Binomial distribution are 6 and 4 then find the value of   [1M]
      'n'
   e) Define null hypothesis.   [1M]
   f) Write about types of errors.   [1M]
   g) Define t-distribution.   [1M]
   h) Define Chi-Square test.   [1M]
   i) Define Markov chain.   [1M]
                                                                            [1M]
   j) Find the values of x,y,z if $\begin{bmatrix} 0 & x & 1/3 \\ 0 & 0 & y \\ 1/3 & 1/4 & z \end{bmatrix}$ is a stochastic matrix

PART-B   (50 Marks)

2. A random variable X has the following probability distribution   [10M]

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

Find i) the value of k   ii) $P(0 < X < 5)$ iii) mean iv) variance

OR

3. If two dice are rolled, let the random variable X denotes the maximum of their   [10M]
   numbers. Find the discrete probability distribution of X and hence find mean and
   variance.

4. a) Derive the mean and variance of Binomial distribution.   [5M]
   b) If a random variable X has Poisson distribution such that $P(X = 1) = P(X = 2)$.   [5M]
      find i. Mean ii. $P(X = 4)$ iii. $P(X \geq 1)$

OR

5. In a sample of 1000 cases , the mean of certain test is 14 and the standard deviation   [10M]
   is 2.5 assuming the distribution to be normal . Find how many students scored
   i. Between 12 and 15   ii) Above 18   iii) Below 18

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

OR

7. a) Explain the terms
   i. Null Hypothesis ii. Alternative Hypothesis [5M] [5M]

   b) In sample of 1000 people in Karnataka 540 are rice eaters and the rest are wheat eaters. Can we assume that both rice and wheat eaters are equally popular in this state at 1% level of significance

8. a) Explain F-distribution and its uses [5M]

   b) The mean life of a sample of 10 electric bulbs was found to be 1456 hours with S.D [5M] of 423 hours. A second sample of 17 bulbs choose from a different batch showed a mean life of 1280 hours with S.D of 398 hours. Is there a significant difference the means of two batches?

OR

9. Among the items produced by a factory out of 500, 15 were defective ,in another [10M] sample out of 400 , 20 were defective .Using testing of hypothesis , test the significance difference between two proportions at 5% level of significance

10. The transition probability matrix of a Markov chain $\{X_n\}$; $n = 1,2,3$ .....having three [10M]

states $\{1,2,3\}$ is $P = \begin{bmatrix} 0.1 & 0.5 & 0.4 \\ 0.6 & 0.2 & 0.2 \\ 0.3 & 0.4 & 0.3 \end{bmatrix}$ and the initial distribution is

$P^{(0)} = (0.7,0.2,0.1)$ Find

i. $P\{X_2 = 3\}$

ii. $P\{X_3 = 2, X_2 = 3, X_1 = 3, X_0 = 2\}$

OR

11. a) Explain about the classification of the states of a Markov chain [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 [5M]

    this matrix irreducible?

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