Code No.: MA402BS | R20 | H.T.No. | | | 8 | R | | | | | |

CMR ENGINEERING COLLEGE: : HYDERABAD
UGC AUTONOMOUS
II–B.TECH–II–Semester End Examinations (Supply) - July - 2024
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) Define Sample space. [2M]
   b) State the Baye's theorem [2M]
   c) Define Expectation of a Random variable. [2M]
   d) Define Poisson distribution. [2M]
   e) Write the characteristics of Normal distribution [2M]
   f) Define continuous Uniform distribution. [2M]
   g) Explain the terms null and alternate hypotheses. [2M]
   h) What is meant by level of significance? [2M]
   i) Define Transition Probability Matrix [2M]
   j) Define Markov chain. [2M]

PART-B **(50 Marks)**

2. There are three boxes. [10M]
   I contains- 10 light bulbs out of which 4 are defective
   II contains- 6 light bulbs out of which 1 is defective
   III contains- 8 light bulbs out of which 3 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 random variable X has the following probability distribution [10M]

X	0	1	2	3	4	5	6	7
P(X)	0	K	2K	2K	3K	K^2	$2K^2$	$7K^2+K$

(i)Find the value of K, (ii) Evaluate $P(X<6), P(X\geq 6)$ (iii)Mean iv)Variance

4. The mean of Binomial distribution is 3 and variance is 9/4. [10M]
   Find (i) the value of n
   (ii) $p(X\geq 7)$ (iii) $p(1\leq X<6)$

OR

5. If a random variable X has Poisson distribution such that $p(X=1)=p(X=2)$. [10M]
   Find (i),Mean (ii) $p(X=4)$ (iii) $p(X\geq 1)$ (iv) $p(1<X<4)$

6 Find the mean and standard deviation of a normal distribution in which 7% of items are under 35 and 89% are under 63. [10M]

OR

7. If the masses of 300 students are normally distributed with mean 68 kgs and standard deviation 3kgs. How many students have masses? [10M]
i) Greater than 72 kgs ii) Between 65 and 71 kgs

8. 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. [5M]
b. In a ramdom sample of 160 workers exposed to a certain amount of radiation, 24 experienced some ill effects. Construct a 99% confidence interval for the corresponding true percentage. [5M]

OR

9. A random sample of six steel beams has a mean compressive strength of 58,392 p.s.i(pounds per square inch) with a standard deviation of 648 p.s.i. Use this information and the level of significance 0.05 to test whether the true average compressive strength of the steel from which this sample came is 58,000 p.s.i. [10M]

10. If the transition probability of market shares of three brands A, B and C is [10M]

$$\begin{bmatrix} 0.4 & 0.3 & 0.3 \\ 0.8 & 0.1 & 0.1 \\ 0.35 & 0.25 & 0.4 \end{bmatrix}$$

and the initial market shares are 50%, 25% and 25%.

Find i) The market shares in second and third period
ii) The limiting probabilities.

OR

11. Consider a three-state Markov chain with the transition matrix. If the initial probabilities $P_0(x)=(0.2, 0.3, 0.5)$. [10M]

$$P=\begin{pmatrix} 0 & 1 & 0 \\ 0 & 2/3 & 1/3 \\ 1/16 & 15/16 & 0 \end{pmatrix}$$

a) Find the probabilities after two transitions.
b) Find the limiting probabilities.

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