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CMR ENGINEERING COLLEGE: : HYDERABAD
UGC AUTONOMOUS
II–B.TECH–I–Semester End Examinations (Supply) - June- 2025
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 **(20 Marks)**

1. a) State Addition Theorem. [1M]
b) State Baye's theorem. [1M]
c) Define Binomial distribution. [1M]
d) If X is Poisson variate such that $P(X=1)=P(X=2)$ then find its Mean. [1M]
e) Define a normal distribution. [1M]
f) The variance of a population is 4. The size of the sample collected from the population is 225. What is the standard error of the mean? [1M]
g) Define alternative hypothesis. [1M]
h) Write the test statistic for the test of significance of difference of two means. [1M]
i) Define Markov chain. [1M]
j) Define Absorbing state. [1M]

PART-B **(50 Marks)**

2. Companies B_1, B_2 and B_3 produce 30%, 45% and 25% of the cars respectively. It is known that 2%, 3% and 2% of these cars produced from B_1, B_2 and B_3 are defective. If a car purchased is found to be defective, What is the probability that a car purchased is defective?.If a car purchased is found to be defective, what is the probability that this is purchased from company B_1, B_2 and B_3? [10M]

OR

3.a) A bag contains 4 bad and 6 good tubes. Two are drawn out from the box at a time. One of them is tested and found to be good. What is the probability that the other one is also good? [5M]

b) The probabilities that student A, B, C, D solve a problem are $\frac{1}{3}, \frac{2}{5}, \frac{1}{5}$ and $\frac{1}{4}$ respectively. If all of them try to solve the problem, what is the probability that the problem is solved? [5M]

4. If X is a continuous random variable with probability density function given by [10M]
$$f(x)=\begin{cases} k\,x^{\alpha-1}(1-x)^{\beta-1}, \; for\; 0<x<1, \alpha, \beta>0 \\ 0, \; otherwise \end{cases}$$
Find K and mean value of X.

OR

5. In 1000 sets of trails for an event of small probability the frequencies f of the number of x successes are [10M]

x	0	1	2	3	4	5	6	7
$f(x)$	305	365	210	80	28	9	2	1

Find the expected frequencies.

6. In a sample of 1000 cases, the mean of a certain test is 14 and standard deviation is 2.5. assuming the distribution to be normal, find (i) how many students score between 12 and 15? [10M]
(ii) how many score above 18? (iii) How many score below 18?

OR

7. 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 a) The mean of the population. b) The standard deviation of the population. c) The mean of the sampling distribution of means and d) The standard deviation of the sampling distribution of means. [10M]

8. Random samples 400 men and 600 women were asked whether they would like to have a flyover near their residence, 200 men and 325 women were in favour of the proposal. Test the hypothesis that proportions of men and women in favour of the proposal are same, at 5% level. [10M]

OR

9. Two horses A and B were tested according to the time (in seconds) to run a particular track with the following results. [10M]

Horse A	28	30	32	33	33	29	34
Horse B	29	30	30	24	27	29	-

Test whether the two horses have the same running capacity at 5% level of significance.

10. The transition probability matrix of Markov chain $\{x_n\}$, $n = 1,2,3...$ having 3 states 1, 2 and 3 is $P = \begin{pmatrix} 0.1 & 0.5 & 0.4 \\ 0.6 & 0.2 & 0.2 \\ 0.3 & 0.4 & 0.3 \end{pmatrix}$ and the initial distribution is $P^{(0)} = \{0.7 \quad 0.2 \quad 0.1\}$. Find (i) $P\{X_2 = 3\}$, (ii) $P\{X_2 = 2, X_2 = 3, X_0 = 2\}$. [10M]

OR

11. 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 chai 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. [10M]

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