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

CMR ENGINEERING COLLEGE: : HYDERABAD
UGC AUTONOMOUS
II–B.TECH–I–Semester End Examinations (Regular) - December- 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)	State addition theorem of probability.	[1M]
b)	State Baye's rule.	[1M]
c)	State central limit Theorem.	[1M]
d)	If the mean of Binomial distribution is 3 and variance is 9/4, obtain the value of n.	[1M]
e)	Define Normal distribution.	[1M]
f)	Define point and interval estimations.	[1M]
g)	Define Type I error and Type II error.	[1M]
h)	What is meant by Level of significance?	[1M]
i)	Discuss the transition probability in brief.	[1M]
j)	Define Markov process.	[1M]

| PART-B | (50 Marks) |

2. Suppose colored balls are distributed in three indistinguishable boxes as follows: [10M]

	Box I	Box II	Box III
Red	2	4	3
White	3	1	4
Blue	5	3	3

A box is selected at random from which a ball is selected at a random. What is the probability that the ball is colored a) red, b) blue?

OR

3.a) The chances that Dr. Rao will diagnose cancer disease correctly is 60%. The chance that a patient will die by his treatment after correct diagnosis is 40% and the chance of death by wrong diagnosis is 70%. A patient of Dr. Rao, who had cancer disease died. What is the probability his disease was correctly diagnosed? [5M]

b) If a die is rolled twice and X is defined as X = min (a,b), then find the probability distribution of X. [5M]

4.a) Derive the mean of the Binomial distribution. [5M]

b) Determine the probability of getting the sum 6 exactly 3 times in 7 throws with a pair of fair dice. [5M]

OR

5. A population consists of ~~five~~ Six numbers 5,10,14,18,13 and 24. Consider all possible samples of size two which can be drawn without replacement from this population. Find

a) The mean of the population. [2M]

b) The standard deviation of the population. [3M]

c) The mean of the sampling distribution of means and [2M]

d) The standard deviation of the sampling distribution of mean. [3M]

6. Show that for the normal distribution *mean* = *median* = *mode*. [10M]

OR

7. A cigarette manufacturing firm claims that its brand A line of cigarettes outsells its brand B [10M] by 8%. If it is found that 42 out of a sample of 200 smokers prefer brand A and 18 out of another sample of 100 smokers prefer brand B, test whether the 8% difference is a valid claim.

8. An investigator states that the husbands are more intelligent than the wives. The following [10M] is the results of 10 samples of IQs. Test a hypothesis with a reasonable test at the 0.05 level of significance.

Husbands	117	105	97	105	123	109	86	78	103	107
Wives	106	98	87	104	116	95	90	69	108	85

OR

9. To test the claim that the resistance of electric wire can be reduced by more than 0.050 [10M] ohm by alloying, 32 values obtained for standard wire yielded mean of 0.136 ohm and standard deviation 0.004 ohm, and another 32 values obtained for alloyed wire yielded mean 0.083 ohm and standard deviation 0.005 ohm. At 0.05 level of significance, does this support the claim?

10. Compute the equilibrium vector for the transition matrix [10M]

$$P = \begin{bmatrix} 0.5 & 0.2 & 0.3 \\ 0.1 & 0.4 & 0.5 \\ 0.2 & 0.2 & 0.6 \end{bmatrix}$$

OR

11. Identify all absorbing states in the Markov chains having the following matrices. Decide whether the Markov chain is absorbing or not?

a) $\begin{pmatrix} 0.6 & 0 & 0.4 & 0 \\ 0 & 1 & 0 & 0 \\ 0.9 & 0 & 0.1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix}$ [5M]

b) $\begin{pmatrix} 1 & 0 & 0 \\ 0.3 & 0.5 & 0.2 \\ 0 & 0 & 1 \end{pmatrix}$ [5M]

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