R22

Code No: 183AK

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech II Year I Semester Examinations, December – 2024/January - 2025
COMPUTER ORIENTED STATISTICAL METHODS
(Common to CSE, IT, CSIT, CE(SE), CSE(CS), CSE(DS), CSD)

Time: 3 Hours **Max. Marks: 60**

Note: This question paper contains two parts A and B.
i) **Part- A** for 10 marks, ii) **Part - B** for 50 marks.

- Part-A is a compulsory question which consists of ten sub-questions from all units carrying equal marks.
- Part-B consists of **ten questions** (numbered from 2 to 11) **carrying 10 marks each**. From each unit, there are two questions and the student should answer one of them. Hence, the student should answer five questions from Part-B.

PART- A

(10 Marks)

1.a) If 3 cars are selected randomly from 6 cars having 2 defective cars. Find the expected number of defective cars. [1]

b) A random variable X has the following probability function

x	-3	-2	-1	0	1	2	3
p(x)	k	0.1	k	0.2	2k	0.4	2k

Find the mean. [1]

c) If from 6 pm to 7 pm in the evening one telephone line in every five is engaged in a conversation: what is the probability that when 10 telephone numbers are chosen at random, only two are in use? [1]

d) Determine the binomial distribution for which the mean is 4 and variance is 3. [1]

e) Draw the shape of the normal curve? [1]

f) Write the types of estimations? [1]

g) A random sample of size 100 has a standard deviation of 5. What can you say about the maximum error with 95% confidence? [1]

h) Explain the level of significance? [1]

i) Define Markov Process? [1]

j) Check whether this matrix $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ is stochastic or not. [1]

PART-B

(50 Marks)

2.a) Two cards are drawn from a pack of 52 cards. Find the probability of drawing that both the cards are aces (i) if the card drawn first is replaced before the second draw and (ii) if the card drawn first is not replaced before the second draw.

b) If X is a continuous random variable with distribution $f(x) = \begin{cases} \frac{1}{6}x + k, & if\ 0 \le x \le 3 \\ 0, & elsewhere \end{cases}$.

Find k. [5+5]

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?

b) If a die is rolled twice and X is defined as X = min (a,b), then find the probability distribution of X. [6+4]

4. Out of 800 families with 4 children each, how many could you expect to have (a) three boys (b) four girls (c) 2 or 3 boys (d) at least 1 boy. [10]

OR

5. A car hire firm has 2 cars which it hires out day by day. The number of demands for a car on each day is distributed as a poisson with mean 1.5. Calculate the proportion of days (a) on which there is no demand (b) on which demand is refused. [10]

6. In a normal distribution 7% of the items are under 35 and 89% of the items are under 63. Find mean and variance of the distribution. [10]

OR

7.a) Ten workers are given a training program with a view to study their assembly time for a certain mechanism. A results of the time and motion studied before and after the training program are given below.

Workers	1	2	3	4	5	6	7	8	9	10
x	15	18	20	17	16	14	21	19	13	22
y	14	16	21	10	15	18	17	16	14	20

Test whether there is significant difference in assembling times before and after training.

b) Pumpkins were grown under two random experiments. Two random samples of 11 and 9 pumpkins, show the sample S.D of their weights as 0.8 and 0.5 respectively. Assuming that the weight distribution normal and find out that the two variances are equal. [5+5]

8.a) Random samples of 400 men and 200 women in a locality were asked whether they would like to have a bus stop near their residence. 200 men and 40 women in favor of the proposal. Test the significant to difference between the two proportions at 5% level of significance?

b) A die was thrown 9000 times and out of these 3220 yielded a 3 or 4. Is this consistent with the hypothesis that the die was unbiased? [5+5]

OR

9.a) In a sample of 8 observations from a normal population, the sum of the squares of deviations of the sample values from the sample mean is 84.4 and in another sample of 10 observations it was 102.6. Test at 5% level whether the populations have the same variance?

b) A cigarette manufacturing firm claims that its brand A line of cigarettes outsells its brand B by 8%. If it is found that 42 out of 200 smokers prefer brand A and 18 out of another sample of 100 smokers prefer brand B. Test whether this 8% difference is a valid claim? [5+5]

10.a) The transition probability matrix is given by $P = \begin{bmatrix} 0.1 & 0.4 & 0.5 \\ 0.2 & 0.2 & 0.6 \\ 0.7 & 0.2 & 0.1 \end{bmatrix}$ and $P_0 = [0.4, 0.4, 0.2]$

i) Find the distribution after three transitions.

ii) Find the limiting probabilities.

b) Check the following stochastic matrix is regular, $B = \begin{bmatrix} 0 & 0 & 1 \\ 1/2 & 0 & 1/2 \\ 0 & 1 & 0 \end{bmatrix}$ [5+5]

OR

11. Three boys A,B, 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 show that the process is Markovian. Find the transition matrix and classify the states. [10]

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