R18

Code No: 153AJ

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech II Year I Semester Examinations, February - 2024
COMPUTER ORIENTED STATISTICAL METHODS
(Common to CSE, IT, CE(SE), CSE(IOT), CSE(N))

Time: 3 Hours **Max. Marks: 75**

Note: i) Question paper consists of Part A, Part B.
ii) Part A is compulsory, which carries 25 marks. In Part A, answer all questions.
iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART – A

(25 Marks)

1.a)	State addition theorem of probability for two events.	[2]
b)	Define the probability density function of a continuous random variable.	[3]
c)	Define the mean and variance of a random variable.	[2]
d)	Define the binomial distribution of a discrete random variable X and state its limitations.	[3]
e)	Define random sampling.	[2]
f)	Write the applications of the normal distribution.	[3]
g)	Define the standard error of a point estimation for large and small samples.	[2]
h)	Define the null and alternative hypotheses and give suitable examples.	[3]
i)	What is a stochastic process? Give an example.	[2]
j)	Explain the construction of Markov chain in brief.	[3]

PART – B

(50 Marks)

2.a) A can hit a target 3 times in 5 shots, B can hit 2 times in 5 shots and C can hit 3 times in 4 shots. They fire a volley, what is the probability that
(i) two shots hit the target (ii) at least two shots hit the target.

b) State and prove multiplication theorem of probability. [5+5]

OR

3. Of the three, the chances that an IAS officer, IPS officer or an academician will be appointed as a vice-chancellor of a university are 0.7, 0.5, and 0.2 respectively. Probabilities that the outcome-based education (OBE) is promoted by these if appointed are 0.2, 0.5, and 0.7 respectively. If outcome-based education is promoted, what is the probability that vice-chancellor is an academician? [10]

4. If a die is rolled twice and let X be a random variable that denotes the sum of two faces. Find the probability distribution of X, and hence find its mean and variance. [10]

OR

5.a) 10 coins are thrown simultaneously. Find the probability of getting i) at least 7 heads and ii) exactly 6 heads.

b) If a Poisson distribution is such that $\frac{3}{2}P(X=1)=P(X=3)$, find $P(X\geq 1)$. [5+5]

6. A population consists of 6 numbers 4, 8, 12, 16, 20 and 24. Consider all possible samples of size two which can be drawn with and without replacement from this population and hence find the mean and variance of the sampling distribution of means. [10]

OR

7.a) X is a normal variate with mean 30 and standard deviation 5. Find the probabilities that (i) X lies between 26 and 40. (ii) X greater than 45.

b) Explain uniform distribution and Gamma distribution. [6+4]

8. Suppose that we want to estimate the true proportion of defectives in a very large shipment of adobe bricks, and that we want to be at least 95% confidence that the error is at most 0.04. How large a sample will we need if
(a) we have no idea what the true proportion might be;
(b) we know that the true proportion doesn't exceed 0.12? [10]

OR

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

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

10. A certain gene in a plant has two alleles, A and a. Thus, its genotype with respect to this gene can be AA, Aa, or aa. Now suppose that a plant is crossed with itself and one offspring is selected that is crossed with itself and so on and so forth. Describe the sequence of genotypes as a Markov chain. [10]

OR

11. Consider a population of cells. Each cell lives for a time that is exp(α) and then either splits into two new cells with probability p or dies with probability $1-p$, independent fall other cells. Let X(t) be the number of cells at time t and describe this as a continuous-time Markov chain. [10]

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