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Reg. No: ☐☐☐☐☐☐☐☐☐☐

VELAGAPUDI RAMAKRISHNA
SIDDHARTHA ENGINEERING COLLEGE
(AUTONOMOUS)

II/IV B.Tech. DEGREE EXAMINATION, JUNE - 2023

Fourth Semester

COMPUTER SCIENCE AND ENGINEERING

20BS4101A PROBABILITY AND STATISTICS

Time: 3 hours *Max. Marks: 70*

Part-A is compulsory
Answer One Question from each Unit of Part - B
Answer to any single question or its part shall be written at one place only

PART-A

10 x 1 = 10M

1. a. Define random variable. (CO1 K1)

   b. Write mean and variance of Binomial distribution. (CO1 K2)

   c. Define the term population. (CO2 K1)

   d. Define null hypothesis. (CO2 K1)

   e. Write the formula for hypothesis concerning one variance. (CO3 K2)

   f. Define chi square test. (CO3 K1)

   g. Write the test stastic for two sample proportions in large samples. (CO3 K2)

   h. Define Statistical Quality Control. (CO4 K1)

   i. Write any two applications of Quality control. (CO4 K2)

   j. Define reliability. (CO4 K1)

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7. b. The following table gives the classification of 100 workers according to sex and nature of work. Test whether the nature of work is independent of the sex of the worker. (CO3 K4) 8M

	Stable	Unstable	Total
Males	40	20	60
Females	10	30	40
Total	50	50	100

UNIT-IV

8. a. write a short notes in detail

   i) Control charts for measurements

   ii) Control charts for attributes. (CO4 K2) 7M

   b. Thirty five successive samples of 100 casting each taken from a production line contained respectively

   3,3,5,3,5,0,3,2,3,5,6,5,9,1,2,4,5,2,0,10,3,6,3,2,5,6,3,3,2,5,1,7,4,2 and 3 defectives. if the fraction detective is to be maintained at 0.02 construct a p-chart for these data and state whether or not this standard is being met. In case there is a evidence that the given standard is being exceeded, construct the new control limits. (CO4 K3) 8M

(or)

9. a. Derive general equation for failure rate function. (CO4 K3) 8M

   b. Explain the role of exponential model in reliability. (CO4 K2) 7M

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PART-B

4 x 15 = 60M

UNIT-I

2. a. A random variable X has the following probability function.

$X = x$	-3	-2	-1	0	1	2	3
$P(X = x)$	K	0.1	K	0.2	2K	0.4	2K

Find: i) K   ii) Mean iii) Variance   **(CO1 K1) 7M**

b. For the continuous random variable X whose Probability density function is given by $f(x) = \begin{cases} cx(2-x), & \text{if } 0 \leq x < 2 \\ 0, & \text{otherwise} \end{cases}$

Find c, mean, variance and S.D of X.   **(CO1 K1) 8M**

(or)

3. a. Out of 800 families with 5 children each, how many would you expect to have i) 3 boys ii) 5 girls iii) Either 2 or 3 boys. (Assuming equal probabilities for boys and girls).   **(CO1 K3) 7M**

b. Suppose that two random variables have the joint probability density   **(CO1 K3) 8M**

$f(x_1, x_2) = \begin{cases} \frac{2}{3}(x_1 + 2x_2) & for 0 < x_1 < 1, 0 < x_2 < 1 \\ 0 & elsewhere \end{cases}$

Find the conditional density of the first given that the second takes on the value x_2

UNIT-II

4. a. Explain the relation between tests and confidence intervals.   **(CO2 K5) 7M**

4. b. An ambulance service claims that it takes on the average less than 10 minutes to reach its destination in emergency calls. A sample of 36 calls has a mean of 11 minutes and the variance of 16 minutes. Test the claim at 0.05 level of significance.   **(CO2 K3) 8M**

(or)

5. a. Explain the procedure for testing of hypothesis.   **(CO2 K2) 7M**

b. A sample of 400 items is taken from a population whose standard deviation is 100. 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.   **(CO2 K3) 8M**

UNIT-III

6. a. Use the 0.01 level of significance to test the null hypothesis that $\sigma = 0.015$ inch for the diameters of certain bolts against the alternative hypothesis that $\sigma \neq 0.015$ inch, given that a random sample of size 15 yielded $s^2 = 0.00011$.   **(CO3 K3) 7M**

b. In a big city 325 men out of 600 men were found to be smokers. Does this information support the conclusion that the majority of men in this city are smokers.   **(CO3 K4) 8M**

(or)

7. a. In a random sample of 400 industrial accidents, it was found that 231 were due at least partially to unsafe working conditions. Construct a 99% confidence interval for the corresponding true proportion using the large sample confidence interval formula.   **(CO3 K4) 7M**