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SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)

MCA I Year I Semester (R16) Supplementary Examinations June 2017

PROBABILITY & STATISTICS

(For Students admitted in 2016 only)

Time: 3 hours

Max. Marks:60

(Answer all Five Units 5 X 12 = 60 Marks)

UNIT-I

- 1 a. State and prove the Baye's Theorem. 6M
- b. In a bolt factory machines A, B, C manufactures 20%, 30% and 50% of the total of their output of which 6%, 3% and 2% are defective. A bolt is drawn at random and found to be defective. Find the probability that it is manufactured from (i) Machine A (ii) Machine B and (iii) machine C. 6M

OR

- 2 a. From a lot of 10 items containing 3 defectives, a sample of 4 items is drawn at random. Let the random variable X denote the number of defective items in the sample. Find the probability distribution of X when the sample is drawn without replacement. 6M
- b. A continuous random variable has the probability density function

$$f(x) = \begin{cases} k x e^{-\lambda x}, & \text{for } x \geq 0, \lambda > 0 \\ 0, & \text{otherwise} \end{cases}$$
Determine (i) k (ii) Mean (iii) Variance. 6M

UNIT-II

- 3 a. Fit a Binomial Distribution to the following data
- | | | | | | | |
|----------|---|----|----|----|----|---|
| <i>x</i> | 0 | 1 | 2 | 3 | 4 | 5 |
| <i>f</i> | 2 | 14 | 20 | 34 | 22 | 8 |
- b. If X is a Poisson variate such that $3p(x=4) = \frac{1}{2}p(x=2) + p(x=0)$, find
(i) the mean of *x* (ii) $p(x \leq 2)$. 6M

OR

- 4 a. Define the Normal Distribution and derive its mean.
If X is a Normal variate with mean 30 and standard deviation 5. Find the
b. probabilities that (i) $26 \leq X \leq 40$ (ii) $X \geq 45$. 6M

UNIT-III

- 5 a. Find 95% confidence limits for the mean of a normality distributed population from which the following sample was taken 15, 17, 10, 18, 16, 9, 7, 11, 13, 14. 6M
- 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. 6M

OR

- 6 a. The Blood Pressure of 5 women before and after intake of a certain drug are given below:

Before	110	120	125	132	125
After	120	118	125	136	121

Test whether there is significant change in Blood Pressure at 1% level of significance. 6M

- b. Pumpkins were grown under two experimental conditions. Two random samples of 11 and 9 pumpkins, show the standard deviation of their weights as 0.8 and 0.5 respectively. Assuming that the weight distributions are normal, test hypothesis that the true variances are equal. 6M

UNIT-IV

- 7 Explain the one-way classification of ANOVA. 12M

OR

- 8 To study the performance of three detergents and three different water temperatures the following Whiteness readings were obtained with specially designed equipment.

Water temperature	Detergent-A	Detergent-B	Detergent-C
Cold water	57	55	67
Warm water	49	52	68
Hot water	54	46	58

Perform a Two-way analysis of variance using 5% level of significance. 12M

UNIT-V

- 9 a. Write the advantages of Statistical Quality Control. 6M
- b. The number of weekly customer complaints is monitored at a large hotel using a C-chart. Complaints have been recorded over the past twenty weeks. Develop three sigma control limits using the following data.

Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
No. of complaints	3	2	3	1	3	3	2	1	3	1	3	4	2	1	1	1	3	2	2	3

6M

OR

- 10 a. Write the construction of \bar{X} - chart. 6M
- b. The following figures give the number of defectives in 20 samples containing 2000 rubber belts: 425, 430, 216, 341, 225, 322, 280, 306, 337, 305, 356, 402, 216, 264, 126, 409, 193, 280, 326, 389. Calculate the values for central line and the control limits for P-chart. 6M

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