

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

**B.Tech I Year II Semester Regular & Supplementary Examinations August-2023**

**PROBABILITY & STATISTICS**

(Common to CAD, CSIT, CAI, CIC, CSE, CCC & CSM)

**Time: 3 Hours**

**Max. Marks: 60**

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

**UNIT-I**

- 1 a If three coins are tossed. Find the probability of getting CO1 L1 6M  
i) 3 heads ii) 2 heads iii) no heads.
- b In studying the causes of power failures, these data have been gathered: 5% are CO1 L2 6M  
due to transformer damage, 80% are due to line damage, 1% involves both  
problems. Based on these percentages, approximate the probability that a given  
power failure involves:  
(i) Line damage given that there is a transformer damage  
(ii) Transformer damage given that there is line damage  
(iii) Transformer damage given that there is no line damage.  
(iv) Transformer damage or line damage.

**OR**

- 2 a A random variable  $X$  has the density function  $f_X(x) = 2e^{-2x}; x > 0$ . CO1 L2 6M  
Find, (i)  $P(1 < X \leq 3)$  (ii)  $P(X \leq 2.5)$
- b Find the mean and variance of the uniform probability distribution given by CO1 L3 6M  
 $P(X = x) = \frac{1}{n}; x = 1, 2, 3, \dots, n$

**UNIT-II**

- 3 a Two dice are thrown five times. Find the probability of getting 7 as sum CO2 L2 6M  
(i) at least once (ii)  $P(1 < X < 5)$ .
- b Derive mean and variance of Poisson distribution. CO2 L3 6M
- OR**
- 4 a Derive variance of Normal distribution. CO2 L3 6M  
b If  $X$  is normally distributed with mean 1 and variance 4, find CO2 L3 6M  
(i)  $p(X < 3)$  (ii)  $p(1 < X < 3)$  (iii)  $p(X > 2)$

**UNIT-III**

- 5 Compute Pearson's coefficient of skewness for the following data: CO3 L4 12M
- |       |       |       |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Class | 10-19 | 20-29 | 30-39 | 40-49 | 50-59 | 60-69 | 70-79 | 80-89 |
| $f$   | 5     | 9     | 14    | 20    | 25    | 15    | 8     | 1     |

**OR**

- 6 Obtain the line of regression  $Y$  on  $X$  and estimate  $Y$  when  $X = 45$  for the following CO3 L4 12M  
data:

|     |    |    |    |    |    |    |    |    |    |    |
|-----|----|----|----|----|----|----|----|----|----|----|
| $X$ | 56 | 42 | 72 | 36 | 63 | 47 | 55 | 49 | 38 | 68 |
| $Y$ | 14 | 12 | 16 | 11 | 14 | 12 | 15 | 14 | 11 | 15 |
|     | 7  | 5  | 0  | 8  | 9  | 8  | 0  | 5  | 5  | 2  |

**UNIT-IV**

- 7 a Fit a second degree polynomial  $y = a + bx + cx^2$  to the following data: **CO4 L3 6M**

|     |     |    |     |    |     |    |
|-----|-----|----|-----|----|-----|----|
| $x$ | 1.5 | 2  | 2.5 | 3  | 3.5 | 5  |
| $y$ | 10  | 18 | 13  | 25 | 63  | 95 |

- b Fit the curve of the form  $y = ae^{bx}$  to the following data: **CO4 L3 6M**

|     |     |      |      |      |      |      |
|-----|-----|------|------|------|------|------|
| $x$ | 35  | 45   | 55   | 65   | 75   | 90   |
| $y$ | 1.5 | 2.34 | 3.45 | 4.50 | 5.65 | 7.75 |

**OR**

- 8 a A sample of 400 items is taken from a population whose standard deviation is 10. The mean of the sample is 40. Test whether the sample has come from a population with mean 38. **CO4 L3 6M**
- b In two large populations, there are 30%, and 25% respectively of fair haired people. Is this difference likely to be hidden in samples of 1200 and 900 respectively from the two populations? **CO4 L3 6M**

**UNIT-V**

- 9 Samples of two types of electric light bulbs were tested for length of life and following data were obtained: **CO5 L3 12M**

|             | Type I               | Type II              |
|-------------|----------------------|----------------------|
| Sample size | $n_1 = 8$            | $n_2 = 7$            |
| Sample mean | $\bar{x} = 1,234hrs$ | $\bar{y} = 1,036hrs$ |
| Sample S.D. | $s_1 = 36hrs$        | $s_2 = 40hrs$        |

Is the difference in the means sufficient to warrant that type I is superior to type II regarding length of life?

**OR**

- 10 a In one sample of 8 observations the sum of the squares of deviations of the sample values from the sample was 84.4 and in the other samples of 10 observations it was 102.6. Test whether this difference is significant at 5% level. **CO5 L3 6M**
- b In an experiment on pea-breeding, Mendal obtained the following frequencies of seeds: 315 round and yellow, 101 wrinkled and yellow, 108 round and green and 32 wrinkled. Total 556. Theory predicts that the frequencies should be in the proportion 9: 3: 3:1 respectively. Set up proper hypothesis and test it at 5% level of significance. **CO5 L3 6M**

**\*\*\* END \*\*\***