| O.P.Code: 23HS0838 | R23 | H.T.No. | | | | | | | | | |
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**SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR**

(AUTONOMOUS)

**B.Tech. II Year II Semester Regular Examinations July/August-2025**

**PROBABILITY & STATISTICS**

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

**Time: 3 Hours** **Max. Marks: 70**

**PART-A**

(Answer all the Questions **10 x 2 = 20** Marks)

| | | | | | |
|---|---|---|---|---|---|
| 1 | a | The weights of 6 competitors in a game are given below 58,62,56,63,59,64 kgs. Find arithmetic mean and median of weight of competitors. | CO1 | L2 | 2M |
| | b | Define Skewness and Kurtosis in statistics | CO1 | L1 | 2M |
| | c | State the axiomatic definition of probability | CO2 | L1 | 2M |
| | d | The sample space is $S = \{1, 2, 3, 4, 5, 6\}$. let $A$ be the event that an even number turns up and let $B$ be the event that a number divisible by 3 occurs. Find $P(A \cup B)$ and $P(A \cap B)$. | CO2 | L2 | 2M |
| | e | *If* $X$ is the binomial variate with parameters $n = 15$ and $p = 0.2$. Find the variance of $X$ | CO3 | L2 | 2M |
| | f | If the variance of a Poisson variate is 3. Find $P(1 \leq X < 4)$ | CO3 | L2 | 2M |
| | g | Define type-I error and type-II error. | CO4 | L1 | 2M |
| | h | State the confidence interval estimation formula for mean | CO4 | L1 | 2M |
| | i | Define t-test for single mean | CO5 | L1 | 2M |
| | j | Define t-test for difference of two means | CO5 | L1 | 2M |

**PART-B**

(Answer all Five Units **5 x 10 = 50** Marks)

**UNIT-I**

| | | | | | |
|---|---|---|---|---|---|
| 2 | Calculate correlation coefficient to the following data: | CO1 | L3 | 10M |

| X | 10 | 15 | 12 | 17 | 13 | 16 | 24 | 14 | 22 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|
| Y | 30 | 42 | 45 | 46 | 33 | 34 | 40 | 35 | 39 | 38 |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| 3 | Find the two regression equations from the following data: | CO1 | L3 | 10M |

| X | 10 | 25 | 34 | 42 | 37 | 35 | 36 | 45 |
|---|---|---|---|---|---|---|---|---|
| Y | 56 | 64 | 63 | 58 | 73 | 75 | 82 | 77 |

**UNIT-II**

| | | | | | |
|---|---|---|---|---|---|
| 4 | A manufacturing firm employs three analytical plans for the design and development of a particular product. For cost reasons, all three are used at varying times. In fact, plans 1, 2, and 3 are used for 30%, 20%, and 50% of the products, respectively. The defect rate is different for the three procedures as follows $P(D\|P_1) = 0.01$, $P(D\|P_2) = 0.03$, $P(D\|P_3) = 0.02$. If a random product was observed and found to be defective, find $P(P_1\|D)$, $P(P_2\|D)$ and $P(P_3\|D)$. | CO2 | L3 | 10M |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| 5 | A continuous random variable has the probability density function given by $f(x) = \begin{cases} k(1-x^2); 0 < x < 1 \\ 0; otherwise \end{cases}$. Determine i) Constant $k$ ii) Mean iii) Variance and iv) Standard deviation. | CO2 | L5 | 10M |

## UNIT-III

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 6 | | Fit a Binomial distribution to the following frequency distribution: | | | | | | CO3 | L3 | 10M |

| $x$ | 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| $f$ | 2 | 14 | 20 | 34 | 22 | 8 |

**OR**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 7 | | In a sample of 1000 cases, the mean of certain test is 14 and standard deviation is 2.5. Assuming the distribution to be normal find (i) How many students score between 12 and 15 (ii) How many students score above 18? (iii) How many students score below 8? | | | | | | CO4 | L3 | 10M |

## UNIT-IV

| | | | | | | |
|---|---|---|---|---|---|---|
| 8 | a | Due to the decrease in interest rates, the First Citizens Bank received a lot of mortgage applications. A recent sample of 50 mortgage loans resulted in an average loan amount of Rs. 257,300. Assume a population standard deviation of Rs. 25,000. For the next customer who fills out a mortgage application, find a 95% prediction interval for the loan amount. | CO5 | L3 | 6M |
| | b | 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. | CO5 | L3 | 4M |

**OR**

| | | | | | | |
|---|---|---|---|---|---|---|
| 9 | | Samples of students were drawn from two universities and from their weights in kilograms, mean and standard deviations are calculated and shown below. Make a large sample test to significance of the difference between the mean | CO5 | L4 | 10M |

| | Mean | S.D | Size of the sample |
|---|---|---|---|
| University A | 55 | 10 | 400 |
| University B | 57 | 15 | 100 |

## UNIT-V

| | | | | | | |
|---|---|---|---|---|---|---|
| 10 | | To examine the hypothesis that the husbands are more intelligent than the wives, an investigator took a sample of 10 couples and administered them a test which measures the I.Q. The results are as follows: | CO6 | L4 | 10M |

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

Test the hypothesis with a reasonable test at the level of significant of 0.05 and also calculate F-test.

**OR**

| | | | | | | |
|---|---|---|---|---|---|---|
| 11 | | The following table gives the classification of 100 workers according to gender and nature of work. Test whether the nature of work is independent of the gender of the worker ($\psi^2 = 3.84$ at 1d.f). | CO6 | L4 | 10M |

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

***** END *****