

Reg. No:

--	--	--	--	--	--	--	--	--	--

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

B.Tech II Year I Semester Supplementary Examinations August-2021

PROBABILITY & STATISTICS

(Common to ME, CSE, CSIT)

Time: 3 hours

Max. Marks: 60

**PART-A**

(Answer all the Questions 5 x 2 = 10 Marks)

- 1 a If  $f(x) = \begin{cases} k(1-x^2), & 0 < x < 1 \\ 0, & \text{otherwise} \end{cases}$ , then find  $k$  so that  $f$  be a valid probability distribution. 2M
- b If  $X$  is a Poisson variate such that  $3P[X = 4] = \frac{1}{2}P[X = 2] + P[X = 0]$ , then find  $P[X \leq 2]$ . 2M
- c The weights of 6 competitors in a game are recorded as 58, 62, 56, 63, 55 and 61 kgs. Find the variance of the weight distribution. 2M
- d In a random sample of 125 cool drinkers, 68 said they prefer thumsup instead pepsi. Find the test statistic value if the preference of population of cool drinkers is 0.5. 2M
- e 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. Find the F-test statistic value. 2M

**PART-B**

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

**UNIT-I**

- 2 a Two dice are thrown. Let  $A$  be the event that the sum of the point on the faces is 9. Let  $B$  be the event that at least one number is 6. Find (i)  $P[A^C \cup B^C]$  (ii)  $P[A^C \cap B^C]$  (iii)  $P[A^C \cap B]$  5M
- b Let the probability set function  $P$  is given by  $P(A) = \int_A f(x)dx$ , where  $f(x) = \frac{3x^2}{8}$ ,  $x \in S = \{x: 0 < x < 2\}$ . Let  $A_1 = \{x: 0 < x < \frac{1}{2}\}$  and  $A_2 = \{x: 1 < x < 2\}$  be two subsets of  $S$ . Then find  $P(A_1 \cup A_2)$ . 5M

OR

- 3 a Let  $A$  and  $B$  be two random events such that  $P(A) = \frac{1}{3}$  and  $P(B) = \frac{1}{4}$ . Determine the conditional probabilities  $P(B|A)$  and  $P(A|B)$ . 5M
- b Let  $X$  be a random variable that denotes the life in hours of certain electronic device. The probability density function of  $X$  is  $f(x) = \begin{cases} 2e^{-2x}, & \text{for } x > 0 \\ 0, & \text{otherwise} \end{cases}$ . 5M
- (i) Find the expected life of the device.
- (ii) Compute the value of  $P[1 < X < 3]$ .

**UNIT-II**

- 4 a A student is taking a MCQ exam with 10 questions. Each question has five options and exactly one option is correct. Assume that the student guesses at all 10 questions. Determine the probability that the student will get (i) either 4 or 5 answers correct, (ii) at most 3 answers correct. **5M**
- b Suppose  $X$  denote the number of tornadoes observed in a particular region in one year follows approximately Poisson distribution with mean 8. Compute: **5M**  
(i)  $P[X \leq 3]$  and (ii)  $P[4 < X \leq 6]$

**OR**

- 5 Find the mean and variance of a Normal distribution in which 7% of items are under 35 and 89% are under 63. **10M**

**UNIT-III**

- 6 a The following information represents marks distribution of 60 students in an examination; compute the median and mode. **5M**

Marks	0-10	10-20	20-30	30-40	40-50
Number of students	5	15	20	10	10

- b Estimate the Regression line of Y on X from the following data: **5M**

Mid exam score (X)	10	25	34	42	37	35	36	45
End exam score (Y)	56	64	63	58	73	75	82	77

**OR**

- 7 a The first four moments of a distribution about the value 5 of a variable are respectively, 2, 20, 40 and 50. Calculate mean, variance,  $\beta_1$  and  $\beta_2$  of the distribution. **5M**
- b Determine the value of the Spearman's rank correlation coefficient from the following data. **5M**

Normal stress X	68	64	75	50	64	80	75	40
Shear stress Y	62	58	68	45	81	60	68	48

**UNIT-IV**

- 8 a It is claimed that a random sample of 49 tyres has a mean life of 15200 km. This sample was drawn from a population whose mean is 15150kms and standard deviation of 1200 kms. Test the Significance at 0.05 levels. **5M**
- b Fit a second degree polynomial to the following data by method of least squares **5M**

X	0	1	2	3	4
Y	1	5	10	22	38

**OR**

- 9 a Fit the following data of the form  $y = ax^b$  and hence compute  $y(2.5)$ . **5M**

X	1	2	4	6
Y	6	4	2	2

- b Based on their total scores, 200 candidates of a civil service examination are divided in to two groups, the upper 30% and the remaining 70%.consider the first question of the examination. Among the first group, 40 had correct answer, where as among the second group, 80 had correct answer. On the basis of these results, can one conclude that the first question is not good at discriminating ability of the type being examined here? **5M**

**UNIT-V**

- 10 a Two random samples reveal the following results:

5M

	Sample-I	Sample-II
Sample size	10	12
Sample mean	15	14
Sample S.D.	9	9

Test whether the samples came from the same normal population.

b

5M

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 worker ( $\chi^2 = 3.84$  at 1d.f)

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

**OR**

- 11 a Scores obtained in a shooting competition by 10 soldiers before and after intensive training are given below:

5M

Before	67	24	57	55	63	54	56	68
After	70	38	58	58	56	67	68	75

Test whether the intensive training is useful at 0.05 significance level.

- b A die is thrown 264 times with the following results. Show that the die is biased. ( $\chi^2 = 11.07$  at 5 d.f & 5% L.S)

5M

Number on the die	1	2	3	4	5	6
Frequency	40	32	28	58	54	52

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