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

B.Tech II Year I Semester Supplementary Examinations Feb-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 A class consists of 6 girls and 10 boys. If a committee of 3 is chosen at random from the class, find the Probability that (i) 3 boys are selected (ii) exactly 2 girls are selected **2M**
- b Suppose  $X$  is normally distributed with mean 5 and standard deviation 0.4. Using the standard transformation  $Z = \frac{X-\mu}{\sigma}$ , we find  $P(X \leq X_0) = P(Z \leq 1.3)$ . What is the value of  $X_0$ ? **2M**
- c Obtain the values of mean and median of the data 10, 12, 15, 20, 12, 16, 18, 15, 12, 10, 16, 20, 12 and 24. **2M**
- d If  $n=100$ ,  $\sigma=5.1$ ,  $\bar{x}=21.6$ , then construct 95% confidence interval for the population mean  $\mu$ . **2M**
- e A sample of 26 bulbs gives a mean life of 990 hours with a S.D of 20 hours. The manufacturer claims that the mean life of bulbs is 1000 hours. Compute the test statistic value. **2M**

**PART-B**

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

**UNIT-I**

- 2 a In a certain town 40% have brown hair, 25% have brown eyes and 15% have both brown hair and brown eyes. A person is selected at random from the town. **5M**
  - (i) If the selected person has brown hair, what is the probability that he has brown eyes also?
  - (ii) If the selected person has brown eyes, then what is the probability that he does not have brown hair?
- b Let  $X$  be a random variable that denotes the life in hours of certain electronic device. The probability density function of  $X$  is  $f(x) = \begin{cases} \frac{20000}{x^3}, & \text{for } x > 100 \\ 0, & \text{otherwise} \end{cases}$ . Find the expected life of the device and its variance. **5M**

**OR**

- 3 A random variable  $X$  has the following probability function **10M**

$X = x$	0	1	2	3	4	5	6	7
$P(X = x)$	0	$k$	$2k$	$2k$	$3k$	$k^2$	$2k^2$	$7k^2 + k$

- (i) Determine the value of  $k$ .
- (ii) Evaluate  $P[X > 7]$  and  $P[0 < X \leq 5]$ .
- (iii) If  $P[X \leq k] > \frac{1}{2}$ , then find the minimum value of  $k$ .
- (iv) What is value of variance of  $X$ .

**UNIT-II**

- 4 a The probability that a patient recovers from a disease is 0.3. If 10 people are affected from the disease, what is the probability that (i) At least 2 survive? (ii) between 4 to 6 survive, inclusive? 5M
- b Let X be the number of flaws on the surface of a randomly selected boiler of a certain type, have a Poisson distribution with mean 5. Find (i)  $P[0 < X \leq 2]$ , (ii)  $P[4 < X \leq 5]$  and (iii)  $P[X > 3]$  5M

**OR**

- 5 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 18? 10M

**UNIT-III**

- 6 a The following information represents income distribution of families; calculate the first quartile and mode. 5M

Income in '000 Rs.	40-50	50-60	60-70	70-80	80-90
No. of families	5	12	23	8	2

- b Calculate coefficient of correlation to the following data 5M

X	10	15	12	13	16	24
Y	30	42	45	46	33	30

**OR**

- 7 a Ten competitors in a musical test were ranked by the three judges A, B and C in the following order: 6M

Ranks by A	1	6	5	10	3	2	4	9	7	8
Ranks by B	3	5	8	4	7	10	2	1	6	9
Ranks by C	6	4	9	8	1	2	3	10	5	7

Using rank correlation coefficient method, discuss which pair of judges has the nearest approach to Common likings in music.

- b If the two lines of regression are given by  $4X - 5Y + 30 = 0$  and  $20X - 9Y + 107 = 0$ , which of these is the line of Regression of X on Y? Also find  $r$  and  $\sigma_y$  when  $\sigma_x = 3$ . 4M

**UNIT-IV**

- 8 a Fit a second degree polynomial to the following data by method of least squares 5M

X	1	2	3	4	5
Y	10	12	8	10	14

- 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. Use 5% significance level. 5M

**OR**

- 9 a Fit the curve of the form  $y = ae^{bx}$  to the following data. 5M

X	1	5	7	9	12
Y	10	15	12	15	21

- b The mean yield from a district A was 210 dollars per acre from a sample of 100 plots. In other district the mean yield was 200 dollars from a sample of 150 plots. Assuming that, the standard deviation of the entire state was 11 dollars. Test whether there is any significant difference between the mean yields of crops in the two districts at 5% level of significance. 5M

## UNIT-V

- 10 a Samples of two types of electrical light bulbs were tested for length of life and following data were obtained: 5M

	Type I	Type-II
Sample size	10	15
Sample mean	1234 hrs	1036 hrs
Sample S.D.	36 hrs	40hrs

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

- b A pair of dice are thrown 360 times and the frequency of each sum is indicated below: 5M

Sum	2	3	4	5	6	7	8	9	10	11	12
Frequency	8	24	35	37	44	65	51	42	26	14	14

Would you say that the dice are fair with the help of chi-square test at 0.05 level of significant?

OR

- 11 a Blood pressure of 5 women before and after intake of a certain drug are given below: 5M

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

Test whether the significant change in blood pressure at 1% level of significance.

- b 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. 5M

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

