

II/IV B.Tech. DEGREE EXAMINATIONS, NOV/DEC- 2019**Second Semester****CSE/IT****MATHEMATICS-IV (PROBABILITY & STATISTICS)****Time: Three Hours****Maximum marks:60****Answer Question No.1 Compulsory****6X2=12 M****Answer ONE Question from each Unit****4X12=48 M**

1.
 - a) Define joint probability mass functions
 - b) Give physical conditions for Binomial distribution
 - c) Write pdf for Normal distribution and hence define standard normal variate
 - d) Define Population and Sample
 - e) Define errors in Hypothesis testing
 - f) Define reliability

UNIT-I

2.
 - a) Determine the probability of getting the sum 6 exactly 3 times in 7 throws with a pair of fair dice.
 - b) Determine the Binomial distribution for which the mean is 4 and variance 3.

(OR)

3. A random sample of size 64 is taken from a normal population with $\mu = 51.4$ and $\sigma = 68$. What is the probability that the mean of the sample will
 - i) exceed 52.9
 - ii) fall between 50.5 and 52.3
 - iii) be less than 50.6

UNIT-II

4. A sample of 64 students have a mean weight of 70kgs. Can this be regarded as a sample from a population with mean weight 56kgs and standard deviation 25kgs.

P.T.O

(OR)

5. 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 significance.

UNIT-III

6. A manufacturer of electronic equipment subjects samples of two completing brands of transistors to an accelerated performance test. If 45 of 180 transistors of the first kind and 34 of 120 transistors of the second kind fail test, what can he conclude at the level of significance $\alpha=0.05$ about the difference between the corresponding sample proportions?

(OR)

7. 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.

UNIT-IV

8. A plastic manufacturer extrudes blanks for use in the manufacturer of eyeglass temples. Specification require that the thickness of these blanks have $\mu = 0.150$ and $\sigma = 0.002$ inch. Use the specifications to calculate a central line and three sigma limits for an mean chart with $n=5$.

(OR)

9. Ten samples each of size 5 are drawn at regular intervals from a manufacturing process. The sample means and their range are given below.

Sample No	1	2	3	4	5	6	7	8	9	10	total
Mean	49	45	48	53	39	47	46	39	51	45	462
range	7	5	7	9	5	8	8	6	7	6	68

Calculate the control limits in respect of Mean chart and R-chart comment on the state of control by constructing the control charts.



UNIT-II

4. a) In a random sample of 125 interested in Bakery products, 68 said they prefer Cake to Bread. Test the null hypothesis $p=0.5$ against the alternate hypothesis $p>0.5$
- b) In an Investigation on the machine performance the following results were obtained:

	No.of Units inspected	No.of defectives
Machine 1	375	17
Machine 2	450	22

Test whether there is any significant performance of two machines at $\alpha=0.05$

(OR)

5. a) Write the formula for testing the hypothesis concerning “Two Means”.
- b) The research investigator was interested in studying whether there is a significant difference in the salaries of MBA grades in two metropolitan cities. A random sample size 100 from Mumbai yields on average income of Rs.20,150. Another random sample of 60 from Chennai results in an average income of Rs.20,250. If the variances of both the populations are given as $\sigma_1^2 = \text{Rs.}40,000$ and $\sigma_2^2 = \text{Rs.}32,400$ respectively.

UNIT-III

6. 4 coins were tossed 160 times and the following results were obtained.

No.of Heads:	0	1	2	3	4
Observed Frequencies:	17	52	54	31	6

Under the assumption that coins are balanced, find the expected frequencies of 0,1,2,3, or 4 heads, and test the goodness of fit ($\alpha=0.05$).

(OR)

7. The three samples below have been obtained from normal populations with equal variances. Test the Hypothesis that the sample means are equal

11	10	15
03	8	12
9	3	15
18	13	16
14	10	18

P.T.O

The table value of F at 5% LOS for $V_1=2$ and $V_2=12$ is 3.88

UNIT-IV

8. a) Given a brief on different charts that are commonly constructed for quality characteristics that represent attributes of a product.
- b) Suppose that the time to failure, in minutes, of a particular electronics equipment subjected to continuous vibrations can be approximated by a Weibull distribution with $\alpha=50$ and $\beta=0.40$. What is the probability that such a component will fail in less than 5 hours.

(OR)

9. a) Mention different distribution function and several hazard models that have an application in reliability engineering and explain any two of the distributions.
- b) Discuss properties of exponential distribution that are useful in understanding its characteristics, when and where it can be applied.
- c) A part has a normal distribution of failure times with $\mu=40000$ cycles and $\sigma=2000$ cycles. Find the reliability of the part at 38000 cycles.

