(or)

7. a. Tests of the fidelity and the selectivity of 190 digital radio receivers produced the results shown in the following table.

		Fidelity		
		Low	Average	High
Selectivity	Low	6	12	32
	Average	33	61	18
	High	13	15	0

Use the 0.01 level of significance to test whether there is relationship (dependence) between fidelity and selectivity. **7M**

b. Two different lighting techniques are compared by measuring the intensity of light at selected locations in areas lighted by the two methods. If 15 measurements in the first area had a standard deviation of 2.7 foot-candles and 21 measurements in the second area had a standard deviation of 4.2 foot-candles, can it be concluded that the lighting in the second area is less uniform? Use a 0.01 level of significance. What assumptions must be made as to how the two samples are obtained? **8M**

UNIT–IV

8. a. Explain the significance of control charts in quality control. **7M**

b. Suppose that 50 units are placed on life test (without replacement) and test is to be truncated after 10 of them have failed. Furthermore suppose that the first 10 failure times are 65, 110, 380, 420, 505, 580, 650, 840, 910 and 950 hours. Test whether the failure rate is 0.40 failures per thousand hours against the alternative that the failure rate is less. Use the 0.05 level of significance. **8M**

(or)

9. a. Explain the exponential model in life testing. **7M**

b. A plastic manufacturer extrudes blanks for use in the manufacture of eyeglass temples. Specifications require that the thickness of these blanks have $\mu = 0.125$ inch and $\sigma = 0.0015$ inch.

i) Use the specifications to calculate a central line and three-sigma control limits for an $\bar{x}$ chart with $n = 5$.

ii) Use the specifications to calculate a central line and three-sigma control limits for an R chart with $n = 5$. **8M**

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Reg. No: | | | | | | | | | | |

VELAGAPUDI RAMAKRISHNA

SIDDHARTHA ENGINEERING COLLEGE

(AUTONOMOUS)

II/IV B.Tech. DEGREE EXAMINATION, APRIL, 2018

Fourth Semester

14MA1401 PROBABILITY AND STATISTICS

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

Part-A is compulsory

Answer One Question from each Unit of Part - B

Answer to any single question or its part shall be written at one place only

PART-A

10 x 1 = 10M

1. a. Check whether the function $f(x) = \frac{x^2}{25}$ for x = 0, 1, 2, 3, 4 can serve as probability distribution?

b. Compare and contrast standard normal distribution and t-distribution.

c. Distinguish point estimation and interval estimation.

d. What is the guideline for selecting the null hypothesis?

e. Write the statistic for test of equality of two variances of normal populations.

f. Find the 95% confidence interval of proportion when n = 20 and x = 16.

g. Write the χ^2 statistic for test of goodness of fit.

h. Write the control chart values for a fraction defective chart.

i. Calculate the reliability of the system consisting 5 independent components in series each having a reliability of 0.970.

j. What is central line in control chart?

PART-B

4 x 15 = 60M

UNIT-I

2. a. The income of a group of 10,000 persons was found to be normally distributed with mean Rs.750 p.m and standard deviation of Rs. 50. Show that of this group, about 95% had income exceeding Rs. 668 and only 5% had income exceeding Rs. 832. Also, find lowest income among the richest 100. **9M**

   b. The following are the times between 6 calls for an ambulance (in a certain city) and the patient's arrive at the hospital 27, 15, 20, 32, 18 and 26 minutes. Use these figures to judge the reasonableness of the ambulance services claim that it takes on the average of 20 minutes between the call for an ambulance and the patient's arrival at the hospital. **6M**

(or)

3. a. Suppose that the proportion of defectives shipped by a vendor, which varies somewhat from shipment to shipment, may be looked upon as a random variable having the Beta distribution with $\alpha = 1$ and $\beta = 4$.

   i) Find the average proportion of defectives in a shipment from this vendor.

   ii) Find the probability that a shipment from this vendor will contain 25% or more defectives. **8M**

   b. A safety engineer feels that 30% of all industrial accidents in her plant are caused by failure of employees to follow instructions. Find approximately, the probability that among 84 industrial accidents in this plant anywhere from 20 to 30 (inclusive) will be due to failure of employees to follow instructions. **7M**

UNIT–II

4. a. In a study of automobile collision insurance costs, a random sample of 80 body repair costs for a particular kind of damage had a mean of Rs. 47236 and standard deviation of Rs. 6235. If $\bar{x}$ = Rs. 47236 is used as a point estimate of the true average repair cost of this kind of damage, with what confidence can one assert that the error does not exceed Rs. 1000? **8M**

   b. A laboratory technician is timed 20 times in the performance of a task, getting $\bar{x} = 7.9$ and $s = 1.2$ minutes. If the probability of a type-I error is to be at most 0.05, does this constitute evidence against the null hypothesis that the average time is less than or equal to 7.5 minutes? **7M**

(or)

5. a. The specifications for a certain kind of ribbon call for a mean breaking strength of 180 pounds. If five pieces of the ribbon (randomly selected from different rolls) have a mean breaking strength of 169.5 pounds with a standard deviation of 5.7 pounds, test the null hypothesis $\mu = 180$ pounds against the alternative hypothesis $\mu < 180$ pounds at the 0.01 level of significance. Assume that the population distribution is normal. **8M**

   b. To compare two kinds of bumper guards, 6 of each kind, were mounted on a certain kind of compact car. Then each car was run into a concrete wall at 5 miles per hour and the following are the costs of repairs (in rupees). **7M**

Bumper guard I:	407	448	423	465	402	419
Bumper guard II:	434	415	412	451	433	429

   Use the 0.01 level of significance to test whether the difference between the two sample means is significance.

UNIT–III

6. a. The following random samples are measurements of the heat producing capacity (in millions of calories per ton) of specimens of coal from two mines.

Mine I:	8260	8130	8350	8070	8340	
Mine II:	7950	7890	7900	8140	7920	7840

   Use the range of the second sample to estimate σ for the heat producing capacity of coal from the second mine and compare the result with the standard deviation of the second sample. **8M**

   b. A study showed that 64 of 180 persons who saw a photocopying machine advertised during the telecast of a baseball game and 75 of 180 other persons who saw it advertised on a variety show remembered the brand name 2 hours later. At the level of 0.05 significance test whether the difference between the corresponding sample proportions is significant? **7M**