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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

07 THRISSUR CLUSTER

FIRST SEMESTER M.TECH. DEGREE EXAMINATION FEBRUARY 2021

07 MA 6021 MANAGERIAL STATISTICS

(Common for Manufacturing Systems Management, Industrial Engineering and Management & Health Safety and Environmental Management)

Time:3 hours

Max.Marks: 60

Α

Answer all six questions. Part 'a' of each question is compulsory.

Answer either part 'b' or part 'c' of each question (Any missing data may suitably be assumed.)

Q. No	Module 1	Marks	
4(=)		4	

1(a) Find the mean and variance of the random variable X with pdf

 $f(x) = \begin{cases} kx^2 & ; 0 < x < 1\\ 0 & : Othewise \end{cases}$

Answer b or c

- 1(b) 5 The time required to assemble a piece of machinery is a random variable normal distribution with $\mu = 12.9$ minutes and $\sigma = 2.0$ minutes. having Find the probability that the assembly of a piece of machinery of this kind will take (a) at least 11.5 minutes (b) anywhere from 11.0 to 14.8 minutes
- 1(c) If 0.8% of the fuses delivered to a factory are defective, find the probability that atmost 4 fuses will be defective in a random sample of 400 fuses.

Q. No

Module 2

2(a) Find the correlation coefficient and the equations of regression lines for the following values of x and y

x	1	2	3	4	5
у	2	5	3	8	7

Answer b or c

2(b) From a trivariate data set the following information is available 5

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Use Linear Regression Model to estimate X_3 when $X_1 = 30$ and $X_2 = 80$

2(c) From a trivariate data set the following correlations are available

 $r_{12} = 0.86, r_{12} = 0.65, r_{12} = 0.72,$ Find $R_{1.23}$ and $r_{12.3}$

Q. No Module 3

3(a) Write a short note on (a) Maximum Likelyhood Estimation (b) Estimation by Method of 4 Moments

Answer b or c

- **3(b)** Let $x_1, x_2, x_3, ..., x_n$ be a random sample taken from a normal population with mean μ and variance σ^2 . Find the maximum likelyhood estimation of the mean and variance of the population
- **3(c)** Let $x_1, x_2, x_3, ..., x_n$ be a random sample taken from a normal population with 5 mean μ and variance σ^2 . Find the estimation of mean and variance of the population by the method of moments

Q. No Module 4

4(a) A tyre company claims that the average life of tyre is at least 28000km. A random sample of 40 tyres were tested and it is found that the mean life is 27463km with a standard deviation 1348 km. Test the claim of the claim at 1% level of significance

Answer b or c

4(b) The following random samples are measurements of the heat-producing 5 capacity (in millions of calories per ton) of specimen of coal from two mines

Mine 1: 8260 8130 8350 8070 8340 Mine 2: 7950 7890 7900 8140 7920 7840

Use 1% level of significance to test whether the difference between the means of these two samples is significant.

4(c) It is desired to determine whether there is more variability in the silver plating 5 done by company 1 than that done by company 2. If independent random samples of size 12 of the two companies work yield $S_1 = 0.035$ mil and $S_2 = 0.062$ mil. Test whether the variability of company 1 is more than that of company 2 at 5% level of significance

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Module 5

5(a) The following are the weight losses of a certain machine parts (in milligrams) due to 5 friction when 3 different lubricants were used under controlled conditions.

Lubricant A: 12.211.813.111.03.94.110.38.4Lubricant B: 10.95.713.59.411.415.710.814.0Lubricant C:12.719.913.611.718.314.322.820.4

Test at 1% level whether the difference among the means can be attributed to chance

Answer b or c

5(b) A laboratory technician measures the breaking strength of each of 5 kinds of
7 linen thread by means of 4 different instruments and obtains the following results

		Measuring instruments			
		l1	12	13	14
	T1	20.6	20.7	20.0	21.4
ype	T2	24.7	26.5	27.1	24.3
ead t	Т3	25.2	23.4	21.6	23.9
Thr	T4	24.5	21.5	23.6	25.2
	T5	19.3	21.5	22.2	20.6

Perform 2 way ANOVA to test whether the means between thread type and the mean between measuring instruments are significant or not at 1% level of significance

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^{5(c)} The following data resulted from an experiment to compare three burners $B_{1,}$ B_{2} and B_{3} . A Latin square design was used as the tests were made on 3 engines and were spread over 3 days.

	Engine1	Engine2	Engine3
Day1	B ₁ -16	B ₂ -17	B ₃ -20
Day2	B ₂ -16	B ₃ -21	B ₁ -15
Day3	B ₃ -15	B ₁ -12	B ₂ -13

Test the hypothesis that there is no difference between the burners

Q. No

6(a) Define multivariate analysis. Mention some basic concepts of multivariate 5 analysis

Answer b or c

6(b) What is the importance of factor analysis in modern research? What are the four issues to which factor analysis is keyed to meet its objectives? Explain data reduction.

6(c) What are the types of multivariate techniques? Explain any three of them.

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Q. No