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Question Paper Code: 41403

B.E. / B.Tech. DEGREE EXAMINATION, DEC 2021

Fourth Semester

Mechanical Engineering

14UMA423 - STATISTICS AND NUMERICAL METHODS

(Regulation 2014)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

(Statistical Tables are permitted)

PART A - (10 x 1 = 10 Marks)

1. What is the essential difference between confidence limits and tolerance limits?
 - (a) Population Parameters & Certain Proportion
 - (b) Proportion of population
 - (c) Distribution of Values
 - (d) Sampling error and variance in the population
2. The chi-square goodness-of-fit test can be used to test for
 - (a) significance of sample statistics
 - (b) difference between population means
 - (c) normality
 - (d) probability
3. In t-test say about sample size n
 - (a) $n < 30$
 - (b) $n > 30$
 - (c) $n < 50$
 - (d) $n > 50$
4. What is main advantage of Latin square design over Randomized Block Design
 - (a) Controls the effect of one extraneous variables
 - (b) Controls the effect of two extraneous variables
 - (c) No control over the variables
 - (d) Limited Control over the variables
5. 2x2 Latin square is not possible. Why?
 - (a) Comparison is not possible
 - (b) One Comparison is not possible
 - (c) Mean Squared Error possible
 - (d) Sum of Square is possible

17. (a) The following data represent the number of units of production per day turned out by different workers using 4 different types of machines.

		Machine Type			
		A	B	C	D
Workers	1	4	3	4	3
		4	8	7	6
	2	4	4	5	4
		6	0	2	3
	3	3	3	4	3
		4	6	4	2
	4	4	3	4	3
		3	8	6	3
	5	3	4	4	3
		8	2	9	9

- (i) Test whether the five men differ with respect to mean productivity and
(ii) Test whether the mean productivity is the same for the four different machine types. (16)

Or

- (b) Compare and contrast the Latin square design with the Randomised Block Design. (16)

18. (a) Compute the real root of $x \log_{10} x = 1.2$ correct to three decimal places using Newton's Raphson Method. (16)

Or

- (b) Solve the following system of equations using Gauss Seidel iterative method:
 $27x + 6y - z = 85$, $6x + 15y + 2z = 72$, $x + y + 54z = 110$. (16)

19. (a) Using Newton's forward interpolation formula, find the polynomial $f(x)$ satisfying the following data. Hence evaluate $f(x)$ at $x = 5$. (16)

$$x : 4 \quad 6 \quad 8 \quad 10$$

$$f(x) : 1 \quad 3 \quad 8 \quad 10$$

Or

- (b) Using Lagrange's method, find the value of $f(3)$ from the following table:

x	0	1	2	4	5	6
y	1	14	15	5	6	19

(16)

20. (a) The table given below gives the velocity V of a moving particle at time t seconds. Find the distance covered by the particle in 12 seconds and also the acceleration at $t = 2$ seconds using Simpson's rule. (16)

X	:	0	2	4	6	8	10	12
V	:	4	6	16	34	60	94	136

Or

- (b) Evaluate $\int_{1.2}^{1.4} \int_2^{2.4} \frac{1}{xy} dx dy$ using Trapezoidal and Simpson's rule. Verify your result by actual integration. (16)
