Reg. No. :

Question Paper Code: 41403

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2017

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

6. What is the order of convergence of N-R method
   (a) 1   (b) 3   (c) 2   (d) none of these

7. As soon as a new value for a variable is found by iteration it is used immediately in the following equations .This method is called
   (a) Gauss -Seidel method   (b) Gauss -Jordan method
   (c) Gauss –Jacobi method   (d) Gauss -Elimination method

8. Interpolation is used to find
   (a) Missed data   (b) Assembled data
   (c) Repeated data   (d) None of these

9. Newton's forward interpolation formula used only for _____ intervals.
   (a) Un equal intervals   (b) In-Equidistance intervals
   (c) Equidistance intervals   (d) Anisometric Intervals

10. Simpson's rule will give exact result , if the entire curve $y = f(x)$ is itself a
    (a) Ellipse   (b) Parabola   (c) Hyperbola   (d) Straight Line

PART - B (5 x 2 = 10 Marks)

11. Define student's t-test for difference of means of two samples.

12. What is the aim of the design of experiments?

13. State the principle used in Gauss – Jordan method.

14. What is the assumption we make when Lagrange's formula is used?

15. Find the area under the curve passing through the points (0, 0), (1, 2), (2, 2.5), (3, 2.3), (4, 2) (5,1.7) and (6, 1.5).

PART - C (5 x 16 = 80 Marks)

16. (a) Two types of Manure were applied to 16 one hectare plots, other conditions remaining the same. The yield in quintals are given below. Is there any significant difference between the mean yield? Use 5% level of significance. (16)

Manure I	8	20	36	50	49	36	34	49	41
Manure II	29	28	26	35	30	44	46		

Or

(b) Before an increase in excise duty on tea, 800 persons out of a sample of 1000 persons were found to be tea drinkers. After an increase in duty, 800 people were tea drinkers in a sample of 1200 people. Using standard error of proportion, state whether there is a significant decrease in the consumption of tea after the increase in excise duty? (Z_α at 5% level 1.645, 1% level 2.33). (16)

41403

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
	1	44	38	47	36
	2	46	40	52	43
Workers	3	34	36	44	32
	4	43	38	46	33
	5	38	42	49	39

(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 xlog10x=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)

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

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

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)

3

41403

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)

$$X \; : \; 0 \quad 2 \quad 4 \quad 6 \quad 8 \quad 10 \quad 12$$
$$V \; : \; 4 \quad 6 \quad 16 \quad 34 \quad 60 \quad 94 \quad 136$$

Or

(b) Evaluate $\int_{1.2}^{1.4} \int_{2}^{2.4} \frac{1}{xy} dxdy$ using Trapezoidal and Simpson's rule. Verify your result by actual integration. (16)

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41403