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**Question Paper Code: 44023**

B.E. / B.Tech. DEGREE EXAMINATION, DEC 2020

Fourth Semester

Mechanical Engineering

14UMA423 - STATISTICS AND NUMERICAL METHODS

(Regulation 2014)

Duration: 1:45 hour

Maximum: 50 Marks

PART A - (10 x 2 = 20 Marks)

**(Answer any ten of the following questions)**

1. Define student's t-test for difference of means of two samples.
2. What is the aim of the design of experiments?
3. State the principle used in Gauss – Jordan method.
4. What is the assumption we make when Lagrange's formula is used?
5. 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).
6. Define Type-I error and Type-II error.
7. Write the differences between RBD and LSD.
8. Solve the following system of equations, using Gauss - Jordan elimination method  
 $2x + y = 3$ ,  $x - 2y = -1$ .
9. What is the assumption we make when Lagrange's formula is used?
10. 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).
11. What is a null hypothesis?
12. Write the differences between RBD and LSD.

13. Solve the following system of equations, using Gauss - Jordan elimination method  
 $2x + y = 3, x - 2y = -1.$
14. What is the assumption we make when Lagrange's formula is used?
15. Write the Gaussian three points Quadrature formula

PART – B (3 x 10= 30 Marks)

(Answer any three of the following questions)

16. 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. (10)

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

17. The following Latin square of a design when 4 varieties of seeds are being tested. Set up the analysis of variance table and state your conclusion. (10)

*A 105 B 95 C 125 D 115*  
*C 115 D 125 A 105 B 105*  
*D 115 C 95 B 105 A 115*  
*B 95 A 135 D 95 C 115*

18. Find a root of  $x \log_{10} x - 1.2 = 0$  by Newton Raphson method correct to three decimal places. (10)
19. Using Lagrange's formula fit the polynomial. (10)

$x$	0	1	4	5
$y = f(x)$	4	3	24	39

20. 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. (10)

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