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

Question Paper Code: 34003

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

Fourth Semester

Mechanical Engineering

01UMA423 - STATISTICS AND NUMERICAL METHODS

(Regulation 2013)

(Statistical tables may be permitted)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions.

PART A - (10 x 2 = 20 Marks)

1. Define Null hypothesis and Alternative hypothesis.
2. Write any two properties of the *F* distribution.
3. What is the aim of the design of experiments?
4. What is ANOVA?
5. State the condition for convergence of Newton's method.
6. State the condition for convergence of Gauss - Seidal method.
7. State the properties of cubic spline.
8. State Lagrange's Interpolation formula.
9. Write down the formulae $\frac{dy}{dx}$ & $\frac{d^2y}{dx^2}$ at $x = x_0$ in terms of Newton's forward differences.
10. State Simpson's 1/3 and 3/8 rule of numerical integration formula.

PART - B (5 x 16 = 80 Marks)

11. (a) Random samples of 400 men and 600 women were asked whether they would like to have a flyover near their residence. 200 men and 325 women were in favour of the proposal. Test the hypothesis that proportions of men and women in favour of the proposal are same, at 5% level. (16)

Or

(b) Two random samples gave the following results.

Sample	Size	Sample mean	Sum of squares of deviation from mean
I	10	15	90
II	12	14	108

Test whether the samples could have come from the same normal population. (16)

12. (a) The tea company appoints four salesman A, B, C and D and observes their sales in three seasons summer, winter and monsoon. The figures (in lakhs) are given in the following table.

Seasons	Salesman			
	A	B	C	D
Summer	36	36	21	35
winter	28	29	31	32
Monsoon	26	28	29	29

(i) Do the Salesman significantly differ in performance.

(ii) Is there significant difference between the seasons. (16)

Or

(b) The following is a Latin square of a design when 4 varieties of seeds are being tested. Analyse the LSD design. (16)

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

13. (a) (i) Find the real positive root of $3x - \cos x - 1 = 0$ by Newton-Raphson method correct to 6 decimal places. (8)

(ii) Find the real positive root of $3x - cosx - 1 = 0$ by Newton's method correct to 6 decimal places. (8)

Or

(b) Using power method to find the dominant eigen value and eigen vector of the matrix $\begin{bmatrix} 15 & -4 & -3 \\ -10 & 12 & -6 \\ -20 & 4 & -2 \end{bmatrix}$ correct to three decimal. (16)

14. (a) Using Newton's divided difference formula, find the value of $f(8)$ using the following data;

x	4	5	7	10	11	13
$f(x)$	48	100	294	900	1210	2028

(16)

Or

(b) Obtain the cubic spline approximation for the function $y = f(x)$ from the following data, given that $y_0'' = y_3'' = 0$ (16)

x	-1	0	1	2
y	-1	1	3	35

15. (a) Find $\int_0^{\frac{\pi}{2}} \sin x \, dx$ by two and three point Gaussian quadrature formula. (16)

Or

(b) Evaluate $\int_1^{1.4} \int_2^{2.4} \frac{dxdy}{xy}$ using Trapezoidal rule and Simpson's rule. (16)
