Reg. No. :

Question Paper Code: 34002

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

Fourth Semester

Civil Engineering

01UMA422 - NUMERICAL METHODS

(Common to EEE, EIE and ICE)

(Regulation 2013)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions.

PART A - (10 x 2 = 20 Marks)

1. Define truncation error.

2. What is the order of convergence of method of false position?

3. Solve $x + y = 2, 2x + 3y = 5$ by Gauss Elimination method.

4. Find the dominant Eigen value of A= $\begin{pmatrix} 1, 2 \\ 3, 4 \end{pmatrix}$ by power method.

5. State Newton's backward interpolation formula.

6. State the conditions required for a natural cubic spline.

7. What is the order of trapezoidal rule?

8. Using two point Gaussian quadrature formula, evaluate $\int_{-1}^{1}(3x^2 + 5x^4)dx$.

9. State the principle of least squares.

10. Write the observation equations when the equation $y = ax + b$ is fit by the method of moments.

11. (a) Find the positive real root of $3x - cosx - 1 = 0$ using Newton - Rapshon method. (16)

Or

(b) Find the positive root of $x^3 - x = 1$ correct to four decimal places by bisection method. (16)

12. (a) Solve the following system of equation using Gaussian elimination method.
$28x + 4y - z = 32, \ x + 3y + 10z = 24, 2x + 17y + 4z = 35.$ (16)

Or

(b) Find the eigen values and eigen vectors of the matrix by Jacobi method.

$$\begin{pmatrix} 1 & \sqrt{2} & 2 \\ \sqrt{2} & 3 & \sqrt{2} \\ 2 & \sqrt{2} & 1 \end{pmatrix}.$$ (16)

13. (a) Using Newton's backward formula find $f(7.5)$ from the following table: (16)

X	1	2	3	4	5	6	7	8
f (x)	1	8	27	64	125	216	343	512

Or

(b) Using cubic spline to the following data find $Y(1.5)$. (16)

x	1	2	3	4
Y	1	2	5	11

14. (a) Evaluate $\int_1^5 \frac{dy}{x}$ using Gaussian quadrature with three points. (16)

Or

(b) Evaluate $\int_1^2 \int_1^2 \frac{dxdy}{x^2+y^2}$ h=0.2, k=0.25 by both trapezoidal and Simpson's rule. (16)

15. (a) (i) Find a straight line fit of the form $y = a + bx$, by the method of group averages for the following data. (8)

X	0	5	10	15	20	25
Y	12	15	17	22	24	30

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(ii) From the table given below, find the best values of a and b in the law $y = ae^{bx}$ by the method of least squares. (8)

X	1	2	3	4
Y	60	30	20	15

Or

(b) By using the method of moments, obtain a straight line fit to the data (16)

x	1	2	3	4
y	0.30	0.64	1.32	5.40

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