24291

B.Tech. 5th Semester (F) Scheme (Civil)

Examination, December–2018

NUMERICAL METHODS AND

COMPUTING TECHNIQUES

Paper– CE-309-F

Time allowed : 3 hours] *[Maximum marks : 100*

Note : *Attempt **five** questions in total by selecting **one** question from each section. **Question no. 1 is compulsory.***

1. (a) Write Lagrange interpolation formula.

   (b) Define Numerical differentiation and integration.

   (c) What is the difference between Euler's and modified Euler's method.

   (b) Write finite difference approximations for first order and second order derivatives in x-direction.

Section - A

2. Discuss Bezier and B-spline curves with the help of suitable examples.

3. Find the positive root of $x^4 - x = 10$ correct to four decimal places, using Newton-Raphson method.

Section - B

4. Solve $10x - 7y + 3z + 5u = 6$, $-6x + 8y - z - 4u = 5$, $3x + y + 4y + 11u = 2$, $5x - 9y - 2z + 4u = 7$ by Gauss - Jordan method.

5. Evaluate $\int_0^1 \frac{dx}{1+x}$ correct to three decimal places using Romberg's method. Hence find the value of $\log_e 2$.

Section - C

6. Using Runge-Kutta method of fourth order, solve for y at x = 1.2, 1.4, 1.6 from

$$\frac{dy}{dx} = \frac{2xy + e^x}{x^2 + xe^x} \text{ given } x_0 = 1, y_0 = 0.$$

7. Solve the equations :

$10x - 2y - 3z = 205$; $-2x + 10y - 2z = 154$;

$-2x - y + 10z = 120$ by Relaxation method.

Section - D

8. Solve $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$ in $0 < x < 5, t \geq 0$ given that $u(x, 0) = 20$, $u(0, t) = 0$, $u(5, t) = 100$.

Compute u for the time-step with h = 1 by Crank-Nicholson method.

9. By the method of least squares, fit a parabola of the form $y = a + bx + cx^2$, to the following data :

x :	2	4	6	8	10
y :	6.07	12.85	31.47	57.38	91.29