24262

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

Examination, December–2018

APPLIED NUMERICAL

TECHNIQUE AND COMPUTING

Paper– ME-311-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) Define interpolation.

(b) Define two bracketing methods for locating a root.

(c) Write steps of Gauss elimination method.

(b) Define initial and boundary value problem.

Section - A

2. (a) Round off the numbers 865250 and 37.46235 to four significant figures and compute absolute, relative and percentage errors.

(b) Use Lagrange's formula to find the form of f(x), given

x :	0	2	3	6
f(x) :	648	704	729	792

3. Find the cubic splines for the following table of values:

x :	1	2	3
y :	−6	−1	16

Hence evaluate y(1.5) and y'(2).

Section - B

4. Evaluate $\int_0^1 \frac{dx}{1+x}$ applying

   (i) Trapezoidal rule

   (ii) Simpson's $\frac{1}{3}$rd rule

5. Find by Newton's method, the real root of the equation $3x = \cos x + 1$ correct to four decimal places.

Section - C

6. Solve, by Jacobi's iteration method, the equations :

   $20x + y - 2z = 17$; $3x + 20y - z = -18$;

   $2x - 3y + 20z = 25$.

7. Find, by power method the largest eigen value and the corresponding eigen-vector of the matrix.

$$A = \begin{vmatrix} 15 & -4 & -3 \\ -10 & 12 & -6 \\ -20 & 4 & -2 \end{vmatrix}$$

Section - D

8. (a) Given $\frac{dy}{dx} = \frac{y-x}{y+x}$ with initial condition $y = 1$ at $x = 0$; find y for $x = 0.1$ by Euler's method.

   (b) Apply Runge - Kutta fourth order method to find an approximate value of y when $x = 0.2$ given that $\frac{dy}{dx} = x + y$ and $y = 1$, when $x = 0$.

9. Solve $u_t = u_{xx}$ 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.