Answer All questions in your own words.

Your answer script should not exceed more than Eight (08) Pages

1. What are iterative and non-iterative methods for the solution of system of linear equations. Where have they been used and why? Solve the below questions using Gauss Elimination and Gauss Seidel methods and compare the results. [2+2+3+3]

$$4x + y + 2z = 4$$
$$5x + 8y - 2z = 5$$
$$7x + y + 11z = 7$$

2. State the General Newton's- Raphson Method with the criteria for convergence. Find the roots of the equation: $f(x)=5x^2$ -3tan(x) -3 using Newton's- Raphson methods upto three decimal places. Can we apply iteration method to find the root of the equation? [4+5+1]

3. State Newton's forward and backward interpolation formulae. Where these methods are different from Langrange and Newton divided difference interpolation formulae. Find the function f(x) using any these methods, where interpolating points are given by [2+2+2+4]

x	3	6	2	11	5
f(x)	10	20	30	40	50

4. Discuss some numerical integration methods. Where these methods are applied. Using Simpsons3/8 and Weddle's rules, solve the following integration problem with step value=1.5 and compare the results. [2+2+6]

$$\int_1^5 (x + log(x))dx$$

5. What are transcendental equations? Explain LU factorization method for system of solutions of linear equations. What is the order of the truncation error of the trapezoidal rule as function of n, the number of trapezoids? [2+4+4]

6. If $\Delta f(x) = f(x+h) - f(x)$, then a constant k, Δk equals? Show that Gaussian quadrature using $n + 1$ points is exact for polynomials of degree $k \leq 2n + 1$. What is significant digits for $0.0216x10^4$. [2+4+4]

7. For the given real numbers x0, x1 and x2, define the divided difference f[x0, x1, x2] of a real valued function f(x). Find the value of f[1, 0.5, 1] when f(x) = tan(x). Estimate the effect of data inaccuracy on results computed by Trapezoidal and Simpson's rule. Find the approximate solution of the equation x tan(x)-1 = 0 (sine is calculated in radians) in the interval [0, 2] using Bisection method. Obtain the number of iterations to be performed to obtain a solution whose absolute error is less than 10^{-3}. [3+1+6]

8. What are constrained and unconstrained optimizations? How can you solve the systems of non-linear equations using numerical methods? How differential equations are solved using numerical methods. What are ways for the solution of complex optimization problems? [2+4+2+2]