

Subject Title: Numerical Analysis

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Unit - I: Solutions of equations in one variable

1. Use Bisection method to find solutions accurate to within 10^{-2} , 10^{-4} , 10^{-5} for the given functions
2. Use fixed point method to determine solution to the given functions on given intervals using initial approximations and finding fixed points to the given functions by manipulating $f(x)$
3. Newtons method, secant method, false position method (problems to find root or solutions within 10^{-i} for $i = 0, 1, 2 \dots n$)
4. Order of convergence definition and problems to find limit, aitkens Δ^2 method problems
5. Using Steffensens method find first n terms ($n=0, 1, 2, \dots, k$)
6. Mullers method (finding root using $f(x)$ in $[a, b]$)

All practical problems

Unit - II: Interpolation and polynomial approximation

7. Constructing lagrange interpolating polynomial of degree one, two, three... and finding absolute errors
8. Define nevilles method and problems depending on nevilles, finding unknown terms in table
9. Write divided difference formula and construct the interpolating polynomial of degree one, two, three.... (newton forward, newton backward)
10. Hermite interpolation (working rule, problems on hermite both with respect to interpolating functions and divided difference table and finding absolute errors)
11. Cubic spline (construction of cubic spline, natural cubic spline conditions and clamped cubic spline conditions)
12. Practical problems

Unit - III: Numerical differentiation and integration

13. Three and five point formulas with conditions (finding missing entries, error bounds, and derivatives)

14. Define extrapolation problems using richardsons extrapolation(finding approximation of given integral)
15. Use mid point, Trapezoidal rule, simpsons rule to approximate the givendefinite integral
16. Using quadrature formula finding the constant values to the given integral function,finding absolute error
17. Use composite trapezoidal, mid point,simpsons rule to approximate the given integral(even when data is given)
18. Romberge integration (problems,finding unknown terms,formula,even when data is given approximate the given integral)
19. Adaptive quadrature method,formula (approximating the integral by adaptive quadrature method with in 10^{-i} for $i = 0,1,2 \dots n$)
20. Gaussian quadrature method,formula(approximating the integral by Gaussian quadrature by taking $n=1,2,3 \dots k$ ada finding constants)

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