Course Delivery Plan

Department of Computer Science and Engineering

Semester: Summer-2020

Course Code : CSE 234 **Credit Hours**:3

Course Title : Numerical Methods

Course Intended Learning Outcome: **Students will be able to**

1. Solve algebraic or transcendental equations using appropriate numerical methods
2. Approximate functions using appropriate numerical methods
3. Solve differential equations using appropriate numerical methods
4. Evaluate derivatives at a point using appropriate numerical methods
5. Solve system of linear equations using appropriate numerical methods
6. Perform error analysis for a given numerical method
7. Prove results for numerical root finding methods
8. Model engineering systems using first and second order differential equations, and solve the equations both analytically and numerically
9. Calculate definite integrals using appropriate numerical methods
10. Code numerical methods in a modern computer language

Theory Session Plan:

Week No	Topics	Expected Learning Outcome	Assessments(ASSN/ CT/Mid/Final)
WK1	a. Introduction and error analysis b. Bisection method to solve algebraic and transcendental equations with algorithm	a. Appreciate the needs of numerical analysis b. Visualize the applications c. perform an error analysis for a given numerical method	
WK2	a. Newton Raphson method to solve algebraic and transcendental equations with algorithm	a. prove results for various numerical root finding methods b. perform an error analysis for a given numerical method c. code a numerical method in a modern computer language	2/3 problems related to discussion in the class
WK3	a. Interpolation: Newton's Backward Difference Method	a. approximate a function using an appropriate numerical method b. code a numerical method in a modern computer language	**CLASS TEST1** (Up-to last class of the week)
WK4	a .Interpolation: Newton's Forward difference Method. b. Lagrange Interpolation Formula	a. approximate a function using an appropriate numerical method b. able to use in cryptography	2/3 problems related to discussion in the class
WK5	a. Lagrange Interpolation Formula b. Numerical Differentiation: maximum and minimum value of a tabulated functions	a. approximate a function using an appropriate numerical method b. able to forecast missing data	
WK6	a. Maximum and minimum value of a tabulated functions b. Review discussion	a. able to find maximum and minimum value of a tabulated functions.	**CLASS TEST2**
WK7	----- midterm week------	----- midterm week------	**MIDTERMEXAM**
WK8	a. Curve fitting: Least square method for linear and non-linear case	a. Construct a curve or mathematical function that has the best fit to a series of data points.	**PRESENTATION**

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WK09	a. Derivation of General Formula Numerical Integration for Simpson's 1/3 rule	a. calculate a definite integral using an appropriate numerical method	**CLASS TEST3**
WK10	a. Numerical solution of ordinary differential equations: Runge-kutta method of 4thorder	a. solve a differential equation using an appropriate numerical method	
WK11	a. Background of matrix and solving systems of Linear Equations	a. solve a linear system of equations using an appropriate numerical method	2/3 problems related to discussion in the class
WK12	Gauss Method	a. able to find solution of linear system b. find the dominant Eigen -values	
WK13	----- final exam week-----	----- final exam week------	**FINALEXAM**

Text Book(s):

(1) Numerical Analysis by Burden & Faires , 5th edition
(2) Introductory Methods of Numerical Analysis, S.S Sastry, 5th edition
(3) Numerical Methods in Engineering, J. Kiusalaas