

Course Title: Numerical Methods and Applications As per Choice Based Credit System (CBCS) scheme] SEMESTER:VI			
Subject Code	15CV663	IA Marks	20
Number of Lecture Hours/Week	03	Exam Marks	80
Total Number of Lecture Hours	40	Exam Hours	03
CREDITS –03		Total Marks- 100	
Course objectives: This course aims at providing the necessary basic concepts of a few numerical methods and give procedures for solving numerically different kinds of problems occurring in engineering and technology			
Modules		Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
Module -1			
Solution of Equations and Eigen value Problems: Solution of algebraic and transcendental equations, Fixed point iteration method, Newton Raphson method, Solution of linear system of equations, Gauss elimination method, Pivoting, Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss Seidel - Matrix Inversion by Gauss Jordan method		8 hours	L1,L2,L3
Module -2			
Interpolation and Approximation: Interpolation with unequal intervals - Lagrange's interpolation – Newton's divided difference interpolation – Cubic Splines - Interpolation with equal intervals - Newton's forward and backward difference formulae.		8 Hours	L1,L2,L3
Module -3			
Numerical Differentiation and Integration: Approximation of derivatives using interpolation polynomials - Numerical integration using Trapezoidal, Simpson's 1/3 rule – Romberg's method - Two point and three point Gaussian quadrature formulae – Evaluation of double integrals by Trapezoidal and Simpson's 1/3 rules.		8 Hours	L1,L2,L3
Module -4			
Initial Value Problems for Ordinary Differential Equations : Single Step methods - Taylor's series method - Euler's method - Modified Euler's method – Fourth order Runge-Kutta method for solving first order equations - Multi step methods - Milne's and Adams-Bash forth predictor corrector methods for solving first order equations.		8 Hours	L1,L2,L3
Module -5			
Boundary Value Problems in Ordinary and Partial Differential Equations: Finite difference methods for solving two-point linear boundary value problems - Finite difference techniques for the solution of two dimensional Laplace's and Poisson's equations on rectangular domain – One dimensional heat flow equation by explicit and implicit (Crank Nicholson) methods – One dimensional wave equation by explicit method.		8 Hours	L1,L2,L3
Course Outcomes: After studying this course, The students will have a clear perception of the power of numerical techniques, ideas and would be able to demonstrate the applications of these techniques to problems drawn from Industry, management and other engineering fields.			
Program Objectives: <ul style="list-style-type: none"> • Engineering knowledge • Problem analysis • Interpretation of data 			
Question Paper Pattern: <ul style="list-style-type: none"> • The question paper will have 5 modules comprising of ten questions. Each full question carrying 16 marks • There will be two full questions (with a maximum of three subdivisions, if necessary) from each module. • Each full question shall cover the topics as a module • The students shall answer five full questions, selecting one full question from each module. If more than one question is answered in modules, best answer will be considered for the award of marks limiting one full question answer in each module 			

Text Books:

1. Grewal. B.S., and Grewal. J.S., "Numerical methods in Engineering and Science", Khanna Publishers, 9th Edition, New Delhi
2. Gerald. C. F., and Wheatley. P. O., "Applied Numerical Analysis", Pearson Education, Asia, 6th Edition, New Delhi

Reference Books:

1. Chapra. S.C., and Canale.R.P., "Numerical Methods for Engineers, Tata McGraw Hill, New Delhi
2. Brian Bradie. "A friendly introduction to Numerical analysis", Pearson Education, Asia, New Delhi
3. Sankara Rao. K., "Numerical methods for Scientists and Engineers", Prentice Hall of India Private, New Delhi