Course Number and Name

BMA402 - NUMERICAL METHODS

Credits and Contact Hours

4 & 75

Course Coordinator's Name

Ms J.Arthy

Text Books and References

Text Books

1.Sastry.SS "Introductory Numerical Methods" PHI, 2010

2. Jain K.K. Iyengar, S.R.K and Jain, R.K. "Numerical Methods for Scientific and Engineering Computation" 3rd edition, New Age International Publications and Co. 1993

References

1.Grewal, B.S. "Higher Engineering Mathematics (36th edition)" Khanna Publication Delhi .

2 Curtis F.Gerald. "Applied Numerical Analysis" 7th Edn. Pearson Education, Chennai-600113.

3. Dennis G.Zill and Warren S.Wright. "Advanced Engineering Mathematics". 3rd Edn. Jones & Bartlett Publishers, UK. 1992

4 .www.mathforcollege.com

Course Description

- To train the students to Predict the system dynamic behavior through solution of ODEs modeling the system
- To solve PDE models representing spatial and temporal variations in physical systems through numerical methods.

Prerequisites	Co-requisites
BMA101-Mathematics - I , BMA201-Mathematics – II, BMA301-Mathematics - III	Nil

required, elective, or selected elective (as per Table 5-1)

required

Course Outcomes (COs)

CO 1 : Solve a set of algebraic equations representing steady state models formed in engineering problems.

CO2 : Fit smooth curves for the discrete data connected to each other or to use interpolation methods over these data tables.

CO3 : Find the trend information from discrete data set through numerical differentiation and Summary information through numerical integration.

CO4 : Predict the system dynamic behavior through solution of ODEs modeling the system.

CO5 : Solve PDE models representing spatial and temporal variations in physical systems through numerical methods.

CO6 : To train the students with Mathematical techniques to solve problems in Engineering with numerical data.

Student Outcomes (SOs) from Criterion 3 covered by this Course

COs/SOs	a	b	c	d	e	f	g	h	i	j	k
CO1	H	H				M			L		
CO2	H	H	M	M	H				M	H	
CO3	H					H					
CO4	H		M		H						
CO5	H	M							M		
CO6	H	H	M		M	H			L	H	

List of Topics Covered

UNIT I SOLUTION OF EQUATIONS AND EIGEN VALUE PROBLEM 9+6

Iterative method,Newton-Raphson method for single variable-solutions of linear system by Gaussian, Gauss-Jordan, Jacobian and Gauss-Siedal methods,Inverse of matrix by Gauss-Jordan method,Eigen value of a matrix power and Jacobian methods.

UNIT II INTERPOLATION (FINITE DIFFERENCES) 9+6

Newton's Divide difference formula, Lagrange's Interpolation, forward and backward difference formula Stirling's, Bessel's central difference formula.

UNIT III NUMERICAL DIFFERNTIATION AND INTEGRATION 9+6

Numerical Differentiation with interpolation polynomials, Numerical integration by Trapezoidal Simpson"s (Both 1/3" and 3/8") rule, Double integrals using Trapezoidal and Simpson"s rule.

UNIT IV INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATION 9+6

Single step methods, Taylor series, Euler and modified Euler, Runge kutta method of first and second order differential equations, multiple step methods, Milne and Adam's –bash forth predict and corrected method.

UNIT V BOUNDARY VALUE PROBLEMS FOR ODE AND PDE 9+6

Finite difference for the second order ordinary differential equations, finite difference solutions for one dimensional heat equations(both implicit and explicit), one dimensional wave equation, Two dimensional, Laplace and Poisson equation.