Course Number and Name

BMA402 - NUMERICAL METHODS

Credits and Contact Hours

4 & 75

Course Coordinator's Name

Dr.Ramya

Text Books and References

REFERENCES:

1. Srinivasan, "Numerical Methods for Engineering" CBS Publishers.Chennai.1994.
2. Datta, "Numerical Methods for Linear Control Systems" CBS Publishers. Chennai 2005.
3. Yang, "Applied Numerical Methods Using MATLAB" CBS Publishers. Chennai 2005.

Course Description

- 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.

Prerequisites	Co-requisites
Mathematics III	NIL

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

Course Outcomes (COs)

CO1	Have a fundamental knowledge of the basic solutions of equations and eigen value problems
CO2	Have a well-founded knowledge of standard numerical differentiation and integration which can describe real life phenomena.
CO3	Acquire skills in handling situations involving first and second order differential equations
CO4	Understand boundary value problems on ordinary and partial differential equations
CO5	Be able to analyze the interpolation techniques.

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			M	H		H			M	
CO2											
CO3	M			H						M	
CO4	H				H		H				
CO5	H			H						H	

List of Topics Covered

UNIT I SOLUTIONS OF EQUATIONS AND EIGEN VALUE PROBLEMS 9+6

Iterative method Newton - Raphson method for single variable. Solutions of Linear system by Gaussian Gauss – Jordan, Jacobi and Gauss – Seidel methods, Inverse of a matrix by Gauss – Jordan method. Eigen value of a matrix by power and Jacobi methods.

UNITII INTERPOLATION (FINITE DIFFERENCES) 9+6

Newton's Divided Difference Formula – Lagrange's Interpolation Newton forward and backward difference formulae – Stirling's Bessel's central difference formulae.

UNIT III NUMERICAL DIFFERENTIATION AND INTEGRATION 9+6

Numerical Differentiation with interpolation polynomials, Numerical integration by Trapezoidal Simpson's (Both 1/3" and 3/8") rules. Double Integrals using Trapezodial and Simpson's rules.

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

Single step methods – Taylors series, Euler's and Modified Euler, Runge – Kutta method of first and second order differential equations. Multiple step methods – Milne and Adam's – Bashforth 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. Finite difference solutions for one dimensional heat Equations(both implicit and Explicit) one dimensional wave equation and two dimensional Laplace and Poisson Equation.