| Course Number and Name |
| --- |
| BMA401 - NUMERICAL METHODS |

| Credits and Contact Hours |
| --- |
| 4 & 75 |

| Course Coordinator's Name |
| --- |
| Ms.Arthi |

| Text Books and References |
| --- |
| **TEXT BOOKS:**<br><br>1. Sastry.SS "Introductory Numerical Methods" PHI, 2010<br>2. Jain K.K. Iyengar, S.R.K and Jain, R.K. "Numerical Methods for Scientific and Engineering Computation" 3$^{rd}$ edition, New Age International Publications and Co. 1993.<br><br>**REFERENCES:**<br><br>1. Grewal, B.S. "Higher Engineering Mathematics (36$^{th}$ edition)" Khanna Publication Delhi 2001.<br>2. M.K. Venkatraman, " Numerical Methods", NPC, Chennai.<br>3. Curtis F.Gerald. "Applied Numerical Analysis" 7$^{th}$ Edn. Pearson Education, Chennai-600113. 2007<br>4. Dennis G.Zill and Warren S.Wright. "Advanced Engineering Mathematics". 3$^{rd}$ Edn. Jones & Bartlett Publishers, UK. 1992. |

| Course Description |
| --- |
| To train the students with Mathematical techniques to solve problems in Engineering |

| Prerequisites | Co-requisites |
| --- | --- |
| Mathematics I, II & III | Nil |

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

| Course Outcomes (COs) | |
| --- | --- |
| CO1 | solves a single equation and a system of linear equations by different methods and get exact solution and iterative solution. |
| CO2 | Interpolate a dependent variable based on a given set of values by a suitable method. |
| CO3 | Find integral value and differential coefficient based on a given set of values. |
| CO4 | Solve initial value problem of ODE and boundary value problems of PDE. |
| CO5 | Will be able to solve eigen value problems |
| CO6 | Understand the application of differentiation and integration in various fields of engineering. |

| Student Outcomes (SOs) from Criterion 3 covered by this Course | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| COs/SOs | a | b | c | d | e | f | g | h | i | j | k | l |
| CO1 | H | M | H | | | L | L | L | L | L | L | H |
| CO2 | H | M | H | | | L | L | L | L | | | H |
| CO3 | H | M | M | | | | | | | | | |
| CO4 | H | M | H | | | L | L | L | L | | | |
| CO5 | H | M | H | | | | | | | | | H |
| CO6 | H | M | H | | | L | L | L | L | | | H |

## List of Topics Covered

**UNIT-1 :**      **SOLUTION OF EQUATIONS AND EIGEN VALUE PROBLEMS**      **9+6**

Iterative method, Newton–Raphson methods for single variable- Solutions of linear system by Gaussian, Gauss-Jordan, Jacobian and Gauss-Siedel 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 Divided Difference Formula, Lagrange's Interpolation-Forward and Backward Difference Formula-Stirling's and Bessel's Central Difference Formula.

**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)rule, Double integrals using Trapezoidal and Simpson's rule.

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

Single Step methods, Taylors Series, Euler and Modified Euler, Runge-Kutta methods of first and second order Differential equations, Multi Step methods, Milne and Adam's-Bashforth predictor and corrector 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.