



Code	Subject Title	Cr. Hrs	Semester
<b>MATH-418</b>	<b>Numerical Analysis - II</b>	<b>3</b>	<b>VIII</b>
Year	Discipline		
<b>4</b>	<b>Mathematics</b>		

**Objectives:**

Numerical Differentiation

- Derivatives using: Lagrange’s interpolation formula, Newton’s divided difference formula, Gregory Newton forward/backward interpolation formula, Gauss’s forward / backward
- interpolation formula, Stirling’s formula, Laplace Everett’s formula, Bessel’s formula

Numerical Integration

- Newton-Cotes formulae
- Trapezoidal rule, Simpson rule, Weddle’s rule, Boole’s rule
- Errors in quadrature formulae
- Gaussian quadrature formulae

Formulation of Difference Equations

- Analogy of difference equations
- Linear homogeneous difference equations with constant coefficients
- Linear non-homogeneous difference equations with constant coefficients

Ordinary Differential Equations

- Introduction to ODEs
- Taylor’s series method: Simultaneous first order differential equations, higher order differential equations
- Euler’s, improved Euler’s, modified Euler’s and Runge-Kutta methods with error analysis
- Predictor-corrector methods for solving initial value problems

**Recommended Books:**

- Curtis F. Gerald and Patrick O. Wheatley, Applied Numerical Analysis, 6th edition, (Addison-Wesley Publishing Co. Pearson Education, 2003)
- Richard L. Burden and J. Douglas Faires, Numerical Analysis , 6<sup>th</sup> edition, (Brooks/Cole Publishing Company,1997)
- John H. Mathews, Numerical Methods for Mathematics, Science and Engineering, 3<sup>rd</sup> edition (Prentice Hall International, 2003)
- V. N. Vedamurthy and N. Ch. S. N. Iyenger, Numerical Methods , (Vikas Publishing House Pvt. Ltd, 2002)
- Steven C. Chapra and Raymond P. Canale, Numerical Methods for Engineers 3<sup>rd</sup> edition, (McGraw Hill International Edition, 1998)