

UNIVERSITY OF MADRAS
B.Sc. DEGREE COURSE IN MATHEMATICS
SYLLABUS WITH EFFECT FROM 2020-2021

BMA-CSA03

ALLIED: CALCULUS OF FINITE DIFFERENCES
AND NUMERICAL ANALYSIS-I
(Common to B.Sc. Maths with Computer Applications)

Learning outcomes:

Students will acquire knowledge about

- Numerical techniques used as powerful tools in scientific computing.
- Linear algebraic, transcendental equations and interpolation using finite difference formulae.

UNIT I

Solutions of algebraic and transcendental equations: Bisection method- Iteration method- Regula-falsi method- Newton-Raphson method. - Chapter 1 :Section 1.1 - 1.4

UNIT II

Solutions of Simultaneous Linear Equations: Gauss-Elimination method, Gauss-Jordan method, Crout's method, Gauss-Seidel method. - Chapter 2 :Section 2.1 - 2.4 , 2.6

UNIT III

Finite Differences: E operators and relation between them- Differences of a polynomial-Factorial polynomials- inverse operator Δ^{-1} -Summation Series. - Chapter 3 :Section 3.1 to 3.4, 3.6, 3.7.

UNIT IV

Interpolation with Equal Intervals:Newton's Forward and Backward Interpolation formulae-Central Differences Formulae: Gauss-Forward and Backward Formulae- Stirling's Formula and Bessel's Formula-Equidistant terms with one or more missing values.
Chapter 4 :Section 4.1- 4.3 (omit 4.1a, 4.4), 4.7 . - Chapter 5 :Section 5.1- 5.6.

UNIT V

Interpolation with Unequal Intervals: Divided Differences - Newton's Divided Differences Formula for Interpolation -Lagrange's Formula for Interpolation-Inverse Interpolation-Lagrange's method- Reversion of Series method. - Chapter 6 :Section 6.1, 6.2, 6.5, 6.7.

Content and Treatment as in

“Calculus of Finite Differences and Numerical Analysis” by P. Kandasamy and K. Thilagavathy, S. Chand and Co Pvt.Ltd.

Reference:

1. “Numerical Analysis “ by B. D. Gupta, Konark Publishing.
2. “Numerical methods in Science and Engineering” by M. K. Venkataraman, National Publishing House, Chennai.

e-Resources:

1. <https://nptel.ac.in>
2. https://www.encyclopediaofmath.org/index.php/Finite-difference_calculus