

**UNIVERSITY OF MADRAS**  
**U.G. DEGREE COURSE**  
**SYLLABUS WITH EFFECT FROM 2020-2021**

**BMA-CSA01**

**ALLIED MATHEMATICS-I**

**Credits: 5**

**Year: I/II, Sem:I/III**

**LEARNING OUTCOMES:**

- Students gain knowledge about basic concepts of Algebra, Theory of Equations, Matrices, Trigonometry and Calculus.

**UNIT I**

Algebra And Numerical Methods:

Algebra: Summation of series - simple problems.

Numerical Methods: Operators  $E, \Delta, \nabla$ , difference tables- Newton-Raphson method- Newton's forward and backward interpolation formulae for equal intervals, Lagrange's interpolation formula.

Chapter 2, Section 2.1.3, 2.2, 2.2.1, 2.3, 2.3.3

Chapter 3, Section 3.4.1 and Chapter 5, Section 5.1 and 5.2.

**UNIT II**

Matrices: Symmetric, Skew-Symmetric, Orthogonal, Hermetian, Skew-Hermetian and Unitary matrices. Eigen values and Eigen-vectors, Cayley-Hamilton theorem (without proof) – verification- Computation of inverse of matrix using Cayley - Hamilton theorem.

Chapter 4, Section 4.1.1 to 4.1.6, 4.5, 4.5.2, 4.5.3.

**UNIT III**

Theory Of Equations: Polynomial equations with real coefficients, irrational roots, complex roots, symmetric functions of roots, transformation of equation by increasing or decreasing roots by a constant, reciprocal equation-simple problems.

Chapter 3, Section 3.1 to 3.4.1(omit section 3.2.1)

**UNIT IV**

Trigonometry: Expansions of  $\sin(n\theta)$  and  $\cos(n\theta)$  in a series of powers of  $\sin\theta$  and  $\cos\theta$  - Expansions of  $\sin^n\theta$ ,  $\cos^n\theta$ ,  $\tan^n\theta$  in a series of sines, cosines and tangents of multiples of " $\theta$ " - Expansions of  $\sin\theta$ ,  $\cos\theta$  and  $\tan\theta$  in a series of powers of " $\theta$ " – Hyperbolic and inverse hyperbolic functions .

Chapter 6, Section 6.1 to 6.3.

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**UNIT V**

Differential Calculus: Successive differentiation,  $n^{\text{th}}$  derivatives, Leibnitz theorem (without proof) and applications, Jacobians, Curvature and radius of curvature in Cartesian co-ordinates, maxima and minima of functions of two variables- Simple problems

Chapter 1, Section 1.1 to 1.3.1 and 1.4.3.

**Content and treatment as in**

Allied Mathematics, Volume I and II, by P. Duraipandian and S. Udayabaskaran, S. Chand Publications

**Reference:-**

1. S. Narayanan and T.K. Manickavasagam Pillai – Ancillary Mathematics, S. Viswanathan Printers, 1986, Chennai.
2. Allied Mathematics by Dr. A. Singaravelu, Meenakshi Agency.

**e-Resources:**

1. <http://www.themathpaage.com>
2. <http://nptel.ac.in>