

**UNIVERSITY OF MADRAS**  
**B.Sc. DEGREE PROGRAMME IN COMPUTER SCIENCE**  
 SYLLABUS WITH EFFECT FROM 2023-2024

Year: I

Semester: I

<b>Title of the Course</b>		<b>MATHEMATICS-I</b> (Common to B.Sc Physics, Physics with CA, Chemistry, ECS, Data Science, Artificial Intelligence, Software Applications & BCA)					
<b>Paper Number</b>		<b>ELECTIVE COURSE I</b>					
<b>Category</b>	Elective	<b>Year</b>	I	<b>Credits</b>	3	<b>Course Code</b>	125E1A
		<b>Semester</b>	I				
<b>Instructional Hours per week</b>		<b>Lecture</b>	<b>Tutorial</b>	<b>Lab Practice</b>	<b>Total</b>		
		4	1	--	5		
<b>Pre-requisite</b>		12 <sup>th</sup> Standard Mathematics					
<b>Objectives of the Course</b>		<ul style="list-style-type: none"> <li>Students gain knowledge about the basic concepts of Algebra, Theory of Equations.</li> <li>They also gain the basic knowledge in Matrices, Trigonometry and Differential Calculus.</li> </ul>					
<b>Course Outline</b>		<b>UNIT-I: Summation of series:</b> Binomial series -Exponential series - Logarithmic series -Simple Problems. <span style="float: right;"><b>Hours:15</b></span>					
		<b>Chapter2: Sections:2.1.3,2.2,2.2.1,2.3,2.3.3.</b>					
		<b>UNIT II: Matrices:</b> Symmetric– Skew-Symmetric–Hermitian– Skew-Hermitian–Orthogonal and Unitary matrices–Cayley-Hamilton theorem (without proof) – Verification- Computation of inverse of matrix using Cayley - Hamilton theorem.					
		<b>Chapter4: Sections:4.1.1–4.1.6,4.5.2 and 4.5.3.</b> <span style="float: right;"><b>Hours:15</b></span>					
		<b>Unit III: Numerical Methods:</b> Newton's method to find a root approximately. <b>Finite Differences:</b> Interpolation: Operators, $\Delta, \nabla, E, E^{-1}$ difference tables. Interpolation formulae: Newton's forward and backward interpolation formulae for equal intervals, Lagrange's interpolation formula. <span style="float: right;"><b>Hours:15</b></span>					
		<b>Chapter3: Sections 3.4.1. Chapter5: Sections:5.1 and 5.2.</b>					
		<b>Unit IV: Trigonometry:</b> Expansions of $\sin^n \theta$ , $\cos^n \theta$ in a series of powers of $\sin \theta$ and $\cos \theta$ -Expansions of $\sin(n\theta)$ and $\cos(n\theta)$ in a series of sines and cosines of multiples of " $\theta$ " -Expansion of $\sin \theta$ , $\cos \theta$ and $\tan \theta$ in a series of powers of " $\theta$ " – Hyperbolic and inverse hyperbolic functions . <span style="float: right;"><b>Hours:15</b></span>					
		<b>Chapter6: Section 6.1– 6.3</b>					
		<b>Unit V: Differential Calculus:</b> Successive differentiation, n th derivatives, Leibnitz theorem (without proof) and applications, Jacobians, maxima and minima of functions of two variables- Simple problems					
		<b>Chapter1, Section 1.1 to 1.3.1.</b> <span style="float: right;"><b>Hours:15</b></span>					
		<b>Total Hours:75</b>					

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<b>Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)</b>	Questions related to the above topics, from various competitive examinations UPSC / TNPSC / others to be solved (To be discussed during the Tutorial hour)
<b>Skills acquired from this course</b>	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferable Skill
<b>Recommended Text</b>	Allied Mathematics, Volume I and Volume II by P. Duraipandian and S. Udayabaskaran, S. Chand Publications <b>Volume I: Unit I–IV, Volume II–Unit V</b>
<b>Reference Books</b>	1. Ancillary Mathematics by S. Narayanan and T. K. Manickavachagom Pillay, S. Viswanathan Publishers, 1986, Chennai Allied Mathematics by A. Singaravelu Allied Mathematics by P. R. Vittal
<b>Website and e-Learning Source</b>	1. <a href="http://www.themathpage.com">http://www.themathpage.com</a> 2. <a href="http://nptel.ac.in">http://nptel.ac.in</a>

**Course Learning Outcome (for Mapping with POs and PSOs)**

Students will be able to

**CLO1:** Understand the concepts of Summation of Series.

**CLO2:** Understand the concepts of Cayley Hamilton Theorem and inverse matrices.

**CLO3:** Understand the concepts of finite differences.

**CLO4:** Understand the knowledge about expansions, hyperbolic and inverse hyperbolic functions.

**CLO5:** Understand the concept of Leibnitz theorem and functions of two variables

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO 1	2	3	1	3	1	1	3	1	1
CLO 2	3	2	1	3	1	1	3	1	1
CLO 3	3	2	1	3	1	1	3	1	1
CLO 4	3	3	1	3	1	1	3	1	1
CLO 5	3	2	1	3	1	1	3	1	1