UNIVERSITY OF MADRAS

B.Sc. DEGREE PROGRAMME IN MATHEMATICS

SYLLABUS WITH EFFECT FROM 2023-2024

CORE-I: ALGEBRA & TRIGONOMETRY
(Common to B.Sc Maths with Computer Applications)

<table>
<tr><td colspan="2">Paper Number</td><td colspan="6">CORE M1</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">Core</td><td>Year</td><td>I</td><td rowspan="2">Credits</td><td rowspan="2">5</td><td rowspan="2">Course Code</td><td rowspan="2">134C1A</td></tr>
<tr><td>Semester</td><td>I</td></tr>
<tr><td colspan="2">Instructional Hours per week</td><td colspan="2">Lecture</td><td colspan="2">Tutorial</td><td>Lab Practice</td><td>Total</td></tr>
<tr><td colspan="2"></td><td colspan="2">3</td><td colspan="2">1</td><td>--</td><td>4</td></tr>
<tr><td colspan="2">Pre-requisite</td><td colspan="6">12th Standard Mathematics</td></tr>
<tr><td colspan="2">Objectives of the Course</td><td colspan="6">• Basic ideas on the Theory of Equations, Matrices and Number Theory.
• Knowledge to find expansions of trigonometry functions, solve theoretical and applied problems.</td></tr>
<tr><td colspan="2" rowspan="3">Course Outline</td><td colspan="6">Unit I: Reciprocal Equations-Standard form–Increasing or decreasing the roots of a given equation- Removal of terms–Approximate solutions of roots of polynomials by Horner’s method – Related Problems.
Chapter-6 : Sections: 16, 16.1, 17, 19, 30 Hours 15</td></tr>
<tr><td colspan="6">Unit II: Summation of Series: Binomial– Exponential –Logarithmic series (Theorems without proof) –Related Problems. Hours 15
Chapter-3 :Sections: 10 Chapter -4 :Sections 3 to 7</td></tr>
<tr><td colspan="6">Unit III: Characteristic equation – Eigen values and Eigen Vectors-Similar matrices - Cayley – Hamilton Theorem (Statement only) - Finding powers of square matrix–Inverse of a square matrix up to order 3– Diagonalization of square matrices –Related Problems.
Chapter-2 :Sections: 16, 16.1 to 16.4 Hours 15</td></tr>
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	Unit IV: Expansions of sin nθ, cos nθ in powers of sinθ, cosθ - Expansion of tan nθ in terms of tan θ– Expansions of $\cos^n\theta$, $\sin^n\theta$, $\cos^m\theta \sin^n\theta$ –Expansions of $\tan(\theta_1 + \theta_2 +,\ldots,+\theta_n)$ – Expansions of sinθ,cosθ and tanθ in terms of θ –Related Problems. **Chapter 2 :Sections : 2.1, 2.1.1, 2.1.2** **Chapter 3 : Sections : 3.1, 3.1.1, 3.2.1, 3.4, 3.4.1 to 3.4.3** **Hours 15**
	Unit V: Hyperbolic functions – Relation between circular and hyperbolic functions–Formulas in hyperbolic functions, Inverse hyperbolic functions– Logarithm of complex quantities, Summation of trigonometric series –Related Problems. **Chapter 4: Sections: 4.1 to 4.7, Chapter: 5 Sections: 5.1 to 5.3.** **Chapter 6 Sections 6.1. to 6.6. Hours 15**
Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	**Total Hours:75** Questions related to the above topics, from various competitive examinations UPSC / TNPSC / others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, problem solving, analytical ability, professional competency, professional communication and transferable skill.
Recommended Text	1. Algebra, **Volume I** by T.K.Manicavachagom Pillay,T.Natarajan, K.S.Ganapathy, Viswanathan Publication 2007, **Unit – 1** and **Unit – 2** 2. Algebra, **Volume II** by T.K.Manicavachagom Pillay, T.Natarajan, K.S.Ganapathy, Viswanathan Publication 2008 **Unit -3** 3. Trigonometry by P.Duraipandian and Kayalal Pachaiyappa, Muhil publishers, **Unit – 4, Unit – 5**

Reference Books	1. W.S. Burnstine and A.W. Panton, Theory of equations 2. David C. Lay, Linear Algebra and its Applications, 3rd Ed., Pearson Education Asia, Indian Reprint, 2007 3. G.B. Thomas and R.L. Finney, Calculus, 9th Ed., Pearson Education, Delhi, 2005 4. C. V. Durell and A. Robson, Advanced Trigonometry, Courier Corporation, 2003 5. J. Stewart, L. Redlin, and S. Watson, Algebra and Trigonometry, Cengage Learning, 2012. 6. Calculus and Analytical Geometry, G.B. Thomas and R. L. Finny, Pearson Publication, 9th Edition, 2010.
Website and e-Learning Source	https://nptel.ac.in https://mathhelp.com/

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1: Classify and Solve reciprocal equations

CLO 2: Find the sum of binomial, exponential and logarithmic series

CLO 3: Find Eigen values, eigen vectors, verify Cayley – Hamilton theorem and diagonalize a given matrix

CLO 4: Expand the powers and multiples of trigonometric functions in terms of sine and cosine

CLO 5: Determine relationship between circular and hyperbolic functions and the summation of trigonometric series

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	-	-	-	3	2	1
CLO2	2	1	3	1	-	-	3	2	1
CLO3	3	1	3	1	-	-	3	2	1
CLO4	3	1	3	-	-	-	3	2	1
CLO5	3	1	3	-	-	-	3	2	1