

**ST. JOSEPH'S COLLEGE OF ARTS & SCIENCE (AUTONOMOUS)
CUDDALORE-1**



PG & RESEARCH DEPARTMENT OF MATHEMATICS

M.Phil. MATHEMATICS

SYLLABUS (2016-2017)

CURRICULUM DESIGN TEMPLATE

| Yr/ Sem | Subject | SUB CODE | Paper | Title of the paper | Hrs | Credits |
|-------------------|----------------|-----------------|--------------|--|------------|----------------|
| I YEAR / I SEM | Core | MMT101A | I | ALGEBRA AND ANALYSIS | 6 | 5 |
| | Core | MMT102A | II | TOPOLOGY AND DIFFERENTIAL EQUATIONS | 6 | 5 |
| II SEM | Core | GMT201 | III | GUIDE PAPER | 6 | 5 |
| II SEM | Core | JMT201 | IV | DISSERTATION AND VIVA VOCE | | 19 |

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| YEAR – I | ALGEBRA AND ANALYSIS FOR THE STUDENT ADMITTED FROM 2016 | MMT101A |
| SEMESTER –I | | Hrs / Week: 6 |
| CORE – I | | Credit: 5 |

UNIT I: RINGS, IDEALS AND MODULES

Rings and ring homomorphism-Ideals, Quotient rings-Zero-divisors, Nil potent elements ,units-Prime ideals and maximum ideals-Nil radical and Jacobson radical-operations on ideals-extension and contraction-exercises-Modules and module homomorphism-sub modules and quotient modules-operation on sub modules-Direct sum and product-Finitely generated modules.-Exercises.

UNIT-II: RINGS, MODULES OF FRACTIONS AND PRIMARY DECOMPOSITION

Extract sequences-Tensor product of modules-Restriction and extension of scalars-Exactness properties of the tensor product-Algebra-Tensor product of algebras-Local properties- Extended and contracted ideals in rings of fractions Exercises- Primary decomposition – Exercise.

UNIT-III: ABSTRACT INTEGRATION AND L^p – SPACES

L^p – Spaces Convex Function and Inequalities – The L^p – Spaces – Approximation by Continuous Functions – The Inversion Theorem.

H^p Spaces

The concept of H^p spaces-the role played by the H^p spaces-simple functions –inequalities-Exercises.

UNIT-IV:FOURIER TRANSFORMS AND HOLOMORPHIC FOURIER TRANSFORMS

Formal properties – The Invention Theorem – thePlancheral Theorem – The Banach algebra Li-Introduction – Two Theorems of Paley and Wiener – Quasi – analytic classes – The Denjoy-Carleman theorem.

UNIT-V: RESEARCH METHODOLOGY

Research – Research methods and methodology –Types of Research – Mode of approach– Art of writing a Research paper and thesis

TEXT BOOKS:

1. M.F. Atiyah, I.G. Macdonald, Introduction to Commutative Algebra, Addison – Wesley Publishing Company, 1969.
Unit-I Chapter – 1 (pg. 1-10), Chapter – 2 (pg 17 – 31)
Unit-II Chapter - 3 (pg 36 – 43), Chapter – 4 (pg 50 – 55)
2. Walter Rudin, Real and Complex Analysis II Edition, McGraw Hill International, 1986.
Unit – III Chapter - 3 (pg61 – 70), Chapter – 17 (pg. 335 – 355)
Unit-IV- Chapter – 9 (pg 178 – 193), Chapter – 19 (pg. 371 – 383)
3. Unit-V Research Methodologyby S Rajasekar, P Philominathan and V Chinnathambi, e-material at <http://arxiv.org/pdf/physics/0601009.pdf>.

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| YEAR – I | TOPOLOGY AND DIFFERENTIAL EQUATIONS FOR THE STUDENT ADMITTED FROM 2016 | MMT102A |
| SEMESTER –I | | Hrs / Week: 6 |
| CORE-2 | | Credit: 5 |

UNIT-I: FUNDAMENTAL GROUP AND COVERING SPACES

Homotopy – Fundamental group – Covering spaces.

UNIT – II: SIMPLICIAL COMPLEXES

Geometry of Simplicial Complexes - Bary Centric subdivisions – Simplicial approximation Theorem – Fundamental Group of a simplicial Complex.

UNIT-III: LINEAR SYSTEMS

Uncoupled Linear System – Diagonalization – Exponentials operators – The Fundamental Theorem for linear system – Linear System in R^2 – Complex Eigen Values – Multiple Eigen Values – Non Homogeneous Linear System.

UNIT-IV: NON LINEAR SYSTEMS: LOCAL THEORY

Some preliminary concepts & definitions – The Fundamental Existence – Uniqueness Theorem – Dependence on Initial Conditions and Parameters – The Maximum Interval of Existence- The Flow Defined by a Differential Equation.

UNIT-V: TECHNIQUES AND DYNAMICS OF TEACHING- LEARNING

- a. Emerging trends in Educational Psychology– Meaning, Scope and Methods
- b. Learning–Different Theories of learning, Approaches to learning(Classical Conditioning- Ivan Pavlov; Operant conditioning-B.F.Skinner); kinds of learning, factors affecting learning
- c. Motivation: Intrinsic and extrinsic motivation, Development of memory and intelligence.

TEXT BOOKS:

1. I.M.Singer, J.A.Thorpe, Lecture notes on Elementary Topology and Geometry, Spring-Verlag, Newyork,1967.
Unit-I -Chapter -3 ,pg(49-77)
Unit-II-Chapter -4 ,pg (78-108)
2. L.Pergo,Differential Equation and Dynamical System, thirdedition, Springer –Verlag, Newyork,2006
Unit-III-Chapter -1,sections (1.1 to 1.7and 1.10) –pg(1-39 , 60-63)
Unit-IV-Chapter -2,sections (2.1 to 2.5)-pg(65-101)
3. Unit-V
Covey, Stephen.(2004), Habits of Highly effective people, Free Press.
Driscoll. M. P. (2005),Psychology of Learning for Instruction, Pearson Higher Ed.
Gardner, Howard (1983; 1993) Frames of Mind: The theory of multiple intelligences, New York: Basic Books

QUESTION PATTERN

Time: 3Hrs

Max. Marks: 75

Section – A

5x6=30

Answer ALL Questions (Either or Type)

Section – B

3x15=45

Answer any THREE Questions (Out of five)