LOYOLA COLLEGE

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M.Phil. PROGRAMME

SYLLABUS

EFFECTIVE FROM THE ACADEMIC YEAR 2007-2008

LOYOLA COLLEGE

(AUTONOMOUS)

Chennai - 600 034

★ College Conferred with Potential for Excellence by UGC

★ Re-accredited at A+ by NAAC

DEPARTMENT OF MATHEMATICS

M.Phil. Restructured Syllabus

(Effective from 2007-08)

Total Credits : 36

Semester	Nature	Code	Course Title	Credits
1	MC	MT 1117	Algebra & Topology	6
	MC	MT 1118	Analysis	6
2	ES	MT 1260...............................		6
	MC	MT1217	Project & Viva Voce	18

MT 1117 - ALGEBRA AND TOPOLOGY

Paper - 1

Semester I

Category: Major Core (MC)

Credits 6

Hours/Week 6

1. Algebra:

Modules over a principal ideal domain:

Ring of endomorphisms of an abelian group-Left and right modules-Free modules and matrices-Direct sum of modules-Structure theorem for finitely generated modules over a P.I.D.

Lattices and Boolean Algebras:

Partially ordered sets and lattices-Distributivity and modularity-The theorem of Jordan-Holder, Dedekend-The lattice of subspaces of a vector space-Fundamental theorem of projective geometry-Boolean algebras.

Basic structure theory of Rings:

Primitivity and semi primitivity-The radical of a ring-Density theorems-Artinian Rings structure theory of algebras.

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Treatment as in Basic algebra by Nathan Jacobson, Vol I:

Chapter 3-Sections, 3.1 to 3.8 omitting 3.7

Chapter 8-Sections 8.1 to 8.5

Vol II. Chapter 4-Section 4.1 to 4.5.

2. Topology

Homotopy-Fundamental group-covering spaces-goemetry of simplical complexes-Barycentric subdivisions-simplical approximation theorem.

Treatment as in Lecture notes on Elementary Topology and Geometry by I.M. Singer and J.A. Thorpe.

Chapter 3 and 4 (omitting the section on Fundamental group of a simplical complex)

3. Differentiable Manifolds

Differentiable manifolds-Differentiable functions-The induced topology on a manifold-Differentiable varieties-Grassmann manifolds-Tangent vectors-Derived Linear functions-The inverse function theorem-Leibnitz's formula-vector fields-Definition and characteristic properties-the tangent bundle.

Treatment as in Differentiable Manifolds by F. Brickell and R.S.Clark Chapter 2, 4 and 7: Sections 7.1 and 7.2.

References:

1. S. Lang-Algebra, Addison Wesley
2. Maclane and Birkhoff-Algebra, Macmillan.
3. Joachim Lambek-Lectures on Rings and Modules, Chelsea Publishing Co., New York.
4. Atyah-Introduction to Commmutative Algebra-Addison Wesley.
5. Divinsky-Rings and Radicals.
6. John L.Kelley-General Topology, Springer-Verlag.
7. W. Warner—Foundations of Differentiable Manifolds and Lie Groups.

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MT 1118 : ANALYSIS

Paper - II

Semester I   Credits 6

Category: Major Core (MC)   Hours/Week 6

The concepts of Measurability, Simple functions, Elementary properties of Measures, Arithmetic in

Integration of positive functions, integration of complex functions-The role played by sets of measure zero.

Convex functions and inequalities. The spaces. Approximation by continuous functions.

Inner products and Linear Functionals. Orthonormal sets. Trigonometric series.

Banach spaces, consequences of Baire's theorem-Fourier series of ccontinuous functions. Fourier Coefficients of functions. The Hahn-Banach theorem. An abstract approach to the Poisson integral.

Fourier transforms, Formal properties. The inversion theorem. The plancherel theorem. The Banach Algebra-Regular points and singular points-continuation along curves. The monodromy theorem.

Sub harmonic functions, the spaces and *N* the space, the theorem of F. and M. Riesz.

Holomorphic Fourier Transforms —Introduction-Two theorems of Paley and Wiener.

Treatment as in

Real and Complex Analysis by Walter Rudin-Tata Mc Graw Hill Publishing Co. Ltd.

New Delhi, II Edition.

Chapter 1 pp 5-33 ; Chapter 3 pp 62-78; Chapter 4 pp 79-99

Chapter 5 pp 100-123; Chapter 9 pp 192-211; Chapter 16 pp 343-352; Chapter 17 pp. 361- 370 Chapter 19 pp 403-409.

References :

1. Halmos-Measure Theory-Narosa P.H.

2. Barbarian-Measure Theory and Integration. Van Nostrand.

3. A.L Brown and A. Page-Elements of Functional Analysis, Rehinhold Co.

4. Goffman and Pedrick-First Course in Functional Analysis, Prentice Hall.

5. A.I. Markushovich-Theory of Functions of a complex variable Vol I. II, III, Prentice Hall.

6. R. Narishaman-Several Complex variables —University of Chicago Press, Chicago, 1971