



**M.Phil – MATHEMATICS
(ONE YEAR FULL TIME)
CURRICULUM 2008
SEMESTER I**

Code No.	Course Title	L	T	P	C
ZMA101	Algebra	4	4	0	8
ZMA102	Analysis	4	4	0	8
ZMA103	Algebraic Topology	4	4	0	8

Total Hours:24

Total Credits:24

SEMESTER II

Code No.	Course Title	L	T	P	C
ZMA201	Elective *	4	4	0	8
ZMA202	Thesis / Dissertation / Project work **	0	0	0	16

Total Hours:8

Total Credits:24

Over all Credits: 48

* Elective papers will be offered by the respective guides only and it will be evaluated only internally (by the guides).

** Dissertation to be evaluated by the external and internal examiners (guides) jointly.

Viva-voce to be conducted jointly by the external examiner, Head of the concerned department and the guide.



UNIT I : Modules

Free modules – Projective modules – Tensor products – Flat modules.

UNIT II: Localisation

Ideals – Local rings – Localisation – Applications.

UNIT III Noetherian Rings

Noetherian Modules – Primary decomposition – Artinian modules – Length of a module

UNIT IV : Integral Extensions

Integral elements – Integral extensions – Integrally closed domains – Finiteness of integral closure.

UNIT V Dedekind Domains

Valuation rings- Discrete valuation rings – Dedekind domain.

L:60 T:60 Total:120

TEXT BOOKS:

Commutative Algebra by N. S. Gopalakrishnan , Oxonian Press pvt Ltd., New Delhi

Chapter 1: 1.1,1.2,1.3,1.4

Chapter 2: 2.1,2.2,2.3,2.4

Chapter 3: 3.1,3.2,3.3,3.4

Chapter 4 : 4.1,4.2,4.3,4.4

Chapter 5: 5.1,5.2,5.3,5.4

Reference :

Introduction to Commutative Algebra, by M.F. Atiyah, Addison- Wesley Publishing Company.

ZMA102

ANALYSIS

4 4 0 8

UNIT I Abstract Integration

Simple functions – Arithmetic in $[0, \infty]$ – Integration of positive functions – Integration of complex functions – The role played by sets of measure zero.

UNIT II: Positive Borel measures

Topological preliminaries – The Riesz representation theorem – Regularity properties of Borel measures – Lebesgue measure.

UNIT III L^p Space:

Convex functions and inequalities -The L^p – spaces - Approximation by continuous functions.

UNIT IV Elementary Hilbert Space theory:

Inner products and linear functionals – Orthonormal sets – Trigonometric series

UNIT V Examples of Banach Space Techniques

Banach spaces – Consequences of Baire's theorem – The Hahn Banach Theorem – An abstract approach to the Poisson integral

L:60 T:60 Total:120

TEXT BOOKS:

Real And Complex Analysis, 3rd edition, by Walter Rudin, Tata McGraw-Hill edition

Chapter 1 : 1.16, 1.17, 1.22 – 1.41

Chapter 2: 2.3 – 2.23

Chapter 3: 3.1-3.17

Chapter 4: 4.1 – 4.26

Chapter 5: 5.1 – 5.10, 5.16-5.25

Reference Book

Elements of Integration by BARTLE

UNIT I: Some Underlying Geometric Notions

Homotopy and Homotopy Type 1 - Cell Complexes - Operations on Spaces - Two Criteria for Homotopy Equivalence - The Homotopy Extension Property .

UNIT II : The Fundamental Group

Basic Constructions Paths and Homotopy - The Fundamental Group of the Circle - Induced Homomorphisms

UNIT III : Van Kampen's Theorem

Free Products of Groups - The Van Kampen Theorem - Applications to Cell Complexes

UNIT IV : Covering Spaces

Lifting properties - The Classification of Covering Spaces.

UNIT V : Homology

Simplicial and Singular Homology

Δ - Complexes - Simplicial Homology - Singular Homology - Homotopy Invariance

L:60 T:60 Total:120

Text Book:

Algebraic Topology by Allen Hatcher, Cambridge University Press,2002.

Chapter 0 – Page no. 1 - 20

Chapter 1- Page no. 21 – 68

Chapter 2- Page no. 97 – 113

REFERENCE:

1. Algebraic Topology by C.R.F. Maunder, Cambridge University Press,1980(reprinted by Dover Publications)