Syllabus
M.Sc. II SEM
2019-20
Department of Higher Education Govt. of M.P.
Semester wise Syllabus for P.G.
As recommended by Central Board of Studies and
Approved by HH the Governor of M.P.

(Partially revised by the Board of Studies in Mathematics, Govt. Holkar Science College,
Indore on 19-7-2018 and to be effective from academic session 2019-20)

Class : M.Sc. (Mathematics)
Semester : II
Title of subject/Group : ADVANCED ABSTRACT ALGEBRA-II
Paper No. : I
Compulsory/Optional : Compulsory

UNIT – I

Introduction to Modules Examples, Submodules and direct sums, Cyclic module,
R-homomorphisms and Quotient modules, Isomorphism.
(1. Chapter 14 Sections 1-3)

UNIT – II

Completely reducible modules Schur’s lemma, Free modules, Representation of linear mapping,
Rank of linear mapping.
(1. Chapter 14 Sections 4-7)

UNIT – III

Noetherian & Artinian modules and rings, Hilbert basis theorem, Weddeburn- Artin theorem.
(1. Chapter 19 Sections 1-3)

UNIT – IV

Uniform modules, Primary modules, Finitely generated modules over a PID, Decomposition
theorem, Uniqueness of the decomposition. Application to finitely generated abelian groups.
(1. Chapter 19 Sections 4, Chapter 21 Sections 1-3)

UNIT – V

Linear Transformation, The Algebra of Linear Transformation, Characteristic Roots, Canonical
forms (Triangular form, Nilpotent Transformations, Generalized Jordan form over any field,
Rational canonical form).
(1. Chapter 21 Sections 4,5) (2. Chapter 6 Sections 6.1,6.2,6.5,6.6,6.7)

NOTE: Exercise based on theory are expected to be solved.

TEXT BOOK:
   University Press.

REFERENCE:
Department of Higher Education, Govt. of M.P.  
Semester Wise Syllabus For Post Graduates  
As recommended by Central Board of Studies and  
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Class - M.Sc./M.A.  
Subject - Mathematics - II  
Paper Title - Lebesgue Measure & Integration  
Semester - II

Unit - I  

Unit - II  
Integration of Non-negative functions. The General integral. Integration of Series, Reimann and Lebesgue Integrals.

Unit - III  

Unit - IV  

Unit - V  
Dual of space when $1 \leq p < \infty$ convergence in Measure, Uniform. Convergence and almost uniform convergence.

Text book :  
References :  
1. Walter Rudin, Principles of Mathematical Analysis, McGraw-Hill, International student edition,  
Govt. (Model, Autonomous) Holkar Science College, Indore (M.P)
(Department of Higher Education, Govt. of M.P.)
CHOICE BASED CREDIT SYSTEM (CBCS)
Syllabus
(Session 2019-20)

Class: M.Sc. (Mathematics)
Semester – II
Paper III
Title: TOPOLOGY-II

Max Marks: 50

UNIT – I
Separation axioms T0,T1,T2,T3,T4 : Their Characterizations and basic properties. Urysohn’s lemma.
Tietze extension theorem.

UNIT – II
Compactness. Continuous function and compact sets. Basic properties of compactness. Compactness
and finite intersection property. Sequentially and countably compact sets. Local compactness and one
point compactification. Stone-vech compactification. Compactness in metric spaces. Equivalence of
compactness, countable compactness and one point compactification. Stone-vech compactification.
Compactness in metric spaces. Equivalence of compactness, countable compactness and sequential
compactness in metric spaces.

UNIT – III
Tychonoff product topology in terms of standard sub-base and its characterizations. Projection maps.
spaces (Tychonoff’s theorem) Countability and product spaces.

UNIT – IV
Embedding and metrization. Embedding lemma and Tychonoff embedding. The Urysohn metrization
theorem.

Filters and their convergence. Canonical way converting nets to filters and vice-versa. Ultra-filters and
Compactness.

UNIT-V
The fundamental group and covering spaces-Homotopy of paths. The fundamental group. Covering
spaces. The fundamental group of the circle and the fundamental theorem of algebra.

Text Book:

Reference Books:
1. G.F. Simmons, Introduction to Topology and Modern Analysis, McGraw Hill Book Company
Govt. (Model, Autonomous) Holkar Science College, Indore (M.P) 
(Department of Higher Education, Govt. of M.P.) 
CHOICE BASED CREDIT SYSTEM (CBCS) 
Syllabus 
(Session 2019-20)  

Class: M.Sc. (Mathematics) 
Title: Complex Analysis – II  
Semester – II  
Max Marks: 100 (Theory + CCE = 75+25)  

UNIT – I  
Space of continuous analysis functions, Arzela-Ascoli theorem, Space of analytic functions, Hurwitz’s theorem, Montel theorem Riemann mapping theorem.  
(1. Ch. VII, 2. Ch. VIII)  

UNIT – II  
Infinite product of complex numbers and their absolute convergence, Gamma functions and its properties, Riemann zeta function and its properties, Relation between Gamma and Riemann zeta functions, Riemann functional equations, Runge’s theorem, Mittag-leffler’s theorem.  
(1. Ch. VII & VIII, 2. Ch. IX & X)  

UNIT – III  
Entire functions, Weirstrass factorization theorem, Jenson’s inequality, Jenson’s formula, Poisson-Jenson’s formula, Order of an entire function, Hadamard factorization theorem, Hadamard three circle theorem, Exponential convergence, Borel’s theorem.  
(1. Ch. VII & XI, 2. Ch. XII)  

UNIT – IV  
Analytic continuation, Uniqueness of direct analytic continuation, Uniqueness of analytic continuation along a curve, Power series method of analytic continuation. Schwartz’s reflection principle, Monodromy theorem and its consequences.  
(1. Ch. IX, 2.Ch. XI)  

UNIT-V  
Harmonic functions, Harmonic functions on a disk, Harmonack’s inequality and Harmonack’s theorem, Dirichlet problem, Green’s function, Bloch’s theorem, Little Picard theorem, Schottky’s theorem, Montel-caratheodory theorem, Great-picard theorem, Univalent functions, Biberbach’s conjecture and kobe’s ¼ theorem.  
(1. Ch. X & XII, 2. Ch. XIII, XIV, & XV)  

Text Book:  

Reference Books:  
Govt. (Autonomous) Holkar Science College, Indore (M.P.)

(Syllabus)

[ Semesterwise syllabus (CBCS) for M.Sc. Approved by Board of Studies of College for session 2019 – 20 ]

Class: M.Sc. II Sem.
Subject: Mathematics
Paper: V
Title: Advance/Discrete Mathematics - II
Max Marks: (Theory + CCE) 75+25 =100

<table>
<thead>
<tr>
<th>UNIT-I</th>
<th>Directed graphs, Indegree and outdegree of a vertex, weighted undirected graph Dijkstra’s algorithm, strong connectivity and washell’s algorithm directed trees, search trees, tree traversals.</th>
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</thead>
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Text Book:
4. N. Deo, Graph Theory with applications, Preritice – Hill.

References: