Syllabus
M.Sc. I 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 H.H. 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 : I
Title of subject/Group : ADVANCED ABSTRACT ALGEBRA-I
Paper No. : I
Compulsory / Optional : Compulsory

UNIT – I
Normal & Subnormal series of groups, Compositioh series, Jordan-Holder series, Solvable &
Nilpotent groups.
(1. Chapter 6 Sections 1-3)

UNIT – II
Algebraic extension of fields, Irreducible polynomials and Eisenstein criterion, Adjunction of
roots, Algebraic and Transcendental extension of a field. Algebraically closed fields.
(1. Chapter 15 Sections 1-4)

UNIT – III
Splitting fields, Normal extensions, Multiple roots, Finite fields, Seperable and Inseperable
extension.
(1. Chapter 16 Sections 1-5)

UNIT – IV
Galois theory, Automorphism groups and fixed fields, Fundamental theorem of Galois theory,
Fundamental theorem of algebra.
(1. Chapter 17 Sections 1-3)

UNIT – V
Application of Galois Theory to classical problems, Roots of unity and cyclotomic polynomials,
Cyclic extensions, Polynomials solvable by radicals, Insolubility of general equation of degree 5
by radicals.
(1. Chapter 18 Sections 1-3)

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

TEXT BOOK:
   University Press.

REFERENCE:
4. Surjeet Singh and Qazi Zameeruddin, Modern Algebra, Eighth edition, Vikas
   Publishing House.
Unit - I
Definition and existence of Riemann-Stieltjes integral and its Properties, Integration and differentiation, The fundamental theorem of Calculus.

Unit-II
Integration of vector-valued functions, Rectifiable curves, Rearrangements of terms of a series, Riemann’s theorem.

Unit - III
Sequences and series of functions, pointwise and uniform convergence, Cauchy criterion for uniform convergence, Weierstrass M-test, Abel’s and Dirichlet’s tests for uniform convergence, uniform convergence and continuity, uniform convergence and Riemann-Stieltjes integration, uniform convergence and differentiation, Weierstrass approximation theorem, Power series, uniqueness theorem for power series, Abel’s and Tauber’s theorems.

Unit - IV
Functions of several variables, linear transformations, Derivatives in an open subset of $\mathbb{R}^n$, Chain rule, Partial derivatives, interchange of the order of differentiation, Derivatives of higher orders, Taylor’s theorem, Inverse function theorem.

Unit - V
Implicit function theorem, Jacobians, extremum problems with constraints, Lagrange’s multiplier method, Differentiation of integrals, Partitions of unity, Differential forms, Stoke’s theorem.

Text books:

Reference:
1. T.M. Apostol, Mathematical Analysis Narosa.
2. H.L. Rayden, Real Analysis, Macmillan (Indian Edition)
Unit I

Unit II

Unit III
Alternate methods of defining a topology in terms of Kuratowski Closure Operator and Neighbourhood Systems.
Continuous functions and homeomorphism.

Unit IV
First and Second Countable spaces. Lindelof’s theorems. Separable spaces. Second Countability and Separability.

Unit V

References: G.F. Simmons, Introduction to Topology and Modern Analysis, McGraw Hill
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 – I  
Semester – I  
Paper IV  
Max Marks: 100 (Theory + CCE = 75+25)  

Unit-I  
Complex integration, Line Integral, Cauchy’s fundamental theorem, Cauchy-Goursat theorem,  
Cauchy integral formula, Poission’s integral formula, Higher derivatives.  
(1. Ch. IV, 2. Ch. III)  

Unit - II  
Morera’s theorem, Cauchy’s inequality, Liouville’s theorem, The fundamental theorem of  
algebra, Taylor’s theorem, Laurent’s theorem.  
(1. Ch. IV, 2. Ch. III)  

Unit-III  
The maximum modulus principle, Schwartz lemma, Zeros, Singularities and poles of an analytic  
function, Meromorphic functions, The argument principle, Rouche’s theorem.  
(1. Ch. V & VI, 2. Ch. III & IV)  

Unit - IV  
Calculus of residues, Cauchy’s residue theorem, Evaluation of integrals with their properties and  
classifications.  
(1. Ch. V, 2.Ch. V)  

Unit - V  
Mapping by elementary transformation, Bilinear transformation, Linear group, Critical point,  
Fixed point, Cross ratio, Normal forms, Definition and examples of conformal mappings.  
(2. Ch. VI)  

Text Book :  

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

(Syllabus)

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

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<tr>
<td>UNIT-II</td>
<td>Lattices: Lattices as partially ordered sets. Their properties. Lattices as Algebraic systems. Sublattices, Direct products and homomorphism. Some Special Lattice e.g. Complete Complemented and Distributive Lattice.</td>
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<tr>
<td>UNIT-IV</td>
<td>Graph Theory: Definition of Graph, Paths, Circuits, Cycle &amp; Subgraphs. Induced Subgraphs. Degree of a vertex Connectivity. Planar Graphs and their properties. Trees.</td>
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Text Book:
2. N. Deo, Graph Theory with applications, Prentice – Hall.

References: