2017-18

Devi Ahilya University, Indore

Scheme of Examination

Class M.A./M.Sc. (Semester – I)

Subject : Mathematics

Paper	Title of the Paper	Max. Marks		Minimum Passing Marks	
		Theory	C.C.E.	Theory	C.C.E.
I	Advanced Abstract Algebra –I	85	15	28	05
II	Real Analysis	85	15	28	05
III	Topology – I	85	15	28	05
IV	Complex Analysis –I	85	15	28	05
V	(Any one of the following) 1. Differential Equations –I	85	15	28	05
	2. Advanced Discrete Mathematics –I	85	15	28	05
	3. Programming in C-I (Theory and Practical)	Theory-50 Practical - 35	15	Theory- 17 Practical – 12	05

11/05/2015 11/5 11.5.2015 11.5.15 11.5.15 11/5/15 11.5.15 11.05.15

25.7.17

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, DAVV, Indore on 11-05-2015 and to be effective from academic session ~~2015-2016~~ 2017-18.)

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

UNIT – I

Normal & Subnormal series of groups, Composition 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)

11.5.15

25.7.17

11.5.15

11.5.15

11.5.15

11.5.15

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:

1.P.B.Bhattacharya, S.K.Jain and S.R. Nagpaul, Basic Abstract Algebra, Cambridge University Press.

REFERENCE:

2. I.N.Herstein, Topics in Algebra, Wiley Eastern, New Delhi.
3. N.Jacobson, Basic Algebra, Vol.I, II and VIII, Hindustan Publishing Company.
4. Surjeet Singh and Qazi Zameeruddin, Modern Algebra, Eighth edition,Vikas Publishing House.
5. V.Sahai & V.Bisht, Algebra, Narosa Publishing House.

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, DAVV, Indore on 11-05-2015 and to be effective from academic session 2017-18.)

Class	**: M.Sc/ M.A. (Mathematics)**
Semester	**: I**
Title of subject/Group	**: Real Analysis**
Paper No.	**: II**
Compulsory / Optional	**: Compulsory**

Unit-I

Definition and Existence of Riemann-Stieltjes Integral and Its Properties,Integration and differentiation, The fundamental theorem of Calculus, integration by parts.

(1.Chapter 6 Sections 6.1 - 6.22)

Unit-II

Integration of vector-valued functions, Rectifiable curves. Sequences and Series of Funtions: Uniform convergence, Uniform convergence and Continuity.

(1.Chapter 6 Sections 6.23 - 6.27 , Chapter 7 Sections 7.1 - 7.15)

Unit–III

Uniform Convergence and Integration, uniform convergence and differentiation, Equicontinuous Families of Functions , Stone-Weierstrass theorem.

(1.Chapter 7 Sections 7.16 - 7.33)

Unit-IV

Some Special Functions: Power series,The Exponential and Logarithmic Functions, The Trigonometric Functions , The Algebraic Completeness of the complex field, Functions of several variables: linear transformations.

(1.Chapter 8 Sections 8.1 - 8.8, Chapter 9 Sections 9.1 - 9.9)

Unit-V

Functions of several variables: Differentiation , Chain rule, Partial derivatives, The Contraction Principle ,The Inverse function theorem, The Implicit function theorem Derivatives of higher order, differentiation of integrals.

(1.Chapter 9 Sections 9.10 - 9.29, Sections 9.39 , 9.43)

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

Text books

1. **Walter Rudin, Principles of Mathematical Analysis, McGraw Hill.**

Reference

2. T.M. Apostal, Mathematical Analysis Narosa.

3. H.L. Royden, Real Analysis,Macmillan (Indian Edition)

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.
2017-18
(Partially revised by the Board of Studies in Mathematics, DAVV, Indore on 11-05-2015 and to be effective from academic session ~~2015-2016~~.)

Class	**: M.Sc/ M.A. (Mathematics)**
Semester	**: I**
Title of subject/Group	**: Topology -I**
Paper No.	**: III**
Compulsory / Optional	**: Compulsory**

Unit I

Finite and infinite sets.Countable and uncountable sets.Schroeder-Bernstein Theorem. Axiom of Choice. Well-ordered set. Cardinal numbers and its arithmetic. Cantor's Theorem. The Continuum Hypothesis. Zorn's Lemma.

(1. Sections 6,7,9,10,11)

Unit II

Definition and examples of topological space. Bases and Subbases. Order topology, Product topology. Subspaces and relative topology.

(1.Sections 12, 13, 14, 15, 16)

Unit III

Closed sets and Limit points. Closure of a set. Dense subsets. Interior, exterior and boundary of sets.Neighborhoods and Neighborhood system.Continuous functions and Homeomorphism. Examples.

(1. Sections 17.1 to 17.7 and 18)

Unit IV

Connected Spaces. Connected subspaces of the Real Line, Path Connectedness. Components and Local Connectedness.

(1.Sections 23,24,25)

Unit V

The countability axioms: First and Second countable space,Lindeioff's Theorem, Separable space, Second Countability and Separability .Housdorff Space.

(1.Sections 30, 17.8 to 17.10)

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

Text book

1.James R. Munkres, Topology, A First Course, Prentice Hall of India Pvt. Ltd. New Delhi.

Refrence

2.G.F.Simmons. Introduction to Topology and Modern Analysis. McGraw Hill.

3.K.D.Joshi ; Introduction to general Topology, Kelley, Eastern

4.K.P.Gupta:- Topology; Pragrati Prakashan.

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, DAVV, Indore on 11-05-2015 and to be effective from academic session ~~2015-2016.)~~ 2017-18

Class	**: M.Sc/ M.A. (Mathematics)**
Semester	**: I**
Title of subject/Group	**: Complex Analysis – I**
Paper No.	**: IV**
Compulsory / Optional	**: Compulsory**

Unit – I

Complex numbers, Geometrical representation, Complex conjugate, Modulus and argument, Properties of modulus, Properties of arguments, Inequalities of modulus, Cauchy's inequality, Demoiver's theorem, Limit and continuity, Continuous function, Uniform continuity, Analytic function, Cauchy's Riemann equations [Necessary and sufficient condition for f(z) to be analytic], Conjugate functions, Harmonic functions.

(2.Chapter 1 and 2)

Unit – II

Complex integration, Cauchy's fundamental theorem, Cauchy – Gaursat theorem, Cauchy integral formula, higher order derivatives, extension of the Cauchy's theorem to multiply connected regions.

(2.Chapter 3 sections 3.1-3.4,3.6)

Unit – III

Morera's theorem, Cauchy's inequality, Liouville's theorem, the fundamental theorem of algebra, Taylor's theorem, Problems based on Taylor's theorem.

(2.Chapter 3 section 3.7,3.8,3.10 (Only Taylors Th.), Theorem 5-8,13

Unit – IV

The Maximum modulus principal, Schwartz lemma, Laurent series, problems based on Laurent's series, Uniqueness of Laurent expansion.

(2.Chapter 3 sections 3.9,3.10 (Laurent Theorem) Theorem 9,10,11,14,15

KNRajesh 25.7.17

11.5.15 11-5-15 11.5.15 11.5.15 11.05.15

Unit – V

Bilinear Transformation, Fixed points ,Critical points, cross Ratio, normal form of a Bilinear Transformation, Problems on Bilinear Transformation, Mapping by Elementary Transformation (Transition, Rotation, Magnification, Rotation and Magnification, Inversion),Conformal mapping, Necessary and sufficient condition for conformal mapping.

(2.Chapter 6)

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

Text Book

1. J.B. Convey, Functions of one complex variable, Springer – verlag
2.Complex Analysis – Dr. Brijendra singh,Dr. Varsha Karanjgokar , Dr. R.S. Chandel, Golden Valley Publications Agra.

References

3.S. Ponnuswamy, Foundations of complex analysis, Narosa Publishing House.
4.L.V. Ahlfors,Complex analysis, McGraw Hill

2017-18.

Department of Higher Education, Govt. of M.P.

Semester Wise Syllabus For Post Graduates

As recommended by Central Board of Studies and

Approved by HH the Governor of M.P

Class -	**M.Sc./M.A.**
Subject -	**Mathematics**
Paper -	V (Optional (II)
Paper Title -	**Mathematics Differential Equitation - I**
Semester -	**I**

Max.Marks. 100
Theory 85
C.C.E. 15

Unit - I

Initial value problem and inn equivalent integral equation,mth.order equation in d-dimensions as a first order system, Concepts of local existence Existence uniqueness of solutions with examples.

Unit - II

Basic Theorem,Ascoli—Arzela theorem,-. Theorem on convergence of solutions of a family of initial value problems.

Unit -III

Picard-Lindelof theorem, Peano's existence theorem and corollary. Maximal intervals of existence.Extension theorem and corollaries,Kamkes convergence theorem. Kneser's theorem (statement only).

Unit - IV

Differential inequalities and Uniqueness -Gronwall's inequality. Maximal and Minimal solutions Differential inequalities. A Theorem of wintner. Uniqueness Theorems. Nagumo's and Osgood's criteria.

Unit - V

Egres points and Lyapunov Functions. Successive approximations.

Linear Differential Equations--Linear Systems, Variation of constants, reduction to smaller systems. Basic inequalities, constant coefficients. Floquet theory, Adjoint systems, Higher order equations.

Recommended Text

R Hartman, Ordinary Differential Equations, John Wiley (1964).

References

1. W.T. Reid, Ordinary Differential quations, John Wiley a Sons, NY (1971).

KVRajeswari 25.7.17

11.5.15

KVRajeswari 11.5.15

11.5.15

11.5.15

11.5.15

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, DAVV, Indore on 11-05-2015 and to be effective from academic session ~~2015-2016~~ 2017-18.)

Class	**: M.Sc/ M.A. (Mathematics)**
Semester	**: I**
Title of subject/Group	**: Advanced Discrete Mathematic-I**
Paper No.	**: V**
Compulsory / Optional	**: Optional**

UNIT - I

Formal logic: Statement, Connectives, Tautologies, Normal Forms, Ordering and uniqueness of Normal Form.

(1 Chapter 1 Sections 1.1-1.3)

UNIT - II

Semigroups and Monoids: Definition and examples of Semigroups and Monoids (including those pertaining to concatenation operation) Homomorphism of semigroups and monoids, Congruent relation and Quotient Semigroups and Subsemigroups and submonoids Direct products, Basic homomorphisms theorem.

(1. Chapter 3, Scetion 3.2)

UNIT- III

Lattices: Lattices as partially ordered sets, their properties, Lattices as algebraic systems. Sublattices, Direct products and homomorphism, Some Special lattices e.g. Complete Complemented and Distributive Lattices.

(1 Chapter 4, Section 4.1)

UNIT- IV

Boolean Algebras: Boolean Algebras as lattices, Various Boolean identities, Sub algebras, Direct products and Homomorphisms. Join- irreducible elements,

(1 Chapter 4 Section 4.2)

11-5-2015 11-5-15 11-5-15 11.5.15

UNIT- V

Boolean Functions: Boolean Forms and Free Boolean Algebras, Sum- of- products canonical forms, Product-of- sum canonical forms .Value of Boolean Expressions and Boolean functions. Representation and Minimization of Boolean functions, Application of Boolean algebra to switching theory (using AND,OR and NOT gates). The Karnaugh map method.

(1. Chapter 4, Section 4.3, 4.4)

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

Recommended Books

1.J. P. Trembly and R. Manohar, Discrete Mathematical Structures with Applications to Computer Science, McGraw-Hill book Co.,1997 .

References

2.C.L.Liu, Elements of Discrete Mathematics, McGraw-Hill Book Co.

3. N. Deo, Graph Theory with Application to Engineering and Computer Sciences, Prentice Hall of India.

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, DAVV, Indore on 11-05-2015 and to be effective from academic session ~~2015-2016~~ 2017-18.)

Class	**: M.Sc/ M.A. (Mathematics)**
Semester	**: I**
Title of subject/Group	**: Programming in C-I**
Paper No.	**: V**
Compulsory / Optional	**: Optional**

Unit 1

An overview of programming languages. Programming Basics: Basic Structure of C-program(First C program),Identifiers, Keywords, Constants, Variables and Arithmetic expression, Variable Names, Data Types and Sizes, constants, Scalar Data Types declarations, different types of integers, Different kinds of Integer Constants, Character Constants, Floating – point type Constant, Initialization.

(1. Chapter 1 sections 1.1,1.2,1.4 Chapter 2 sections 2.1,2.2,2.3,2.4 Appendix A2.3-2.5)

Unit 2

Operators and Expressions – precedence associatively and order of evaluation, unary plus and minus operators, Arithmetic operators, increment and decrement operators, comma Operator, relational operators, logical operators, bit- manipulation operators, Bitwise assignment operators and expressions, Conditional expressions, cast operators ,size of Operators , conditional Operators , memory operator. Input and Output functions (formatted and unformatted).

(1. Chapter 2 sections 2.5,2.6,2.8-2.12,Chapter 7 Sections 7.1,7.2,7.4, Appendix A 7.4, 7.5)

Unit 3

Control Flow – Statements and blocks, conditional Branching if, if-else, nested if-else, Looping: do while, while and for loop, nested loops.

(1. Chapter 3 sections 3.1,3.2,3.3,3.5,3.6)

11.5.2015

11.5.15

11.5.15

11.5.15

11/05/15

Unit 4

The break and continue statement, the Goto statement and Labels, exit statement, switch statement, infinite loop.

(1. Chapter 3 sections 3.4,3.7,3.8)

Unit 5

Type Conversions, Mixing types explicit conversions – casts, enumeration types. void data type , Typedefs, preprocessor directives, formatting source files ,continuation Character, integer and float conversions, type conversion in assignment.

(1. Chapter 2 section 2.7, Chapter 6 section 6.7, Appendix A 6, A 8.9, A 12,)

NOTE: Algorithms and Programs based on theory are expected to be developed.

Text Book :

1.Brain W Kernigham & Dennis M Ritchie the C Programmed Language 2nd Edition (ANSI features), Prentice Hall 1989.

Reference Book

2.Samuel P. Harkison and Gly L Steele Jr. C; A Reference manual , 2an Edition Prentice hall 1984.