



CHHINDWARA UNIVERSITY, CHHINDWARA

MADHYA PRADESH

Semester wise Syllabus For Post Graduate

Subject- Mathematics



Meeting held on : 11-12 Feb 2020 Only For Session 2019-20

Class : M.Sc./M.A. (Semester-II)

Paper	Title of Paper	Max. Marks		Min. Marks		Total Marks
		Theory	CCE	Theory	CCE	
I	Advanced Abstract Algebra	40	10	15	04	50
II	Lebesgue Measure & Integration	40	10	15	04	50
III	Topology	40	10	15	04	50
IV	Complex Analysis	40	10	15	04	50
Optional Select Any One						
V	Advanced Discrete Mathematics	40	10	15	04	50
	Differential Equation	40	10	15	04	50
	Programming in C	Max. Marks : Theory – 25, CCE – 10, Pract. – 15 Min. Marks : Theory – 12, CCE – 04, Pract. – 06 Note : Paper setting should be containing Only Long Answer Type Questions 5 x 5 = 25 Marks				

The Scheme of examination and the allotment of marks shall be as under :-

Sections/Part	Questions Type	Marks Distribution	Remark
Section - A	Objective Type Questions (One question to be set from each unit)	1 x 5 = 5 Marks	Passing Marks - 15
Section - B	Short Answer Type Questions (Two questions to be set from each unit and one from each unit to be attempted)	2 x 5 = 10 Marks	
Section - C	Long Answer Type Questions (Two questions to be set from each unit and one from each unit to be attempted)	5 x 5 = 25 Marks	
	Total	40 Marks	

Note : Walk-out paper will not be held again.

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Class	:	M.Sc./M.A. (Semester-II)	Max. Marks - 40
Subject	:	Mathematics	Min. Pass. Marks -15
Paper	:	I	
Title	:	Advanced Abstract Algebra	

Unit-I:

The elements of Galois theory: Automorphism of a field, Group Of automorphisms of a field, Fixed field, Normal extension, Galois group of a polynomial, Fundamental theorem of Galois theory, Solution of polynomial equations by radicals, Insolvability of the general equation of degree 5 by radicals.

Unit-II

Introduction to Modules, Examples, Submodules and Direct sum of submodules, R-homomorphisms and Quotient modules, Finitely generated modules, Cyclic module.

Unit-III:

Simple modules, Semi-simple modules, Schur's lemma, Free modules, Rank of a module.

Unit-IV:

Noetherian and Artinian modules, Ascending and Descending chain condition (acc & dcc), Noetherian and Artinian rings, Examples, Hilbert basis theorem.

Unit-V:

Fundamental Structure theorem of finitely generated modules over a Principal Ideal Domain and its applications to finitely generated abelian groups.

Text book :

- (1) P.B. Bhattacharya, S.K.Jain, S.R. Nagpaul, Basic Abstract Algebra, Cambridge University Press, (Indeian Edition)
- (2) I.N. Herstein, Topics in Algebra, Wiley Eastern.
- (3) S.Kumaresan, Linear Algebra-A geometric approach, Prentice Hall India Ltd.

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Class	:	M.Sc./M.A. (Semester-II)	Max. Marks - 40
Subject	:	Mathematics	Min. Pass. Marks -15
Paper	:	II	
Title	:	Lebesgue Measure & Integration	

Unit -I

Lebesgue outer measure. Measurable sets. Regularity. Measurable functions. Borel and Lebesgue measurability. Non-measurable sets.

Unit - II

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

Unit - III

The Four derivatives. Functions of Bounded variation. Lebesgue Differentiation Theorem, Differentiation and Integration.

Unit - IV

The L^p -spaces, Convex functions, Jensen's inequality. Holder and Minkowski inequalities. Completeness of L^p .

Unit . V

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

Text book :

1. G. de Barra. Measure Theory and Integration, Wiley Eastern (Indian Edition)

References :

1. Walter Rudin, Principles of Mathematical Analysis, McGraw-Hill, International student edition,
2. H.L. Royden, Real Analysis, Macmillan, Indian Edition.
3. Dr. H.K. Pathak, Real Analysis, Shiksha Sahitya Prakashan Meerut (UP).

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Class	:	M.Sc./M.A. (Semester-II)	Max. Marks - 40
Subject	:	Mathematics	Min. Pass. Marks -15
Paper	:	III	
Title	:	Topology	

Unit . I

Separation axioms T_0, T_1, T_2, T_3, T_4 : their Characterizations and basic properties. Urysohn's lemma. Tietze extension theorem.

Unit . II

Compactness. Continuous functions and compact sets. Basic properties of compactness. Compactness and finite intersection property. Sequentially and countably compact sets. Local compactness and one point compactification. Stone-ech compactification. Compactness in metric spaces. countable compactness and sequential compactness in metric spaces. Connected spaces. Connectedness on the real line. Components. Locally connected spaces.

Unit .III

Tychonoff product topology in terms of standard sub-base and its characterizations. Projection maps. Separation axioms and product spaces. Connectedness and product spaces. Compactness and product spaces (Tychonoff.s theorem) Countability and product spaces.

Unit . IV

Embedding and metrization. Embedding lemma and Tychonoff embedding. The Urysohn metrization theorem. Local Finiteness, Nagata Smirnov Metrization theorem, Para compactness.

Unit .V

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

Text book :

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

Reference :

1. G.F. Simmons, Introduction to Topology and Modern Analysis, McGraw-Hill Book Company.

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Class	:	M.Sc./M.A. (Semester-II)	Max. Marks - 40
Subject	:	Mathematics	Min. Pass. Marks -15
Paper	:	IV	
Title	:	Complex Analysis	

Unit - I

Weierstrass factorization theorem. Gamma and its properties. Riemann Zeta function. Riemann's functional equation

Unit - II

Runge's Theorem. Mittag-Leffler's theorem. Analytic continuation. Uniqueness of direct analytic continuation. Uniqueness of analytic continuation along a curve. Power series method of analytic continuation.

Unit - III

Schwartz reflection principle. Monodromy theorem and its consequences. Harmonic function on a disc.

Unit - IV

Harnax inequality and theorem. Dirichlet problem. Green's function. Canonical products. Jensen's formula. Hadamard's three circles theorem. Order of an entire function. Exponent of convergence. Borel's theorem. Hadamard's factorization theorem.

Unit-V

The range of an analytic function. Bloch's theorem. The little Picard theorem. Schottky's theorem. Montel Caratheodary and great Picard theorem. Univalent function. Bieberbach conjecture and the $\frac{1}{4}$ - theorem.

Text Book.:-

J.B.Convey ,Functions of one complex variable, Springer-Verlag

Reference s

- 1- S Ponnuswamy, Fundamentals of complex analysis, Narosa Publishing House.
- 2- L.V.Ahlfors, Complex Analysis, McGraw H

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Class	:	M.Sc./M.A. (Semester-II)	Max. Marks - 40
Subject	:	Mathematics	Min. Pass. Marks -15
Paper	:	V - Optional (I)	
Title	:	Advanced Discrete Mathematics	

Unit . I

Directed graphs, Indegree and outdegree of a vertex, weighted undirected graphs Dijkstra's algorithm, strong connectivity and warshall's algorithm of directed trees, search trees, tree traversals.

Unit .II

Introductory computability theory-Finite State Machines and their Transition Table Diagrams. Equivalence of Finite State Machines. Reduced Machines. Homomorphism. Finite Automata. Acceptors.

Unit . III

Non-deterministic Finite Automata and equivalence of its power to that of Deterministic Finite Automata. Moore and Mealy Machines.

Unit . IV

Turing Machine and Partial Recursive Functions. Grammars and Languages-Phrase-Structure Grammars. Rewriting Rules. Derivations.

Unit -V

Sentential Forms, Language generated by grammar, Regular, Context-Free, and Context Sensitive Grammars and Languages. Regular sets. Regular Expressions and the Pumping Lemma. Kleene's Theorem. Notions of Syntax Analysis. Polish Notations. Conversion of Infix Expressions to Polish Notations. The Reverse Polish Notation.

Text Book :

1. J.P. Tremblay & R. Manohar, Discrete Mathematics with Applications to Computer Science, McGraw-Hill Book Co., 1997.
2. K.D. Joshi – Foundation of Discrete Mathematics. John Wiley and sons Ltd.

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Class	:	M.Sc./M.A. (Semester-II)	Max. Marks - 40
Subject	:	Mathematics	Min. Pass. Marks -15
Paper	:	V - Optional (II)	
Title	:	Differential Equations	

Unit - I

Dependence on initial conditions and parameters, Preliminaries, continuity and differentiability, Higher order differentiability.

Unit - II

Poincare - Bendixson Theory-Autonomous systems. Umlanfsatz Index of a stationary point. Poincare - Bendixson theorem, Stability of periodic solutions, rotation points, foci, nodes and saddle points.

Unit -III

Linear second order equations - Preliminaries. Basic facts. Theorems of Sturm, Sturm Liouville Boundary Value Problems. Number of zeroes, Non Oscillatory equations and principal solutions. Non Oscillation theorems.

Unit - IV

Use of Implicit function and fixed point Theorems-Periodic solutions. Linear equations. Non linear problems.

Unit - V

Second order Boundary' value problems, Linear problems, Nonlinear problems, A priori bounds.

Text Book:-

1. R Hartman, Ordinary Differential Equations, John Wiley (1964).
2. G.F. Simmons, Differential Equations with applications and historical notes.

References !

1. W.T. Reid, Ordinary Differential Equations, John Wiley a Sons, NY (1971).
2. H.T.H. Piaggio, An Elementary Traetise on differential equations and their applications. Indian Reprint, 1966.

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Subject	:	Mathematics	Min. Pass. Marks -15
Paper	:	V - Optional (III)	
Title	:	Programming in C	

Unit –I

Control Flow – Conditional Branching, the Switch Statement. looping. nested loops.

Unit-II

The Break and Continue statement .the goto statement, infinite loop.

Unit-III

Operators and Expressions - Precedence and associativity. Unary plus and Minus operators. Binary Arithmetic operators, arithmetic assignment operators. Increment and decrement operators. Comma Operators, Relational operators, logical operators, bit- Manipulation operators, Bitwise assignment operators. Cast operators, size of Operators, Conditional Operators , memory operator.

Unit –IV

Arrays and multidimensional Arrays. Storage Classes – fixed vs. Automatic Duration Scope, global variable.

Unit-V

The Register Specifier Structures and Unions.

Text Books :

Peter A Darnell and Philip E. Margolis, C; A Software Engineering Approched narosa Publishing House (Springer International Student Edition) 1993.

Reference Books:

- 1 Samuel P. Harkison and Gly L Steele Jr. C; A Reference manual, 2nd Edition Prentice hall 1984.
- 2 Brain W Kernigham & Dennis M Ritchie the C Programmed Language 2nd Edition (ANSI features), Prentice Hall 1989.

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