Meeting held on : 11-12 Feb 2020 – Session 2020-21 & Onwards

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

Paper	Title of Paper	Max. Marks		Min. Marks		Total Marks
		Theory	CCE	Theory	CCE	
I	Advanced Abstract Algebra - I	40	10	15	04	50
II	Real Analysis	40	10	15	04	50
III	Topology - I	40	10	15	04	50
IV	Complex Analysis - I	40	10	15	04	50
Optional Select Any One						
V	Advanced Discrete Mathematics - I	40	10	15	04	50
	Differential Equation - I	40	10	15	04	50
	Programming in C - I	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	
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	Passing Marks - 15
	Total	40 Marks	

Note 1 : The Optional paper chosen by candidates in M.Sc./M.A. First Semester can not be changed in Second Semester. The same optional paper must be selected in second Semester.

Note 2 : Walk-out paper will not be held again.

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I. Chairman Dr RK Sonkhia

II. Subject Expert -

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2. Dr Rajesh Tiwari

3. Kamal (Dr Kamal Wadhwa)

4. (Dr JK Maitra)

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

Unit-I:

Another Counting Principle, Conjugacy relation, Normalizer, Class Equation, Cauchy theorem, Sylow's theorems, Double coset, Second & Third part of Sylow's theorem, Application of Sylow's theorems in finite groups.

Unit-II:

Series of Groups: Normal and Subnormal series, Composition series, Zassenhaus lemma, Schreir refinement theorem, Jordan Holder theorem.

Unit-III:

Solvable Groups and its properties, Commutator subgroup, Nilpotent Groups and its properties.

Unit-IV:

Fields: Extension field, Finite extension, Algebraic element, Algebraic and transcendental extension, Roots of polynomials, Splitting field.

Unit-V:

More about roots: Derivative of a polynomial, Simple extension, Primitive element, Separable and inseparable extension, Perfect field, Finite field.

Text books :

(1) I.N. Herstein, Topics in Algebra, Wiley Eastern, New Delhi.
(2) V.Sahai & V. Bisht, Algebra, Narosa Publishing House.

References.

(1) P.B. Bhattacharya, S.K. Jain and S.R. Nagpaul, Basic Abstract Algebra, Cambridge University press.
(2) N.Jacobson, Basic Algegra,Vol I, II & VIII , Hindustan Publishing Company.
(3) S.Lang, Algebra, Addison-wesley.
(4) I.S. Luther & I.B.S. Passi Algebra vol-1,2,3 Narosa company.
(5) Surjeet singh and Quazi Zammeruddin, modern algebra.

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

Unit - I

Defination 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, point wise 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 R^n, Chainrule, 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 :

1. Water Rudin, Principles of Mathematical Analysis, McGraw Hill.

Reference :

1. T.M. Apostal, Mathematical Analysis Narosa.
2. H.L. Rayden, 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-I)	Max. Marks - 40
Subject	:	Mathematics	Min. Pass. Marks -15
Paper	:	III	
Title	:	Topology - I	

Unit - I

Countable and uncountable *sets*. Infinite sets and the Axiom of Choice. Cardinal numbers and its arithmetic. Schroeder-Bernstein theorem, Cantor's theorem and the continuum hypothesis. Zorn's lemma. Well - ordering theorem.

Unit II

Definition and examples of topological spaces. Closed sets. Closure. Dense subsets. Neighbourhoods, interior exterior and boundary of sets. Accumulation points *and* derived set. Bases and sub-bases for Topology. Subspaces and relative topology.

Unit III

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

Unit IV

First and Second Countable spaces. Lindeiof's theorems. Separable spaces. Second Countability and Separability.

Unit V

Path - connecedness, connected spaces. Connectedness on Real line. Components, Locally connected spaces.

Text Books:

J.R. Munkres, Topology - A first course, Prentice-Hall of India.

References:

1. G.F.Simmons, Introduction to Topology and Modern Analysis, Mc Graw Hill
2. K.D. Joshi: Introduction to general topology, Wiley Eastern.
3. Murdeshwar, General Topology

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

Unit-I

Complex integration, Cauchy Goursat theorem, Cauchy integral formula, Higher order derivatives.

Unit - II

Morera's theorem. Cauchy's inequality. Liouville's theorem. The fundamental theorem of algebra.Taylor's theorem.

Unit-III

The maximum modulus principle. Schwarz lemma. Laurent series. Isolated singularities. Meromorphic functions, The argument principle. Rouche's throrem. Inverse function theorem.

Unit - IV

Residues. Cauchy's residue theorem. Evaluation of integrals. Branches of many valued functions with special reference to argz,log z, z^a.

Unit - V

Bilinear transformations, their properties and classification. Definations and examples of conformal mappings.

Text Book :

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

References :

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

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

Unit - I

Semigroups & Monoids - Definition. Example of semi groups and monoids (including those pertaining to concatenation opretion). Homomorphism of semigroups and monoids. Congruence relation and Quotient Semigroups. Subsemigroup and submonoids. Direct products. Basic Homomorphism Theorem.

Unit - II

Lattices-Lattices as partially ordered sets. Their properties. Lattices as Algebraic systems. Sublattices, Direct products and Homomorphisms. Some Special Lattices e.g. Complete Complemented and Distributive Lattice.

Unit -III

Boolean Algebras-Boolean Algebras as Lattices. Various Boolean Identities. The Switching Algebra example. Subalgebras, Direct Products and Homomorphisms. Join-irreducible elements, Atoms and Minterms. Boolean Forms and Their Equivalence. Minterm Boolean Forms, Sum of Products Canonical Forms. Minimization of Boolean Functions. Applications of Boolean Algebra to Switching Theory (using AND, OR, NOT gates). The Karnaugh Map method.

Unit - IV

Graph Theory-Definition of (Undirected) Graphs, Paths, Circuits, Cycles, & Subgraphs. Induced Subgraphs. Degree of a vertex Connectivity. Planar Graphs and their properties Trees.

Unit - V

Euler's Formula for connected Planer Graphs. Complete Bipartite Graphs. Kuratowski's Theorem (statement only) and its uses. Spanning Trees. Cut-sets. Fundamental Cut-sets and Cycles. Minimal Spanning Trees and Kruskal's Algorithm. Matrix Representations of Graphs.

Text books :

1. J.P. Tremblay & R. Manobar, Discrete Mathematical Structures, McGraw Hill.
2. N.Deo, Graph Theory with applications, Preritice-Hill.

References :

1. C.L.Liu, Elements of discrete Mathematics McGraw Hill.
2. J.L. Gersting Mathematical structures for computer Science Computer Science Press NewYork

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

Unit - I

Initial value problem and equivalent integral equation, m^{th} order equation in d-dimensions as a first order system, Concepts of local existence, Existence in the large and uniqueness of solutions with examples.

Unit - II

Basic Theorems, 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.

Text books :

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 quations, 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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Class	:	M.Sc./M.A. (Semester-I)	Max. Marks - 40
Subject	:	Mathematics	Min. Pass. Marks -15
Paper	:	V - Optional (III)	
Title	:	Programming in C - I	

Unit-1

An overview of programming languages

Unit-2

Classification. C Essentials - Programs development, Functions

Unit-3

Anatomy of a C-Function. Variables and Constants Expressions. Assignment Statements.Formatting Source files, Continuation Character, the Preprocessor.

Unit-4

Scalar Data types - Declarations, Different Types of integers. Different kinds of Integer Constants Floating - point type, Initialization

Unit-5

Mixing types, Explicit conversions - casts. Enumeration Types, the void data type ,Typedefs. Pointers.

Text Books :

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

Reference Books:

1 Samuel P. Harkison and Gly L Steele Jr. C; A Reference manual, 2an 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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