SHIVAJI UNIVERSITY KOLHAPUR

B

Accredited By NAAC

M.Sc- Tech Mathematics.

M. Sc. Tech Mathematics Course Structure
Part-I
SEMESTER – I
MIM -101- Real Analysis
MIM -102- Algebra-I
MIM -103- Discrete Mathematical Structure-I
MIM-104- Syllabus of Computer Architecture
MIM -105- Programming in C with ANSI feature-I
MIM-106- Lab Work (Assignment List)

SEMESTER – II

MIM -201- Real and Complex Analysis
MIM -202- Algebra-II
MIM -203- Discrete Mathematical Structure-II
MIM-204- Data Structure Using C
MIM -205- Programming in C with ANSI feature-II
MIM-206- Lab Work (Assignment List)

Part-II
SEMESTER – III
MIM -301- Topology/Differential Equation
MIM -302- Database
MIM -303- Object Oriented Programming with C++
MIM -304- Operating Systems - I
MIM-305- Design and Analysis of Algorithms-I
MIM-306- Lab Course (External Examiner/s required)
(A) Assignments in C++
(B) Project
SEMESTER – IV
MIM -401- Functional Analysis
MIM -402- Operations Research
MIM -403- Object Oriented Programming with Java
MIM -404- Operating System - II
MIM-405-Design and Analysis of Algorithms - II
MIM-406- Departmental Lab Course
(A) Assignments in Java B) Project

Part-III

SEMESTER – V

MIM -501- Complier Techniques
MIM -502- Software Engineering
MIM -503- Computer Networks
MIM -504- Computer Graphics
MIM-505- Departmental Electives
E1- Artificial Intelligence
E2- Modeling, Simulation and Monte Carlo Methods
E3- Mathematics of Finance and Insurance
E4- Cryptography and Network Security
E5- Probability and Measure
E6- Fuzzy Sets and their applications
E7- Emerging Technologies
MIM-506- Lab Course (External Examiner/s required)
(A) Assignments in Graphics & Networking
(B) Project(External Examiner/s required)

SEMESTER – VI

Project work in Industry or Institution for the full semester. There will be viva at the end of the academic Year and the project work will be graded.

M. Sc. Tech. (Mathematics) SYLLABI
(i)   Paper: MIM 101
(ii)   Title of Paper: Real Analysis (Revised from 2010)
(iii)   A brief note: - Notations and concepts are taken from the book Principles of Mathematical Analysis by W. Rudin; this should be taken in account for examination point of view.
 (iv)   UNIT   No. of Lectures

Unit 1: Metric spaces and its topology- Metric spaces, limit point, interior point, compact sets, connected sets, Weiestrass' theorem, Numerical sequences and series- Convergent sequences, Cauchy sequences, upper and Lower limits, Some special sequences.
                                                                      15 Lectures
Unit 2: Series of nonnegative terms, the root and ratio test, Power series, summation by parts, Absolute and conditional convergence, Addition and Multiplication of series, Rearrangements. Continuity of functions in metric spaces, Continuity and compactness, Continuity and Connectedness, Discontinuities, Monotonic functions.   **15 Lectures**

Unit 3: Differentiation-Derivative of a real function, Mean value theorems, Continuity of derivatives, L' Hospital rule, Taylor's theorem
Riemann-Stieljes integral- Definition and existence of integrals, properties of integrals, Integration and differentiation, the fundamental theorem of calculus,   **15 Lectures**

Unit 4: Integration of vector- valued function, rectifiable curves. Sequences and series of functions- Uniform convergence, uniform convergence and Continuity, uniform convergence and Integration, uniform convergence and differentiation, Equicontinuous family of functions.   **15 Lectures**

 (vi)   Recommended Reading :

a) Basic Reading: Walter Rudin: Principles of Mathematical Analysis
b) Additional Reading: T. M. Apostol: Mathematical Analysis, Narosa Publishing House, 1985
c) References
i)   Books: I. N. Natanson,"Theory of Functions of a Real Variable" Fredrik Pub. Co., 1964.

NOTE :
i) The details of field work, seminar, Group Discussion and Oral examination be given
   wherever necessary.   **1 Hr per week for problem solving/tutorial/seminar**
ii) General/Specific instructions for Laboratory safety should be given wherever
    necessary)   **NIL**

M. Sc. Tech. (Mathematics) SYLLABI

MIM 102: Algebra

Topic 1:

Groups, subgroups, cosets, Lagrange's theorem, normal subgroups, quotient groups, homomorphism, isomorphism theorems, Cayley's theorem, permutation groups,

conjugacy, class equation, simple groups, simplicity of A_n (n > 5), Sylow theorems,

direct sums, structure theorem for finite abelian groups. Normal and subnormal series,

composition series, Jordan holder theorem, solvable groups.

(20)

Topic 2:

Rings, ideals, prime ideals, maximal ideals, homomorphisms,

Quotient rings, integral domains, fields, characteristic of an integral domain, prime fields.

Euclidean domains, unique factorization domains, principal ideal domain. Guass' theorem, unique factorization in polynomia' rings. Eisenstenin's criterion of irreducibility, chain conditions, on rings. Noetherian and Artinian rings.

(20)

Topic 3:

Modules, Sub modules. Quotient modules. Homomorphism and Isomorphism theorems. (05)

Topic 4:

Galois Theory-Extension fields, algebraic and transcendental extension, separable

and inseparable extension, normal extensions.

(05)

Reference Books :

(1) " Basic Abstract Algebra" by Bhattacharya, Jain and Nagpal, 2nd Edition.

(2) " Algebra" by S.Mcclane and G.Birkhoff, 2nd Edition,

(3) " Basic Algebra" by N.Jacbson,Hind.Pub.Corp.1984.

(4) " A first course in Abstract Algebra" by John Fraleigh (3rd Edition), Narossa Publishing House, New Delhi.

M. Sc. Tech. (Mathematics) SYLLABI

MIM 103: Discrete Mathematical Structures - I

Topic 1:

Formal Logic-Statements. Symbolic Representation and Tautologies. Quantifiers, Predicates and Validity. Prepositional Logic. (05)

Topic 2:

Semi groups & Monoids, Relations and Ordering, Transitive Closure of a relation, Functions. Definitions and Examples of Semi groups and Monoids (including those

pertaining to concatenation operation). Homomorphism of Semi groups and monoids.
(05)
Topic 3:
Congruence relation. Quotient Semi groups. Sub semi groups and sub monoids. Direct products. Basic Homomorphism Theorem. (05)
Topic 4:
Lattices-Lattices as partially ordered sets. Their properties. Lattices as Algebraic systems. Sub lattices, Direct products, and Homomorphism. Some Special Lattices e.g.,
Complete, Complemented and Distributive Lattices.
(10)
Topic 5:
Boolean Algebras-Boolean Algebras as Lattices. Various Boolean identities. The Switching Algebra example. Sub algebras, Direct Products and Homomorphism. Joinirreducible
elements, Atoms and Minterms. Boolean Forms and Their Equivalence. Minterm (07)
Topic 6:
Boolean Forms, Sum of Products Canonical Forms. Minimization of Boolean Functions. Applications of Boolean Algebra to Switching Theory (using AND, OR &
NOT gats). The Karnaugh Map method. (08)

References
1. J.P.Tremblay & R.Manohar, Discrete Mathematical Structures with Applications to Computer Science, McGraw-Hill Book Co.,1999.
2. J.L. Gersting, Mathematical Structures for Computer Science, (3rd edition), Computer Science Press, New York. Seymour Lepschutz, Finite Mathematics (International edition 1983), McGraw-Hill Book Company, New York.
3. S. Witala, Discrete Mathematics – A Unified Approach, McGraw-Hill Book Co. J.E.Hopcroft and J.D. Ullman, Introduction to Automata Theory, Languages & Computation, Narosa Publishing House.
4. C. L. Liu, Elements of Discrete Mathematics, McGraw-Hill Book Co.
5. N. Deo, Graph Theory with Applications to Engineering and Computer Sciences, Prentice Hall of India.

M. Sc. Tech. (Mathematics) SYLLABI
MIM 104: Computer Architecture - I
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Topic 1:
Basics of Digital Electronics:- bits, Bytes, Binary Addition, Subtraction, Gates, Boolean Algebra, Half Adder, half-sub tractor, Full adder, 2's Compliment method of subtraction, De-Morgan's Theorems, Flip-Flops, Register. (08)
Topic 2:
Uni-processors:- computer Organization, History of Microprocessors, Microprocessor Architecture, RAM, ROM, Instruction set, Machine and Assembly Language, Instruction Decoding, Microprocessor Performance and trends, Progression of Intel Microprocessor, Architecture of 8086,

80286,80486,80586. (08)

Topic 3:

Storage devices: Magnetic Storage, Optical: CD-R/CD-RW

(08)

Topic 4:

Input Output Devices: Keyboard, Mouse, Introduction to Computer Monitors, The Basics, Display Technology, Background, VGT, DVI, Viewable Area, Maximum Resolution and Dot Pitch, Power Consumption, Monitor Trends: Flat Panels.

(08)

Topic 5:

Introduction to Parallel Computing: Concept and Terminology, von Neumann Computer Architecture, Flynn's Taxonomy, Some General Parallel Terminology, Parallel Computer Memory Architectures: Shared Memory, Distributed Memory, Parallel Model Designing Parallel Programs: Automatic vs. Manual Parallelization, Understand the problem and the Program, Partitioning, Communications, Synchronization, Data Dependencies, Load Balancing, Parallel Examples: Systolic and Wave front Array Processor, PI Calculation, Simple Heat equation, 1-D wave Equation.

(16)

References :

1. H.S. Stone, Introduction to Computer Architecture, Galgotia.
2. J.P. Hayes, Computer Architecture and Organization, McGraw-Hill.
3. K. Hwang & F.A. Briggs, Computer Architecture & Parallel Processing, McGraw-Hill.
4. P.M. Kogge, The Architecture of Pipelined Computers, McGraw-Hill.
5. J.L. Hennessy & D.A. Patterson, Computer Architecture : A Quantitative Approach, Morgan Kauffmann.
6. J.G. Mayers, Advances in Computer Architecture, John Wiley.
7. Aaron M. Tenenbaum, Yedidyah Langsam & Moshe J. Augenstein, Data Structures using C, Prentice-Hall of India Pvt. Ltd. New Delhi, 1994.

M. Sc. Tech. (Mathematics) SYLLABI

MIM 105 Programming in C with ANSI FEATURES - I

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Topic 1: Introduction

1.1 An overview of programming & Programming languages

1.2 C Essentials- Structure of C Program.

1.3 Variables and Constants

1.4 Assignment statements-Continuation Character

(04)

Topic 2: Data Types

2.1 Sealar Declarations

2.2 Integers, Different kind of integer Constants, Floating point numbers, Char, Initialization

2.3 Mixing types Explicit conversion Casts-Enumeration types.

2.4 Void data type

(06)

Topic 3: Operators and Expressions

3.1 Unary plus and minus operators
3.2 Binary Arithmetic operators
3.3 Increment and Decrement Operators-Comma Operators-Relational Operators,
Logic Operators, Conditional Operators
3.4 Assignment Operator
3.5 Bit-Manipulation Operators
3.6 Size of Operators
3.7 Precedence and Associativity
(10)
Topic 4: Control Statements
4.1 If Statements
4.2 Conditional Branching – The SWITCH statement
4.3 Looping –Nested Loops
4.4 The BREAK and CONTINUE statements. GOTO statement infinite loops.
(8)
Topic 5: Functions
5.1 Declarations and calls
5.2 Passing arguments
5.3 Recursion
5.4 Storage Classes – scope of variable, global variable, external and register variables (8)
Topic 6: Arrays and Pointers
6.1 Concepts and Declarations of an Array
6.2 Initializing Arrays
6.3 Pointer Arithmetic – Passing Pointers as Function Arguments
6.4 Accessing Array elements through Pointers
6.5 Passing Arrays as Function Arguments
6.6 String Manipulations, Multidimensional Arrays-Arrays of Pointers, to pointers.
6.7 Dynamic Memory Allocation
8
(08)
Topic 7: Structures and Unions
7.1 Structures
7.2 Structures and Functions
7.3 Array of Structures
7.4 Self Referential Structures
7.5 Unions (06)

Reference

1. Peter A. Darnell and Philip E. Margolis, C: A software Engineering Approach, Narosa Publishing House (Springer International Student Edition), 1993.
2. Samuel P. Harkison and Gly L. Steele Jr., C: A Reference Manual, 2nd Edition, Prentice Hall, 1984.
3. Brain W. Kernighan & Dennis M. Ritchie, The C Programme Language, 2nd Edition, (ANSI features) Prentice

MIM – 106 – Practical Courses

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Practical depending on MIM 105

Guidelines for the practical:-

Topics No.of practicals

1) Simple programmes 1

2) Programmes related to data-types 2

3) Practical on out put 3

4) Programmes on Control Structures if else
Switch / loop 6

5) Practical related to functions 2

6) Practical related to arrays 6
(Vectors & Matrices)

7) Practical related to pointers 2

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M. Sc. Tech. (Mathematics) SYLLABI

(i)   Paper –   MIM 201 (Revised from 2010)

(ii)   Title of Paper: Real and Complex Analysis

(iii)   Specific Objectives: To introduce basic notions in Real and complex Analysis along with their uses in developing advanced mathematics.

(iv) A brief note :- (Unit wise equal weightage should be given in question paper) Theorems and proofs are expected to be prepared from the book Real Analysis by Royden H. L. and Functions of One Complex Variable by J.B. Conway

(v)   UNIT   No. of Lectures

Unit 1: Outer measure, Measurable sets and Lebesgue measure, Non-measurable set, Measurable functions and their properties, Littlewood three principals.   **15 Lectures**

Unit 2: Riemann Integral versus Lebesgue integral, Lebesgue integral of a bounded function over a set of finite measure.   **15 Lectures**

Unit 3: Power series, Radius of convergence, analytic functions, Mobius transformations, crass ratios, Curves in complex plane.   **15 Lectures**

Unit 4: Complex integration, Power series representation of analytic functions, Cauchy integral formula, zeros, Liouvilles theorem, winding or Index number, Maximum modulus theorem.   **15 Lectures**

(vi)   Recommended Reading :
            a) Basic Reading :-
                 1. Royden H. L.: Real Analysis, Prentice Hall India Pvt. Ltd., 2001

2. J.B. Conway: Functions of One Complex Variable (3rd Edition) Narosa Publishing House.
   b) Additional Reading :- -
      1. Halmos P. R. : Measure Theory : Van Liastrand 1950
      2. Alfors L. V,: Complex Analysis, McGraw 1979.
   c) i) Books Rudin W.: Real and Complex Analysis, Tata McGraw Hill. 1974
         ii) Periodicals/Journals:
 NOTE :
i)   The details of fieldwork, seminar, Group Discussion and Oral examination be given wherever necessary.
         1 hr per week for tutorials/seminars/ problem solving.
ii) General/Specific instructions for Laboratory safety should be given wherever necessary) **NIL**

M. Sc. Tech. (Mathematics) SYLLABI
MIM : 203 Discrete Mathematical Structures
Topic1:Graph Theory-Definition of (undirected) Graphs, Paths, Circuits, Cycles, &
Subgraphs. Induced Subgraphs. Degree of a vertex. Connectivity. Planar Graphs and their
properties. Trees. Euler's Formula for connected Planar Graphs.
Complete & Complete Bipartite Graphs. Kuratowski's Theorem and its use. Spanning
Trees, Cut-sets, Fundamental Cut-sets, and Cycles. Minimal Spanning Trees and
Kruskal's Alogrithm. Matrix Representations of Graphs.
Euler's Theorem on the Existence of Eulerian Paths and Circuits. Directed Graphs.
Indegree and Outdegree of a Vertex.
Weighted undirected Graphs. Dijkstra's Algorithm. Strong Connectivity & Warshall's
Algorithm. Directed Trees. Search Trees. Tree Traversals.
Topic2:Introductory Computability Theory-Finite State Machines and their
transition Table Diagrams. Equivalence of Finite State Machines. Reduced Machines.
Homomorphism. Finite Automata. Acceptors. Non-deterministic Finite Automata and
equivalence of its power to that of Deterministic Finite Automata. Moore and Mealy
Machines.
Topic3:Turing Machine and Partial Recursive Functions:
Topic 4: Grammars and Languages-Structure Grammars: Rewriting Rulers.
Derivations. Sentential Forms. Language generated by a Grammar. Regular, Context-

Free, and Context Sensitive Grammars and Languages. Regular sets, Regular Expressions
and the Pumping Lemma. Kleene's Theorem.

References

1. J.P.Tremblay & R.Manohar, Discrete Mathematical Structures with Applications
to Computer Science, McGraw-Hill Book Co.,1999.
2. J.L. Gersting, Mathematical Structures for Computer Science, (3rd edition), Computer Science Press, New York.
3. Seymour Lepschutz, Finite Mathematics (International edition 1983), McGraw-Hill Book Company, New York.
4. S. Witala, Discrete Mathematics – A Unified Approach, McGraw-Hill Book Co.
5. J.E.Hopcroft and J.D. Ullman, Introduction to Automata Theory, Languages & Computation, Narosa Publishing House.
6. C. L. Liu, Elements of Discrete Mathematics, McGraw-Hill Book Co.
7. N. Deo, Graph Theory with Applications to Engineering and Computer Sciences,
Prentice Hall of India.

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M. Sc. Tech. (Mathematics) SYLLABI

MIM 204: Data Structures Using C

1 Introduction
1.1 Data, Data Types, an abstract Data type
1.2 Data Structure
1.3 Arrays as abstract data types (1D, 2D, Multidimensional)
2 Stacks
2.1 Concepts push and pop operations
2.2 Stack implementation using C
2.3 Stack Applications
2.3.1 Infix to Postfix conversion of expression
2.3.2 Expression evaluation
2.3.3 Recursion
3. Queues
3.1 Concept, insert, delete operations
3.2 Queue implementation using C
3.3 Queue Applications: priority queues
4. Linked lists
4.1 Concepts, Operations: Insert, Delete, Traversal
4.2 Static implementation using arrays
4.3 Dynamic implementation
4.4 Doubly linked lists
4.5 Circular lists
4.6 Linked lists applications
4.6.1 Polynomial representation
4.6.2 Stacks and queues as linked lists
5. Trees,
5.1 Terminology and concepts
5.2 Binary trees representation
5.2.1 Static implementation using arrays
5.2.2 Linked representation
5.2.3 binary search tree
5.2.4 Operation insert and Delete

5.2.5 Tree traversals
5.3 Representing trees as binary trees
6 Sorting
6.1 Concepts and needs

15

6.2 Performance criteria
6.3 Techniques
6.3.1 Bubbles
6.3.2 Quick
6.3.3 Selection
6.3.4 Insertion
6.3.5 Tree (Heap)
6.3.6 Merge
6.3.7 Radio
7 Graphs
7.1 Terminology and concepts
7.2 Graph representation: adjacency – matrix, lists, multilists
7.3 Traversal: Depth 1st and breadth 1st

References :
1. Data Structures using C, Aaron M. Tenenbaum, Yedidyah Langsam & Moshe J. Augenstein, , Prentice-Hall of India Pvt. Ltd. New Delhi, 1994.
2. Classic data Structures, Samantha PHI, 2002
3. Fundamentals of Data Structures in PASCAL, Horowitz, Sahani, Galgotia.

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M. Sc. Tech. (Mathematics) SYLLABI

MIM 205 Programming in C with ANSI features

Topic 1: Files. In C
1.1 Input/ output streams
1.2 Opening and closing a file, Reading and writing data
1.3 File operation
1.4 Error handling with files
1.5 Command line arguments
2. Graphics in C
2.1 Concepts
2.2 initgraph, close graph
2.3 Simple programs
3. C Preprocessor
3.1 Macro substitution
3.2 Conditional compilation
3.3 Include facility
3.4 Line control
4. Types of files
4.1 Physical file
4.2 Logical file
4.3 Special characters in file
4.4 Memory Hierarchy
5. File organization
5.1 Introduction
5.2 Fields and record organization
5.3 Types of file organization
5.4 Choosing a file organization
5.5 Overview of indexes
5.6 Types of Indexes
6. Trees Structured indexing
6.1 Introduction

Reference Books

1. C Programming, Dennis M. Ritchie
2. Let us C, Kanitkar
3. Programming in ANSI C, E BALGURUSWAMI
4. Fundamentals of Database system, Elmasari and Navathe
5. Database management systems, Reghuramakrishanan Johannes
6. Database system concepts, H Korth and A Siberschatz

M. Sc. Tech. (Mathematics) SYLLABI

MIM 206 Lab Work

1. Write a C program to create a file and court the number of word and lines and characters in the file
2. Write a C program to encrypt, decrypt the concepts of a file using a command lines arguments
3. Write a C program to display the following pictures using graphics (See Figure given below)
4. Hash table for C identifiers
5. Dense index
6. Evaluation of postfix expression
7. Implementation of reservation systems using queues
8. Addition of two polynomials in one variable using linked lists
9. Creation of binary search tree of integers and displaying its traversals
10. To count the number of steps of quick sort and merge sort
11. Conversion of the adjacency matrix to adjacency lists and calculate in degree and out degree of each vertex of the graph.   18

NEW/REVISED SYLLABUS FOR
M. Sc. Tech. Mathematics (Part II) (Semester III)
(Credit System)
(Introduced from June 2009onwards)

 (i) **Paper**   **MIN 301**
 (ii) **Title Of Paper:**   **Topology**
 (iii) **Specific Objectives: -**
 (iv) **A brief note :- (Unit wise equal weightage should be given in question paper)**
Theorems and proofs are expected to be prepared from the book Foundations of General Topology by W. J. Pervin

 (v) **UNIT**   **No. of Lectures**
Unit-I: Topological spaces. Open sets, Closed sets. Interior points, Closure points. Limit points, Boundrary points, exterior points of a set, Closure of a set, Derived set,   Dense subsets. Basis, subbase, various ways of defining topologies, relative topology.
                                                            15 Lectures
Unit-II: Continuous functions and homeomorphism. First and Second Countable Spaces, Lindelof Spaces, Separable spaces, Connected Spaces, locally connectedness, Connectedness on the real line, Components.   **15 Lectures**
Unit-III: Compact Spaces, compact sets, properties of Compactness. Compactness and finite intersection property, Sequentially and countable compact sets, Local compactness and one point Compactification, Equivalence of Compactness, Countable and Sequential Compactness.
Separation Axioms: T_0 , T_1 and T_2 spaces, examples and basic properties. **15 Lectures**
Unit-IV: Regular and normal spaces and Tychnoff spaces, Urysohn's Lemma, Tietze Extension Theorem, T_3 T_4 & T_5 spaces, finite product topological spaces and some properties.   **15 Lectures**

(vi)   Recommended Reading :
a) Basic Reading   :- 1. W. J. Pervin, Foundations of General Topology
2. Willard, Topology, Academic press
b) Additional Reading   : -
c) References   :-
      i) Books :-   Topology, A First Course By: J. R. Munkers Prentice Hall of India Pvt. Ltd.
      ii) Periodicals/Journals:

NOTE :
i) The details of field work, seminar, Group Discussion and Oral examination be given
   wherever necessary.   **1 Hr per week for problem solving/tutorial/seminar**
ii) General/Specific instructions for Laboratory safety should be given wherever
    necessary)   **NIL**

(i)   Paper   MIN 301
                  (Introduced from June 2010 onwards)
(i)   Paper –
(ii)   Title of Paper: Differential Equations
(iii)   Specific Objectives: To study basic notions in Differential Equations and use
                                 the results in developing advanced mathematics.
(iv)   A brief note :- Theorems and proofs are expected to be prepared from An
introduction to ordinary differential equations by E.A. Coddington.
(v)   UNIT   No. of Lectures

Unit – I Linear Equations with constant coefficients:
The second order homogeneous equation, Initial value problems for second order
equations, Linear dependence and independence, A formula for the Wronskian, The non-
homogeneous equations of order two, The homogeneous equations of order n.

                                                                15 Lectures

Unit - II Initial value problems for the nth order equations, The non-homogeneous
equation of nth order.

        Linear Equations with variable coefficients: Initial value problems for the
homogeneous equations.   **15 Lectures**

Unit - III Solutions of the homogeneous equations, The Wronskian and linear
independence, Reduction of the order of a homogeneous equation, The non-homogenous
equations, Homogeneous equations with analytic coefficients, The Legendre equations.

        Linear Equations with regular singular points: The Euler equations, Second order
equations with regular singular points.   **15 Lectures**

Unit – IV The Bessel equation, Regular singular points at infinity,

        Existence and uniqueness of solutions: The method of successive approximations,
The Lipschitz condition of the successive approximation. Convergence of the successive
approximation.   **15 Lectures**

 (vi)   **Recommended Reading :**
         (In MLA/APA Style Sheet Format)
 a) **Basic Reading:-** An introduction to ordinary differential equations. by E.A.
 Coddington (1974) Prentice Hall of India Pvt.Ltd. New Delhi.
b) **Additional Reading   :-** Differential Equations with Applications and Historical
not by G.F. Simmons (1972) MeGraw Hill, Inc. New York.
c) **References i)   Books:-** 1. Theory of ordinary differential equations by E.A.
                    Coddington and Levinson (1955) McGraw Hill, New York
2. Elementary differential equations by E.D. Rainvills (1964) The Macmillan company,
   New York.
3. Ordinary Differential equations by G. Birkoff and G.G.Rota John Willey and Sons.
ii) Periodicals/Journals: Journal of Pure and Applied Mathematics (NOTE:
    i)   The details of field work, seminar, Group Discussion and Oral examination
            be given   wherever necessary. **1 Hr per week for problem solving /
            tutorial/seminar**
    ii)   General/Specific instructions for Laboratory safety should be given wherever
            necessary)   **Nil**

(i)   **Paper:**   **MIN 302**
(ii)   **Title of Paper:**   **Database Systems**
(iii)   **Specific Objectives: -**
(iv)   **A brief note: (Unit wise equal weightage should be given in question paper)**
Theorems and proofs are expected to be prepared from the book Principles of Database
Systems by J. D. Ullman
(v)   **UNIT**   **No. of Lectures**

Unit – I An Overview of a Database System: A Database System, Levels of Abstraction in a DBMS, Differing Perceptions of the Database, A Model of the Real World. **Physical Data Organization:** A Model for External Storage Organization, Hashed files, Indexed files, B-trees, Files with Dense Index, Files with Variable Length records, Data Structures for Lookup on Nonkey Fields, Partial Match Retrieval   **15 Lectures**

Unit – II The Three Great Data Models: The Relational Data Model, The Network Data Model, The Hierarchical Data Model, Comparison of the Models **Data Manipulation Languages for the Relational Model:** Relational Algebra, Relational Calculus, General Comments Regarding Query Language, SQUARE and SEQUEL: Evolutionary Steps between Algebraic and Calculus Languages, QUEL: A Tuple Relational Calculus Language, Query by Example, SQl, PL/SQL   **15 Lectures**

Unit – III   Design Theory for Relational Databases: What Constitutes a Bad Database Design?, Functional Dependencies, Decomposition of Relation Schemes, Normal Forms for Relation Schemes, Multivalued Dependencies, Fourth Normal Form **Query Optimization:** General Remarks about Optimization, Algebraic Manipulation, The QUEL Decomposition Algorithm, Exact Optimization for a Subset of Relational Queries   **15 Lectures**

Unit – IV Transaction Management and Concurrency Control: ACID Properties of transaction, Serial schedule, Concurrent schedule, Serializability, Conflict Serializability, View Serializability, Recoverable Schedule, Locking 2Pl, Strict 2PL, Rigorous 2PL, Time-Stamp Ordering, Thomos- corite rule, giranularity of data items **Security & Protection:** Role of DBA, File Structure, Table Space Segments, Data Dictionary Management, Memory Structure, Process Structure, Backup and Recovery system.   **15 Lectures**

(vi)   Recommended Reading: (In MLA/APA Style Sheet Format)

a) Basic Reading   **:-** 1. Principles of Database Systems by J. D. Ullman (Computer Science Press)
b) Additional Reading 1. Database System Concepts (Third Edition) by A. Silberschatz, H. F. Korth, S. Sudarshan (The McGraw-Hill Companies)
    2.   Database Management System by Raghu Ramkrishna

c) References   **:-**
i)   Books :- 1. PL/SQL by Iran Bayross
    2.   Oracle 8i
       ii) Periodicals/Journals:

(NOTE :
i) The details of field work, seminar, Group Discussion and Oral examination be given wherever necessary.   **1 Hr per week for problem solving/tutorial/seminar**

ii) General/Specific instructions for Laboratory safety should be given wherever   necessary)
         NIL

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NEW/REVISED SYLLABUS FOR
M. Sc. Tech. Mathematics (Part II) (Semester III)
(Credit System)
(Introduced from June 2009 onwards)

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 (i)   Paper: MIN 303
 (ii)   Title Of Paper: Object Oriented Programming with C++
 (iii)   Specific Objectives: -
 (iv)   A brief note :- (Unit wise equal weightage should be given in question paper)
Theorems and proofs are expected to be prepared from the book C++ Primer by Lippman
(v)   UNIT   No. of Lectures

Unit-I Introduction to Object Oriented Paradigms: Basic terminology and features. Skeleton of an Object Oriented Program - Creating and Using Classes and members, constructors, member initialization list, member wise assignment, efficiency considerations. Copy constructor and destructors. **Constant objects** and member functions, **Static** data members and functions, **Friend** Function, friend class , non member functions, this pointer, Dynamic memory allocation, Nested classes, **Composition**, introduction to Namespace.   **15 Lectures**

Unit-II Operator overloading and user defined conversions – operator overloading fundamentals ,Restrictions., overloading urinary & binary operators, overloading stream (<< & >>) operators, User defined Conversions. **Inheritance**- defining a class hierarchy, Base class member access, Base and Derived class constructor, Object Slicing, public, private & protected inheritance, multilevel inheritance. Direct base classes & indirect base classes, Multiple inheritance.   **15 Lectures**

Unit-III Virtual functions and Polymorphism- early and late binding, virtual table, virtual pointer, pure virtual functions, virtual base class, virtual inheritance, Run Time Type Identification.   **15 Lectures**

Unit-IV Generic Programming- overview, Function templates, Class templates, member templates, Specialization, overview of Standard Template Library. **Exception handling**- keywords, basics of c++ exceptions, catching an exception, re-throwing an exception and stack unwinding.   **15 Lectures**

(vi)   Recommended Reading :   a) Basic Reading :- 1.C++ Primer – Lippman
2.C++ How to program – Deitel & Deitel (Pearson Education)
3. A.L.Stevens - " C++ database development"
b) Additional Reading: 1. Mastering C++ - K.R.VenuGopal, Rajkumar, T. RaniShankar.
2. Effective C++ - Scott Meyers (Pearson Education)
c) References :- i)   Books:- 1. Object Oriented Programming in C++ - R. Subburaj (Vikas Publication)
2. Rambaugh et.al. - "Object Oriented Modeling and Designing"
3. Grady Booch -"Object Orient Analysis and Design with applications"
4. Bajarne Stroustrup - "The C++ programming language"(Addison Wesley)
         ii) Periodicals/Journals:
NOTE : i) The details of field work, seminar, Group Discussion and Oral examination be given wherever necessary.   **1 Hr per week for problem solving/tutorial/seminar**

ii) General/Specific instructions for Laboratory safety should be given wherever necessary)   **NIL**

NEW/REVISED SYLLABUS FOR
M. Sc. Tech. Mathematics (Part II) (Semester III)
(Credit System)
(Introduced from June 2009 onwards)

(i)   **Paper –**   **MIN 304**
(ii)   **Title of Paper:**   **Operating Systems-I**
(iii)   **Specific Objectives:**
(iv)   **A brief note :- (Unit wise equal weightage should be given in question paper) Theorems and proofs are expected to be prepared from the book Modern Operating Systems by Tanenbaum A. S.**

(v)   **UNIT**   **No. of Lectures**
Unit – I: Operating System, Types of operating systems: Mainframe, server, multiprocessor, personal computer, Real-time, Embedded and smart card. Processes and Threads: Processes, Threads, inter process communication,   Classical IPC problems such as Dining philosophers, Readers and writers, and Sleeping barber. **15 Lectures**

Unit – II: Deadlocks: Resources, Deadlocks, ostrich algorithm, Deadlock detection and recovery, Deadlock prevention.   **15 Lectures**

Unit – III: Memory management: Basic memory management, Swapping, Virtual Memory, Segmentation, Page replacement algorithms.   **15 Lectures**

Unit – IV: Input/output: Principles of I/O hardware and software, I/O software layers. File systems: Files, Directories.   **15 Lectures**

(vi)   **Recommended Reading :**
a) Basic Reading   :-   1.Tanenbaum A. S.: Modern Operating Systems, Pearson Education Aisa, First Indian reprint 2001
b) Additional Reading   1. Dhamdhare D. M. : System programming and Operating Systems, Tata McGraw Hill Publicing Co., New Delhi 1996.
c) References   :-
        i) Books :- 1. Hansen P. B. : Operating System Principals, Prentice Hall Int. Inc
        ii) Periodicals/Journals:

NOTE :
i) The details of field work, seminar, Group Discussion and Oral examination be given wherever necessary.   **1 Hr per week for problem solving/tutorial/seminar**
ii) General/Specific instructions for Laboratory safety should be given wherever necessary)   **NIL**

NEW/REVISED SYLLABUS FOR
M. Sc. Tech. Mathematics (Part II) (Semester III)
(Credit System)
(Introduced from June 2009 onwards)

 (i)   **Paper**   **MIN 305**
(ii)   **Title Of Paper:**   **Design and Analysis of Algorithms-I**
(iii)   **Specific Objectives:**
(iv)   **A brief note :- (Unit wise equal weightage should be given in question paper)**
Theorems and proofs are expected to be prepared from the books in Basic Reading

(v)   **UNIT**   **No. of Lectures**
Unit I   Mathematical Foundations-Growth functions, summations, and
                 recurrences-substitution, iteration, and master methods, counting, and
                 probability, amortized analysis.   **15 Lectures**
Unit II   Sorting-Heap sort, quick sort, merge sort, sorting in linear time, median,
                 and order statistics.
                 Advanced Data Structures-B-trees, red-black trees, hashing, dynamic
                 order statistics, binomial and fibonacci heap, disjoint sets.
                                                                          15 Lectures
Unit III   Dynamic Programming-Matrix chain multiplication, longest common
                 subsequence, optimal polygon triangulation.
                 Greedy Algorithms-Huffman coding and task scheduling problems.
                                                                          15 Lectures

Unit IV   Graphs-Traversal, topological sort, minimum spanning trees, single source
                 shortest paths Dijkstra's and Bellman Ford Algorithms, all-pairs shortest
                 path, maximum flow problems.   **15 Lectures**

(vi)   **Recommended Reading :**

a) Basic Reading   **:-** 1. T. H. Cormen, C. E. Leiserson, R. L. Rivest,
Introduction to Algorithms, Prentice Hall of India. Wesley.

2.   S. Basse, A. V. Gelder, Computer Algorithms, Introduction

to Design & Analysis, Addison Wesley.
b) Additional Reading   1.   S. Sedgewick, Algorithms, Addision Wesley.
2.   M. J. Quinn, Designing Efficient Algorithms for parallel Computers.

c) References   **:-**
       i) Books :-   1. C. E. Leiserson.

2. R. L. Rivesl   prentice Hall of India.

ii) Periodicals/Journals:

NOTE :
i) The details of field work, seminar, Group Discussion and Oral examination be given wherever necessary. **1 Hr per week for problem solving/tutorial/seminar**
ii) General/Specific instructions for Laboratory safety should be given wherever necessary) **NIL**

NEW/REVISED SYLLABUS FOR
M. Sc. Tech. Mathematics (Part II) (Semester III)
(Academic Flexibility)
(Introduced from June 2009 onwards)

(i) **Paper –** **MIM 306**
(ii) **Title Of Paper:** **Lab Work**
(iii) **Specific Objectives: Objectives are to apply theory studied in computer based papers in the semester.**
(iv) **A brief note: -** -

NEW/REVISED SYLLABUS FOR
M. Sc. Tech. Mathematics (Part II) (Semester IV)
(Credit System)
(Introduced from June 2009 onwards)

(i) **Paper :** **MIN 401**
(ii) **Title of Paper:** **Functional Analysis**
(iii) **Specific Objectives: To introduce Normed linear spaces, Hilbert spaces and operator theory.**
(iv) **A brief note : (Unit wise equal weightage should be given in question paper) Theorems and proofs are expected to be prepared from the books in Basic Reading**

(v) **UNIT** **No. of Lectures**
Unit I Normed linear spaces, Banach spaces, Quotient norm spaces, continuous linear transformations, equivalent norms, the Hahn-Banach theorem and its consequences. Conjugate space and separability, second conjugate space. The natural embedding of the normed linear space in its second conjugate space, Weak *topology on the conjugate space. **15 Lectures**
Unit II The open mapping Theorem, The closed graph theorem, The conjugate of an operator, The uniform boundedness principle, Definition and examples of a Hilbert space and simple properties, orthogonalsets and complements. **15 Lectures**
Unit III The projection theorem, separable Hilbert spaces.Bessel's inequality The conjugate space, Riesz's theorem, The adjoint of an operator, self adjoint operators, Normal and unitary operators, Projections. **15 Lectures**

Unit IV Finite dimensional spectral theory : Eigen values and eigenvectors of on operator on a Hilbert space. The determinants and spectrum of an operator, The spectral theorem on a finite dimensional Hilbert space.   **15 Lectures**

(vi)   Recommended Reading:

a) Basic Reading:-1.G.F.Simmons: Topology and Modern Analysis, McGraw Hill (1963)
b) Additional Reading:
1. G.Bachman and Narici : Functional Analysis, Academic Press 1964
2. A.E.Taylor : Introduction to Functional analysis, John Wiley and sons (1958)
3.   A.L.Brown and Page : Elements of Functional Analysis, Van-Nastrand Reinehold com (1970)
c) References   :-
i) Books :- 1. B.V.Limaye : Functioned Analysis, New age international.
2. Erwie Kreyzig : Introduction to Functional Analysis with Applications, John Wiley and Sons.

ii) Periodicals/Journals:

NOTE : i) The details of field work, seminar, Group Discussion and Oral examination be given   wherever necessary.   **1 Hr per week for problem solving/tutorial/seminar**
ii) General/Specific instructions for Laboratory safety should be given wherever
   necessary)   **NIL**

 (i)   Paper :   MIN 402
(ii)   Title of Paper: Operations Research
(iii)   Specific Objectives: To study linear programming, nonlinear programming, dynamic problem and their applications.
(iv)   A brief note : Theorems and proofs are expected to be prepared from the books in Basic Reading

(v)   UNIT   No. of Lectures
Unit – I Convex sets, supporting and separating hyperplanes convex polyhedra and polytope, extreme points, convex functions, generalised convexity and concavity.
Linear Programming : Introduction to linear programming problems, optimal solutions of linear programming problem, Derivation of the simplex method, computational technique of a simplex method, Resolution of degeneracy, revised simplex method. **15 Lectures**
Unit – II Duality in linear programming. The dual simplex method. Integer Programming: Importance of integer Programming problems, Solutions of IPP, Gomorys

all IPP Method, Construction of Gomorys Constraints, Computational procedure for the solution of IPP by Gomorys Method, The Branch and Bound method. **15 Lectures**

Unit – III Dynamic programming: Belmans principle of optimality, solution of problems with a finite number of stages, the concept of dynamic programming, Application of dynamic programming in production, inventory control and solving linear programming problems. **15 Lectures**

Unit – IV Non liner programming problems: The general Linear Programming problems of constrained maxima and minima.

Quadratic Programming: General quadratic programming problem, Kuhn Tucker conditions of quadratic programming problems, Examples based on Wolfe's method and Beale's method. **15 Lectures**

(vi)   Recommended Reading:

a) Basic Reading:- 1. S.D.Sharma : Operations Research, Kedar Nath Ram Noth and co.
2. Kanti Swarup , P.K.Gupta and Manmohan : Operations research, S.Chand & Co.
3. Hamady Taha : Operations Research :Mac Millan Co.
b) Additional Reading: 1.S.D.Sharma :Linear programming, Kedarnath,Romnath & Co.
2. S.D.Sharma : Nonlinear and Dynamic programming Kedar Nath Ram Nath and Co. **c)**
References   :- i)   Books :- 1.R.K.Gupta: Operations Research Krishna Prakashan Mandir, Meerut
2. G.Hadley : Linear programming, Oxford and IBH Publishing Co.
3. S.I.Gass : Linear Programming, Mc Graw Hill Book Co.
ii) Periodicals/Journals:
NOTE : i) The details of field work, seminar, Group Discussion and Oral examination be given wherever necessary. **1 Hr per week for problem solving/tutorial/seminar**
ii) General/Specific instructions for Laboratory safety should be given wherever necessary) **NIL**

NEW/REVISED SYLLABUS FOR
M. Sc. Tech. Mathematics (Part II) (Semester IV)
(Credit System)
(Introduced from June 2009 onwards)

 (i)   **Paper :**   **MIN 403**
(ii)   **Title of Paper:**   **Object Oriented Programming with Java**
(iii)   **Specific Objectives: To introduce concepts in Java.**
(iv)   **A brief note : (Unit wise equal weightage should be given in question paper)**
Theorems and proofs are expected to be prepared from the book Learning JAVA by Ricard F. Raposa

(v)   UNIT   No. of Lectures
Unit – I Getting Started with Java: Why Java?, The Java Virtual Machine, The Editions of Java, Downloading the Java 2SDK, Installing the SDK, Running the SDK Tools, A Simple Java Program. **Java Fundamentals:** Java Keywords, Identifiers, Java's Eight Primitive Data Types. **Control Structures:** Flow of Control, Boolean Logic, Boolean Operators, The if Statements, The if/else Statements, The Switch Statements,

The While Loop, The do/While Loop, For Loop, Break Keyword, Nested Loops. **Classes and Objects:** Overview of Classes and objects, Procedural Programming, Object Oriented Programming, Object Oriented Analysis and Design, Writing a Java Class, Instantiating an Object, Garbage Collection, Accessing Fields and Methods, Using the Dot Operator Step 1,2,3,4,5. **15 Lectures**

Unit – II   Method: Method Call Stack, Invoking Methods, Method Signature, Arguments and Parameters, Call by Value, Overloading Methods, Constructors, Default Constructor, Using Constructors, A Class with Multiple Constructors, Using this in Constructor. **Understanding Inheritance:** An Overview of Inheritance, The is a Relationship, Implementing Inheritance, Instantiating Child Objects, Single Versus Multiple Inheritance, The Java Lang. Object Class, Method Overriding, The Super Keyword, The Final Keyword, The Instantiation Process, Invoking a Parent Class Constructor. **Advanced Java Language Concepts:** An Overview of Packages, Adding a Class to a Package, The Namespace Created by Packages, The Important Keyword, The Dictionary Structure of Packages Step 1, 2, 3, 4, 5. The Access Specifies, Encapsulation, Benefits of Encapsulation, Understanding Static Members, Accessing Static Fields and Methods, Static Initializes, Instance Initializes. **Polymorphism and Abstraction:** An Overview of Polymorphism, Using Parent Class References to Child Objects, Casting References, The Instance of Keyword, Polymorphic Parameters, Heterogeneous Collections, Virtual Methods, Taking Advantage of Virtual Methods, An Overview of Abstraction, Abstract Classes, Abstract Methods. **15 Lectures**

Unit – III   Collections: Arrays, Accessing Arrays, The Length of Attribute, Arrays References, Array Initializers, Copping Arrays, Multidimensional Arrays, Example of Heterogeneous Collection, Overview of the Java Collections Framework, The Vector Class, The Hashtable Class. **Interfaces:** An Overview of Interfaces, Declaring Interfaces, User-Defined Interfaces, Implementing an Interfaces, Using Interfaces, Exposing Methods Via an Interface, Forcing Behavior on Class, Declaring Fields in Interfaces, Extending Interfaces, Interfaces and Polymorphism. **Exception Handling:** An Overview of Exception Handling, Flow of Control of Exceptions, Throwable Classes, Methods of Throwable Classes, Catching Exceptions, Writing try/ catch Blocks, Multiple catch Blocks, Handle or Declare Rule, Declaring Exceptions, The throws Keyword, Throwing Exceptions The Finally Keyword, Overridden Methods and Exceptions, User-Defined Exceptions. **15 Lectures**

Unit – IV   An Introduction to GUI Programming: AWT Versus Swing, Creating Windows, Containers and Components, Layout Managers, Flow Layout Manager, Border Layout Manager, Panels, GridLayout Manager, Box Layout Manager, Nesting Panels, Using No Layout Manager. GUI Components and Event Handling: The Delegation Model, The Event Listener Interfaces, Creating an Event Listener, Registering a Listener with an Event Source, The Event Adapter Classes, Buttons, Check Boxes, Radio Buttons, Labels, Text Components, Lists, Combo Boxes, Progress Bars Menus. Applets: An Overview of Applets, The java. applet.Applet Class, Swing Applets, Life Cycle of an Applet Step 1, 2, 3, 4. The <applet> Tag, Document and Code Base, The appletviewer Tool, Sandbox Security, The Applet Context, Displaying Images, Playing Audio, JAR Files and Applets. Threads: An Overview of Threads, Life Cycle of Thread, Creating Thread, Implementing Runnable, Extending the Thread, Class, Method of The Thread,

Class, Timer and Timer Task Classes, Scheduling Tasks, Multithreading Issues, Synchronized Keyword, Deadlock Issues, Ordering Locks, Wait() and Notify() Methods
15 Lectures

(vi)   Recommended Reading:

a) Basic Reading   :-   Learning JAVA by Ricard F. Raposa, Wiely Publishing Inc.
b) Additional Reading: 1. Object Oriented Programming Through JAVA by V.V. Bhaskar, P. V. Subba Reddy, Scitech Publications(India) Pvt. LTD.
2. Fundamentals of Core JAVA Volume –I & II
c) References   :-
    i) Books :- 1. The Complete Reference to JAVA (Fifth Edition) by Herbert Schildt
    ii) Periodicals/Journals:

NOTE : i) The details of field work, seminar, Group Discussion and Oral examination be given   wherever necessary.   **1 Hr per week for problem solving/tutorial/seminar**
ii) General/Specific instructions for Laboratory safety should be given wherever
    necessary)   **NIL**

NEW/REVISED SYLLABUS FOR
M. Sc. Tech. Mathematics (Part II) (Semester IV)
(Credit System)
(Introduced from June 2009 onwards)

 (i)   Paper :   MIN 404
 (ii)   Title Of Paper: Operating Systems-II
 (iii)   Specific Objectives:
 (iv)   A brief note : (Unit wise equal weightage should be given in question paper)
Theorems and proofs are expected to be prepared from the books in Basic Readings.

(v)   UNIT   No. of Lectures
Unit – I: Introduction to Unix Operating System: Unix system structure, Operating system services, architecture, system concepts, buffer cache. Unix file system, Incode, file structure, dictionaries, super black, inode assessment to new files, allocation of disk block.   **15 Lectures**

Unit – II: System calls: open, read, write, close, file creation, change directory, change owner pipes, dup, mounting and unmounting file systems, link and unlink. Processes and memory management: process status and transitions, system memory layout, process context, saving the context of a process, sleep process creation, signal, processes termination, system boot and init process, process scheduling, swapping, demand paging.

15 Lectures

Unit – III: Basic unix commands, banner, cal, date, calendar, who, tty, uname, password, lock, echo, tput, bc etc. Basic file attributes, Navigating the file system, Handling ordinary files.   **15 Lectures**

Unit – IV: The Vi-editor, Simple filters (pr, head, tail, cut, paste, sort, uniq, nl, tr.), Regular expression and gerp (grep, egrep, fgrep), The process (sh, ps, kill, nice, at and batch), Shell programming. **15 Lectures**

(vi) Recommended Reading:

a) Basic Reading :- 1. Maurice J. Bach, The Design of the Unix Operating System, Prentice Hall
2. Sumitabha Das, Unix Concepts and Applications, Tata McGraw Hill, New Delhi, 2001 (ninth reprints).
b) Additional Reading: Yashwant Kanitkar, Unix Shell Programming, B P Publications
c) References :-
i) Books :- 1. Ellen Siever, Linex in a Nutshell, O' Reilly
ii) Periodicals/Journals:

NOTE :
i) The details of field work, seminar, Group Discussion and Oral examination be given wherever necessary. **1 Hr per week for problem solving/tutorial/seminar**
ii) General/Specific instructions for Laboratory safety should be given wherever necessary) **NIL**

NEW/REVISED SYLLABUS FOR
M. Sc. Tech. Mathematics (Part II) (Semester IV)
(Credit System)
(Introduced from June 2008 onwards)

(i) Paper : MIN 405
(ii) Title of Paper: Design and Analysis of Algorithms II
(iii) Specific Objectives: -
(iv) A brief note: (Unit wise equal weightage should be given in question paper)
Theorems and proofs are expected to be prepared from the books in Basic Readings.

(v) UNIT No. of Lectures
Unit I Sorting Networks-Comparison networks, bitonic sort and merge-sort networks. Arithmetic circuits-Combinational circuits, addition, multiplication, and clocked circuits. Parallel Algorithms-CRCW, EREW algorithm, matrix inversion. **15 Lectures**

Unit II FFT- Polynomial representation, DFT, FFT. Number-Theoretic Algorithms-Modular arithmetic. Chinese remainder theorem, RSA Codes. **15 Lectures**

Unit III String Matching-Rabin-Karp, KMP, Boyer-Moore algorithms.

Geometric Alogrithms-Algorithms for finding convex hull. Closet pair of points. Linear programming Problems. **15 Lectures**

Unit IV NP- completeness –P and NP classes, NP-completeness and reducibility, NP-completeness proofs. Approximation Algorithms-Vertex cover, traveling salesman, set covering, and subset-sum problems. **15 Lectures**

(vi)   Recommended Reading:

a) Basic Reading:- 1. T. H. Cormen, C. E. Leiserson, R. L. Rivest, Introduction to Algorithms, Prentice Hall of India. Wesley.

2. S. Basse, A. V. Gelder, Computer Algorithms, Introduction to Design & Analysis, Addison Wesley.

b) Additional Reading: S. Sedgewick, Algorithms, Addision Wesley.

c) References   :-
i)   Books :- 1. M. J. Quinn, Designing Efficient Algorithms for parallel Computers.

2. C. E. Leiserson.

3. R. L. Rivesl   prentice Hall of India.

ii) Periodicals/Journals:

NOTE :
i) The details of field work, seminar, Group Discussion and Oral examination be given wherever necessary.   **1 Hr per week for problem solving/tutorial/seminar**
ii) General/Specific instructions for Laboratory safety should be given wherever necessary)   **NIL**

NEW/REVISED SYLLABUS FOR
M. Sc. Tech. Mathematics (Part II) (Semester IV)
(Academic Flexibility)
(Introduced from June 2009onwards)

 (i)   Paper –   MIM 406
(ii)   Title Of Paper: Lab Work
(iii)   Specific Objectives: Objectives are to apply theory studied in computer based papers in the semester.
(iv)   A brief note: -   -

 (i)   **Paper :**   **MIM 501**
(ii)   **Title of Paper:**   Compiler Techniques
(iii)   **Specific Objectives:**
(iv)   **A brief note :**

Unit 1: Overview of Compilation process:- Phase Structure, Grouping of phases, Bootrapping and cross compilation.
   Lexical Analysis:- Preliminaries, Functions of Scanner, Input Buffering, Regular expressions, Role of DFA.   **15 Lectures**
Unit – 2 : Syntax Analysis:- CFG, Derivation tree, Top-Down parsing: non recursive predictive parsing, Bottom-up parsing: SLR, LL, LALR conflicts, Operator precedence grammar,
   Syntax directed translation:- Syntax directed translation, S-attributed and L-attributed definition.   **15 Lectures**
Unit – 3: Symbol table organization: - Data Structures used, Operations, Top-down translation.
   Run time memory management:- Storage Organization - Activation record , Activation tree, Storage allocation - Static, dynamic, stack and heap allocation, Allocation in block structured language.   **15 Lectures**
Unit – 4 Compilation Generation (Processing):- Issues in design of a code generator – Input to code generator, Target Program, Memory Management, Instruction Selection, Approaches to code generation – The target machine, Instruction cost.
   Code Optimization:- The Principle sources of optimization, Optimization of basic blocks, loop in flow graphs – Dominators, Natural loops, Inner loops, Pre headers, reducible, flow graphs.   **15 Lectures**
(vi)   Recommended Reading:

(In MLA/APA Style Sheet Format)
  a) **Basic Reading**   **:-**   1) Compliers – Principles, Techniques & Tools by Alfred V. Aho, Ravi Sethi, Jeffrey D. Ulman
        2) Theory and Practice of Complier Writing, by Trembly and Sorenson
  b) **Additional Reading :-** 1) Compliers Principles, Techniques and Tools, by Dhamdhere.
c) **References**   **:-**
      i) **Books:** Systems Programming and Operations, by Dhamdere.
      ii) **Periodicals/Journals:**

(NOTE :
i) The details of field work, seminar, Group Discussion and Oral examination be given wherever necessary. **1 Hr per week is for problem solving/ tutorials/seminars.**
ii) General/Specific instructions for Laboratory safety should be given wherever necessary)   **Nil.**

SYLLABUS FOR
M. Sc. Tech. Mathematics (Part III) (Semester V)
(Academic Flexibility)
(Introduced from June 2009 onwards)

 (i)   **Paper :**   MIM 502
(ii)   **Title of Paper:**   Software Engineering
(iii)   **Specific Objectives:**
(iv)   **A brief note :**
Unit 1: Introduction – Software problem, Software Engineering problem, Software Engineering approach . Software process - Software process, characteristics, Software development process project management process, Software configuration management process, process management process.   **15 Lecture**
Unit 2: Software requirement analysis and specification – Software requirement ,problem analysis, requirement specification validation matrices , case study. Planning a Software project – Cost estimation ,project scheduling ,staff and personal planning Quality assurance plan ,project maintaining plans ,Risk management case study.
                              15 Lectures
Unit 3: Function oriented design – Design principles modulo level concepts ,design notation and specification ,structured design , verification, metrics case study object oriented design –object oriented analysis and design, design methodology metrics ,case study.   **15 Lectures**

Unit 4: Detailed design – modulo specification ,detailed design verification , metrics. Tesity - fundamentals tesity structural Tesity, tesity object orinted program , tesity process ,metrics .came study.   **15 Lectures**

(vi)   Recommended Reading:
            (In MLA/APA Style Sheet Format)
 a)   Basic Reading   :- 1)   An interpreted approach to software engineering-Panaj jalote(2nd edition).
b) Additional Reading   :- -
c) References   :-
     i) Books: 1. Software Engineering – A Practitioners Approach 5th and 6th edition, Roger Pressman
     2. Software engineering concepts – Richard Fairley
     3. The Practical guide to Structural design – Miller Paige Jones
     4. Software Engineering – Martin Shooman
     ii) Periodicals/Journals:

(NOTE :
i) The details of field work, seminar, Group Discussion and Oral examination be given wherever necessary. **1 Hr per week is for problem solving/ tutorials/seminars.**
ii) General/Specific instructions for Laboratory safety should be given wherever necessary)   **Nil.**

SYLLABUS FOR
M. Sc. Tech. Mathematics (Part III) (Semester V)
(Academic Flexibility)
(Introduced from June 2009 onwards)

 (i)   Paper :   MIM 503
 (ii)   Title of Paper: Computer Networks
 (iii)   Specific Objectives:
 (iv)   A brief note :

UNIT 1: Applicaton of networks , Requirements, Network architecture and software, performance of n/w. Driect link networks, hardware building blocks, encoding, error detection, reliable transmission, ethemet (802.3), token rings (802.5,FDDI), wireless (802.11), network adaptors.   **15 Lectures**
UNIT 2: Packet switching, switching and forwording, bridge and LAN switches,cell switching(Atm),implemention and performance. InternetworkingIP, routing,global internet,multicast,multipritocol lable switchinf.   **15 Lectures**

UNIT 3: end toend protocols, UDP,TCP,RPC,performance., congestion control and resource allocation, Issues , tcp congestion control , congestion Avoidance. **15 Lectures**
UNIT 4: Network security, cryptographic algorithms,security mechanisms, Examples, Application DNS,SMPT ,MIME,HTTP,SNMP,RTP,SDP,overloading network, End-to-End data- representation, compression. **15 Lectures**

(vi)   Recommended Reading:
       (In MLA/APA Style Sheet Format)
  1) **a)   Basic Reading   :-** 1)   computer networks –Peterson and Davis
b) Additional Reading   :-
c) References   :-
      i) Books: 1. data and computer communication by w. stalliys
         2. computer networks by A.Tannenbaum.
      ii) Periodicals/Journals:

(NOTE :
i) The details of field work, seminar, Group Discussion and Oral examination be given wherever necessary. **1 Hr per week is for problem solving/ tutorials/seminars.**
ii) General/Specific instructions for Laboratory safety should be given wherever necessary) **Nil.**

SYLLABUS FOR
M. Sc. Tech. Mathematics (Part III) (Semester V)
(Academic Flexibility)
(Introduced from June 2009 onwards)

(i)   Paper :   MIM 504
  (ii) Title of Paper: Computer Graphics
(iii)   Specific Objectives:
(iv)   A brief note :

Unit 1:   Input/Ouput devices-Light Pens ,joystick.Digitizers, Refreshing display devices.Random and raster scan display devices. Line Generation and Area Filling algorithms.Scan line.Flood-fill and boundary-fill algorithms for pologonal domains. Line Clipping Algorithms-Cohen-suthurland algorithm. Cyrus-Beck algorithm. Liang-Barsky algorithm.
Unit 2:   Transformation in 2D-Traslation,rotation,scaling and shearing traformation.Reflection about any arbitrary line,Homogeneous Coordinates. Projections-Parallel projection. Isometric projection. Cabinet and Cavalier oblique projections, perceptive projections.Vanishing points.1-point and 2-point perspetive projections.
Unit 3:   Representing Curves and Surfaces-Polygon Keshes.Hermite and Bezier cubic Curves.B-spline   Curves.Uniform.Non-uniform,open   and   non-open   B-

splines.Bicubic surface,patches.Conditions for smooth-jioning of curves and surface patches.Hierichsurface ellimination algorithms-Z-buffer algorithms,depth-sort algorithm,area-subdivision method.floating horizon algorithm.

   Unit 4: Effect of lights-Ambient and diffuse reflection models Phong's specular reflection model.Grourand and Phong shading models. Fractals-solf-similar fractals,solf affine tractals,self-squaring fractals,Mandolbrol sets.Consecutive solid geometry.

(vi)   Recommended Reading:
           (In MLA/APA Style Sheet Format)
a)   Basic Reading   :- 1) Mathematical Elements for Computer Graphics- Roger and Adams (McGraw- Hill)
   b) Additional Reading :- 1) Computer Graphics C Version- Hearn and Baker (Pearson Education)
c) References   :-
   i)   Books: 1) Procedural Elements for Computer Graphics – David Rogers (Tata McGraw-Hill).
   ii) Periodicals/Journals:
(NOTE :
i) The details of field work, seminar, Group Discussion and Oral examination be given wherever necessary. **1 Hr per week is for problem solving/ tutorials/seminars.**
ii) General/Specific instructions for Laboratory safety should be given wherever necessary)   **Nil.**

SYLLABUS FOR
M. Sc. Tech. Mathematics (Part III) (Semester V)
(Academic Flexibility)
(Introduced from June 2009 onwards)
(i)   Paper: MIN 403
(ii)   Title of Paper: MIM - 505
                                      Departmental Electives E7. **Dot Net**
(iii)   Specific Objectives:
(iv)   A brief note :
Unit 1: Introduction to .NET, evolution of .NET platform, advantages of working .NET, .NET framework, CLR, Basic of ASP .NET, Unified programming classes, security in .NET Language and web up port {C#, VB, script .NET, web support for .NET, web services]

  ASP .NET Basics: ASP .NET page structure, directives, code declaration blocks, code render blocks, ASP .NET server controls, server side include directives, HTML tags, view state.   **15 Lectures**
Unit 2: VB. Net and C# programming basic:
   Control event, Variables and variable declaration, Arrays, Functions, Operators, Conditional logic, Loops, namespace, OOP concepts, Objects, Properties, Methods,

Classes, Scope, Events, Inheritance, Delegates, Interface.   **15 Lectures**

Unit 3: Validation Controls: Client side v/s servers side validation, configuring client side validation, Required field validate, compare validater, Range Validater Range validate, Regular expression validater. Custom validater.   **15 Lectures**

Unit 4: Database Design and development:

 Introduction, creating database for inheritance application, designing tables for intranet application, Relationship mgt., stored procedures, queries, introduction to data grid, data list and data sets. **Error Handling:** Introduction, Types of error, viewing error information, Handling errors, .NET debugger.   **15 Lectures**

(vi) Recommended Reading: In MLA/APA Style Sheet Format)
a) Basic Reading   :-
1) Build your own ASP .NET website using C# and VB .NET, **-** *Zak Ruvacaba [Site Point]*
2) ASP .NET Bible. – *Mridula Parihar*
b) Additional Reading   :-
c) References   :-
        i) Books: .
        ii) Periodicals/Journals:
(NOTE : i) The details of field work, seminar, Group Discussion and Oral examination be given   wherever necessary. **1 Hr per week is for problem solving/ tutorials/seminars.**
ii) General/Specific instructions for Laboratory safety should be given wherever necessary)   **Nil.**

NEW/REVISED SYLLABUS FOR
M. Sc. Tech Mathematics (Part III) (Semester V)
(Academic Flexibility)
(Introduced from June 2009 onwards)

(i)   Paper -   MIM - 505
(ii)   Title of Paper: **Departmental Elective** E_1: Artificial Intelligence
(iii)   Specific Objectives:
(iv)   A brief note: - (Notations and concepts are taken from books given in basic reading; this should be taken in account for examination point of view).
(v)   UNIT   **No. of Lectures**
Unit I: Introduction-what is AI? Approaches to AI, Brief History. Search in state spaces- Agets that plan, Ununiformed search, Heuristics search, other searches (ch7,8,9 Book 1), Neural Networks-Fundamentals (Book 2 ch.2), Bakpropagation Network(3.1 to 3.4 Book 2). Associative memory (ch.4 Book 2)
                                        15-Lectures

Unit II: Genetic Algoriths-Fundamentals (ch.8 Book 2), Genetic (ch.9 Book 2) Hybrid System-Integration and Neural Network, Genetic algorithm, Fury logic.(ch.10 Book 2), Genetic algorithm based backpropagation Network (ch.11 Book 2)   **15-Lectures**

Unit III: Knowledge based systems-(ch.17,ch.18, ch.19, ch.20-Book 1). Expert systems,commonsence knowledge. Representation,reasoning with uncertion Information, Bayes nch.   **15-Lectures**

Unit IV: Introduction to natural language prosessing,computer vision and machine learning.   **15-Lectures**

(vi)   Recommended Reading:
        (In MLA/APA Style Sheet Format)
a)   Basic Reading   :- 1) Artificial Intelligence - A New Synthetic by Nils Nilsson
 2) Neural Netwoks, Fuzzy logic and Genetic Algothms systhetic and Application S. Rajsekaran, G. A. Vijayalakshmi Pai .
b) Additional Reading   :-
c) References   :-
        i) Books:
        ii) Periodicals/Journals:

(NOTE :
i) The details of field work, seminar, Group Discussion and Oral examination be given wherever necessary. **1 Hr per week is for problem solving/ tutorials/seminars.**
ii) General/Specific instructions for Laboratory safety should be given wherever necessary)   **Nil.**