M. Sc. Tech Mathematics (Part I) (Semester I)
(Introduced from June 2014 onwards)
Choice Based Credit System

Paper: MT 101
Title of Paper: Algebra

Unit I: 15 Lectures
Groups, subgroups, Cosets, Lagrange’s theorem, normal subgroups, homomorphism, isomorphism theorems, Conjugacy Class, Class equation, simple groups.

Unit II: 15 Lectures
Sylow theorems, Normal and subnormal series, composition series, Jordan holder theorem. Solvable groups, simplicity of $A_n$ ($n > 5$).

Unit III: 15 Lectures
Rings, homomorphisms, ideals, Quotient rings, prime ideals, maximal ideals, field of quotients of an integral domain, Euclidean rings, Unique factorization domains, principal ideal domain. Polynomial rings.

Unit IV: 15 Lectures

Recommended Books:

Reference Books:
M. Sc. Tech Mathematics (Part I) (Semester I)
(Introduced from June 2014 onwards)
Choice Based Credit System

Paper: MT 102
Title of Paper: Advanced Calculus

Unit 1
Lectures: 15
Metric spaces, Limits in a metric space, continuous functions on metric spaces, open sets, closed sets, connected sets, bounded sets, totally bounded sets, complete metric space, compact metric space, Continuous functions on compact metric spaces, Continuity of the inverse function, Uniform continuity.

Unit 2
Lectures: 15
Sequences of real numbers, convergent sequence, Cauchy sequence, absolute and conditional convergence, Sequences of functions: Pointwise convergence of sequences of functions, Examples of sequences of real valued functions, Definition of uniform convergence, Uniform convergence and continuity, Cauchy condition for uniform convergence, Uniform convergence and Riemann integration, Uniform convergence and differentiation.

Unit 3
Lectures: 15

Unit 4
Lectures: 15
Multivariable differential Calculus: The Directional derivatives, directional derivatives and continuity, total derivative, total derivatives expressed in terms of partial derivatives, The matrix of linear function, Jacobin matrix, Chain rule, mean value theorem for differentiable functions, A sufficient condition for differentiability, sufficient condition for equality of mixed partial derivatives, Taylor’s formula for functions from R^n to R^1. The inverse function theorem (Statement only) , The implicit function theorem (Statement only) and their applications. Extrema of real valued functions of one variable, Extrema of real valued functions of several variables.

Recommended Books:
1) Methods of Real Analysis, R. R. Goldberg, Wiley.

Reference Books:
2) Analysis on Manifolds by J.R. Munkers (Addision Wesely)
M. Sc. Tech Mathematics (Part I) (Semester I)  
(Introduced from June 2014 onwards)  
Choice Based Credit System  

Paper : MT 103  
Title of Paper: Discrete Mathematical Structures - I

Unit I: 15 Lectures  

Unit II: 15 Lectures  
Modular lattices, distributed lattices, the complemented lattices, convex sub lattices, Congruence relations in lattices. Conversion of Boolean Algebra into Boolean rings and vice versa.

Unit III: 15 Lectures  

Unit IV: 15 Lectures  
Vertex degree, subgraphs, paths and cycles, the matrix representation of graphs, fusion, trees and connectivity, bridges, spanning trees, connector problems, shortest path problems, cut vertices and connectivity.

Recommended Books:  
2) G. Gartzer, General Lattice theory. AMS.  
3) John Clark and Derek Allan Holton, A First Look At Graph Theory Allied Publishers Limited.  

Reference Books:  
4) N. Deo, Graph Theory with Applications to Engineering and Computer Sciences, Prentice Hall of India.  
5) Herikrishna, Sandeep Kumar, Discrete Mathematics, Pragati Prakshan.  
Paper: MT 104  
Title of Paper: Computer Architecture

Unit I: 15 Lectures  

Unit II: 15 Lectures  
Memory Organization: Memory Hierarchy, Main memory – RAM and ROM chips, memory address map, memory connection to CPU. hardware organization of Auxiliary memory, hardware organization of Associative Memory, Cache memory. Virtual memory – Address and memory space, address mapping using pages, Direct Memory Access (DMA)

Unit III: 15 Lectures  
Pipeline and Vector Processing: Parallel processing, pipelining general considerations, Arithmetic pipeline, instruction pipeline, data dependency, handling of branch instructions, RISC pipeline, delayed load, delayed branch, Vector processing, vector operation, matrix multiplication, Memory interleaving.

Unit IV: 15 Lectures  
Multiprocessors: Characteristics of multiprocessors Interconnection structures – time sharing common bus, multiport memory, crossbar switch, multistage switch network, hypercube interconnection. Interprocessor communication and synchronization.

Recommended Books:  

Reference Books:  
M. Sc. Tech Mathematics (Part I) (Semester I)
(Introduced from June 2014 onwards)
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Paper: MT105
Title of Paper: Programming in C

Unit I: 15 Lectures
An overview of programming & Programming languages, Structure of C Program, Variables, Keywords and Constants, Data Types, **C instructions and Operators**: Unary plus and minus operators, Binary Arithmetic operators, Increment and Decrement Operators, Relational Operators, Logical Operators, Assignment Operator, storage classes in C.

Unit II: 15 Lectures
Decision control structures: If Statements, if else, nested if-else, forms of if, Conditional operators. **Loop control structures**: while loop, for loop, odd loop, nested loop, do-while loop, The BREAK and CONTINUE statements. **Case control structures**: Switch Case, GOTO statement.

Unit III: 15 Lectures
Functions and Pointers: Declarations and calls, Passing arguments, Recursion, pointer declaration, operations on pointers. **Arrays**: Concepts and Declarations of an Array, Initializing Arrays, Passing entire Arrays to Functions, 2-D Arrays, Passing Arrays as Function Arguments, Dynamic Memory Allocation, Bit-Manipulation Operators.

Unit IV: 15 Lectures

Recommended Books:
Let us C, Yeshwant Kanetkar, BPB publications.

Reference Book:
M. Sc. Tech Mathematics (Part I) (Semester I)
(Introduced from June 2014 onwards)
Choice Based Credit System

Paper – MT 106
Title of Paper: Lab Work I

Specific Objectives: Objectives are to apply theory studied in computer based papers in the semester.

The programs related to Programming in C.
Paper: MT 201
Title of Paper: Real Analysis

UNIT I: 15 Lectures
Open Sets, closed sets and Borel sets of real numbers, Lebesgue outer measure, The sigma algebra of Lebesgue measurable sets, Outer and inner approximation of Lebesgue measurable sets, Countable additivity, Continuity and Borel-Cantelli lemma, Non measurable Sets.

UNIT II: 15 Lectures
Sums, product and composition of measurable functions, sequential pointwise limits and simple approximation, Littlewood’s three principles, Egoroff’s theorem, and Lusin’s theorem, Lebesgue integration of a bounded measurable function.

UNIT III: 15 Lectures

UNIT IV: 15 Lectures

Recommended Book:

Reference Books:
M. Sc. Tech Mathematics (Part I) (Semester II)  
(Introduced from June 2014 onwards)  
Choice Based Credit System

Paper: MT – 202  
Title of Paper: Operations Research

Unit – I  15 lectures  

Unit – II  15 lectures  
Simplex method, Computational procedure of simplex method, problem of degeneracy and method to resolve degeneracy. Revised simplex method in standard form I, Duality in linear programming, duality theorems, Integer linear programming, Gomory’s cutting plane method, Branch and Bound method.

Unit – III  15 lectures  
Integer linear programming, Gomory’s cutting plane method, Branch and Bound method, Dynamic programming, Bellman’s principle of Optimality, solution of problems with a finite number of stages. Applications of dynamic programming in linear programming.

Unit – IV  15 lectures  
Non linear programming, unconstrained problems of maximum and minimum, Lagrangian method, Kuhn Tucker necessary and sufficient conditions, Wolfe’s method, Beale’s method.

Recommended Books:  
1) S.D.Sharma : Operations Research, Kedar Nath Ram Noth and co.

Reference Books  
1. Kambo, Mathematical Programming  
M. Sc. Tech Mathematics (Part I) (Semester II)
(Introduced from June 2014 onwards)
Choice Based Credit System

Paper: MT 203
Title of Paper: Discrete Mathematical Structures – II

Unit – I 15 Lectures
Euler Tours and Hamiltonian Cycles: Euler Tours, The Chinese Postman Problem (CPP), Hamiltonian Graphs, The Travelling Salesman Problem, Matchings, Marriage problem, personal assignment problem optimal assignment problem, CPP postscript.

Unit – II 15 Lectures

Unit – III 15 Lectures

Unit – IV 15 Lectures

Recommended Books:
1) A First look at Graph Theory by John Clark and D. A. Holton, Allied Publishers Ltd.
2) Introduction to Automata Theory, Languages and Computation by J. E. Hopcroft, J. D. Ullman, Narosa Publishing House 1987 (Ninth Reprint)

Reference Books:
1) N. Deo, Graph Theory with Applications to Engineering and Computer Sciences by Prentice Hall of India.
M. Sc. Tech Mathematics (Part I) (Semester II)
(Introduced from June 2014 onwards)
Choice Based Credit System

Paper: MT 204
Title of Paper: Operating Systems

Unit – I: 15 Lectures
Operating System, Types of operating systems: Mainframe, server, multiprocessor, personal computer. Processes and Threads: Processes, Threads, inter process communication, Classical IPC problems such as Dining philosophers, Readers and writers, and Sleeping barber.

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

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

Unit – IV: 15 Lectures

Recommended Books:

Reference Books:
1. Avi Silberschatz, Peter Galvin: operating system concepts, john wiley & sons. Inc.
M. Sc. Tech Mathematics (Part I) (Semester II)  
(Introduced from June 2014 onwards)  
Choice Based Credit System

Paper: MT 205  
Title of Paper: Data Structures Using C

UNIT-I:  
15 Lectures  
Data, Data Types, abstract Data type, Data Structure, Arrays as abstract data types (1D, 2D, Multidimensional) Linked lists: Concepts, Operations: Insert, Delete, Traversal, Static implementation using arrays, Dynamic implementation, doubly linked lists, Circular lists, Linked lists applications, Polynomial representation.

UNIT- II:  
15 Lectures  
Stack: Concepts push and pop operations, Stack implementation using C, Stacks as linked lists, Stack Applications, Infix to postfix conversion of expression, Expression evaluation, Recursion.  
Queues: Concept, insert, And delete operations, Queue implementation using C, queues as linked lists, Queue Applications: priority queues.

UNIT- III:  
15 Lectures  
Trees: Terminology and concepts, Binary trees representation, Static implementation using arrays Linked representation, binary search tree, Operation inserts and Delete, Tree traversals, Creation of a tree using preorder, inorder, and postorder traversals, Representing trees as binary Trees, Height balanced trees (AVL tree), B Trees.

UNIT- IV:  
15 Lectures  
Sorting: Concepts and needs, Performance criteria, Techniques, Bubbles, Quick, Selection, Insertion, Tree (Heap), Merge, Radix sort.

Recommended Books:  
1. Classic data Structures, Samantha PHI, 2002

Reference Books:  
M. Sc. Tech Mathematics (Part I) (Semester II)
(Introduced from June 2014 onwards)
Choice Based Credit System

Paper – MT 206
Title of Paper: Lab Work II

Specific Objectives: Objectives are to apply theory studied in computer based papers in the semester.

The programs related to Data Structure in C.