MASTER OF SCIENCE IN INFORMATION TECHNOLOGY

(A Choice Based Credit System Effective from 2016-17)

SYLLABUS

First Semester
CourseCT01:Computer Architecture

Unit I

Processor Basics: CPU Organization: Fundamentals, additional features. Data representation: Basic formats, fixed point numbers, floating-point numbers. Instruction sets: Instruction formats, instruction types, programming considerations.

Unit II

Datapath Design: Fixed point arithmetic: Addition and subtraction, multiplication, division. Arithmetic Logic Unit: Combinational ALUs, sequential ALUs. Advanced topics: Floating-point arithmetic, pipeline processing.

Unit III

Control Design: Basic concepts: Introduction, hardwired control, design examples. Micro-programmed control: Basic concepts, multiplier control unit, CPU control unit. Pipeline control: Instruction pipelines, pipeline performance, super-scalar processing.

Unit IV

Memory Organization: Memory technology: Memory device characteristics, random-access memories, serial-access memories. Memory systems: Multilevel memories, address translation, memory allocation. Caches: Main features, address mapping, structure versus performance.

Unit V

System Organization: IO and System Control: Programmed IO, DMA and interrupts, IO processors. Parallel processing: Processor-level parallelism, multiprocessors.

Text Books:

1. J.P. Hayes: Computer Architecture and Organization, McGraw-Hill International editions.

Course CT02:Introduction to Programming

Note: The practical aspects of the course must be taught as laboratory instructions using computers. Teacher is required to ensure that students carry out the computer implementation of the algorithm/program in the laboratory as a part of this course

UNIT - I

Algorithm development:problem identification, algorithms, flow charts, testing and debugging, algorithms for searching (linear and binary), sorting (selection, bubble & insertion), merging of ordered list, analysis of algorithm.

UNIT – II

Programming in C: history, structure of C programs, compilation and execution of C programs, debugging techniques, character set, keywords, data type and variables, expressions, operators, operator precedence and their order of evaluation.

Control statements :if-else, switch, break, continue, coma operator, goto statement. Loops **-** for, while, do-while.

UNIT – III

Functions: built-in and user-defined functions function declaration, parameter passing- call by value & call by reference, recursive functions. storage classes - auto, extern, global and static.

Array: one dimensional and multi-dimensional array, array handling, passing arrays to functions, arrays and strings, string-handling functions.

UNIT – IV

Pointers: pointer variable and its importance, pointer arithmetic, array of pointers, function of pointers, structure of pointers, dynamic memory allocation functions, pointer to pointer.

Structures and Union :declaration of structures, pointer to structure, array of structure, pointer to function, self-referential structure, unions, enumeration, macro.

UNIT – V

File handling: opening and closing data file, creating a data file, read and write functions, formatted and unformatted data files, command line arguments.

Recommended books : How to solve it by computer -G. Dromey
Programming with C – Schaum's outline Series

Course CT03: Data Structure

UNIT-I

Data Type - Data Object - Data Structure : Data abstraction and abstract data type; Notion of an algorithm - Complexity measures : Rate of growth, basic time analysis of an algorithm; ordering notion - detailed timing analysis - space complexity.

Arrays: Arrays and their representation-Single and multidimensional arrays-row major and column major ordering-address calculation.

Linked lists: Pointers and their uses- Continuous vs linked storage. Singly and doubly linked lists-Operations on lists-representation of Sparse matrices and polynomials using lists-Circular lists-generalized lists

UNIT-II

Storage management: Dynamic storage management-Reclamation and compaction-Boundary Tag method.
Stacks and Queues: Stacks and Queues-representation and Manipulation-Uses of stacks and Queues-Recursion, polish expressions

UNIT-III

Trees: Trees-Binary and N-ary trees-Representation of trees-Tree traversal algorithms-Threaded trees and advantages-Conversion of general trees to Binary trees-B trees-Applications: Decision trees, Game trees and expression parsing.

UNIT-IV

Graphs: Graphs and their representations**:** Matrix representation-List structure-Graph traversal algorithm, Application of graphs.

Strings and their features: Strings-Representation and Manipulation using Arrays and lists-String matching algorithms. Brute force, Knuth-Morris-Pratt and Boyer-Moore strategies.

UNIT-V

Sorting and Searching: Searching and sorting-Sequential, Binary and hashed Searching-Bubble sort, Insertion sort, shell sort, Merge sort and Quick sort-Comparison.

Tables: Decision tables-Symbol tables-Hash Tables-Examples of representation and implementation-Applications.

ReccomendedBooks :

1. Aho A.V. & Ullman J.E. : Data Structure & Algorithms
2. Aron M. Tannenbaum&Others : Data Structures using C
3. Mary E.S. Loomis : Data Management & File Structures
4. Bhagat Singh & Thomas Naps :Intrioduction to Data Structures
5. Trembley&Sorenson : An Introduction to Data Structures with Applications

Course CT04:Discrete Mathematics

UNIT-I

Set Theory: Introduction, sets and elements, universal set and empty set, subsets, venn diagram, set operations, algebra of sets and duality, finite sets, counting principle, classes of sets, power sets.

Relations: Introduction, product set, relations, pictorial representation of relations, composition of relations, types of relations, equivalence relations, partial ordering relations.

UNIT-II

Functions: basic operations on function,Oneone, onto, into, many one functions, inverse of function, composition of functions , mathematical functions, floor & ceiling function, exponential and logarithmic functions, sequences, recursively defined functions.

Logic and Propositional calculus: Propositions and compound propositions, basic logical operations, propositions and truth tables, tautologies and contradictions, logical equivalence, algebra of proposition, conditional and bi-conditional statements, arguments, logical implication, propositional functions, quantifiers, negation of quantified statements.

UNIT-III

Matrices: Matrix addition and scalar multiplication, matrix multiplication, transpose, square matrices, invertible matrices, inverse, value of determinants, elementary row operations, Gaussian elimination, boolean matrices.

UNIT-IV

Counting: Basic counting principles, factorial notation, binomial coefficient, permutations, combinations, the pigeon-hole principle, the inclusion-exclusion principle, ordered and unordered partition.

Probability Theory: Introduction, Sample space and events, finite probability space, conditional probability, independent events, independent repeated trials, binomial distribution, random variables.

UNIT-V

Property of Integers: Order and inequalities, absolute value, mathematical induction, division algorithm, divisibility, primes, greatest common divisor, Euclidean algorithm, fundamental theorem of arithmetic, congruence relation, congruence equations.

Recommended Books :

1. Lipschutz S., Lipson M. :Discrete Mathematics
2. KolmanB.,Robert C.B., Sharon R.: Discrete Mathematical Structures
3. Trembley J.P. and Manohar R.P. : Discrete Mathematical Structures with Applications o Computer Science.
4. J.K.Sharma : Discrete Mathematics

Course CP01: Practical-I :Data Structure Programming

Programming Exercises using C language based on Algorithm for data structures
List of programs will be made available on the course web site.

Course CP02: PRACTICAL -II :Web Development Using HTML & CSS

This course will be taught through practical training to prepare Web pages using HTML and CSS. Each student will be required to select independent web pages and web contents. List of practical will be available on course web site.