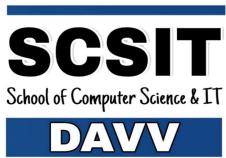# SYLLABUS

MSc (CS/IT)

1st SEMESTER

To produce world-class professionals who have excellent analytical skills, communication skills, team building spirit and ability to work in cross cultural environment.

To produce international quality IT professionals, who can independently design, develop and implement computer applications.

Professionals who dedicate themselves to mankind, who are environment conscious, follow social norms and ethics.

School of Computer Science & IT,
Devi Ahilya Vishwa Vidyalaya, Indore
www.scs.dauniv.ac.in

Course Name: **MSc (CS/IT) 1st Semester**

Subject Code: **CS-4022**

Subject Name: **Computer Organization and Assembly Language Programming**

Aim of the Subject

This course covers the basics of computer organisation with emphasis on the lower level abstraction of a computer system including digital logic, instruction set and assembly language programming. Topics includes data representation, logic gates, simplification of logical expressions, design and analysis of simple combinational circuit such as decoders and multiplexers, flip-flops and registers, design and analysis of simple synchronous sequential circuit, random-access and read-only memories, instruction set architecture and programming in assembly language.

Learning Outcomes

The students are expected to learn following after completion of the course:

- Demonstrate computer architecture concepts related to design of modern processors,
- memories and I/Os.
- Analyze the performance of commercially available computers.
- To develop logic for assembly language programming

Unit 1

Computer Organization: Digital and Analog computers, Major components of a digital computer, Memory addressing capability of a CPU, Word length of a computer, Processing speed of a CPU, Definitions of Hardware, Software and Firmware. Definitions of Dumb, Smart and Intelligent terminals.

Binary Systems: Digital Systems, Binary Numbers, Number Base Conversions, Octal and Hexadecimal Numbers, Complements, Signed Binary Numbers, Binary Codes: BCD code, Gray Code, ASCII code, Excess 3 Code, Error detecting Code.

Unit 2

Computer Arithmetic: Binary representation of Negative Integers using 2's complement and Signed magnitude representation, Fixed point Arithmetic operations on Positive and Signed (Negative) Integers like addition, subtraction, multiplication, Booth algorithm for multiplication,. Division of positive and negative binary numbers.

Unit 3

Introduction of 8085 Microprocessor: Architecture of 8085 processor. Register Architecture: Accumulator, Temporally Register and Flag Register. Program Counter, Stack pointer and Instruction register. Addressing Modes: Direct addressing mode and Register direct Addressing Mode. Register Indirect Addressing Mode, Immediate Addressing Mode and Implicit or Implied Addressing Mode.

Unit 4

Introduction to Assembly Language Programming: Various Instructions Classifications: Instruction Format, Opcode, Operand and Hex code. Instruction Operation Status, Various Instruction Sets: Data Transfer Group Instructions, Arithmetic Group Instructions, Logical Group Instruction, Branch Group Instructions: Conditional and Unconditional and Machine control Instructions.

Unit 5

Assembly language programming: Practice on assembly language programming, pinout diagram of 8085 microprocessor, interfacing of 8085, interrupts, Direct memory access, introduction to 8086 microprocessor.

Text Book(s)

1. Ramesh S. Gaonkar, Microprocessor Architecture, Programming and Applications with 8085/8080. Wiley Eastern Ltd. publication

2. B Ram, Computer Fundamentals: Architecture and Organization, New Age International, 2000

3. V. Rajaraman V and N. Adabala, Fundamentals of Computers, Prentice Hall India Learning Private Limited; 6th Revised edition edition

Reference Material(s)

1. R Theagarajan S Dhanasekaran and S Dhanapal, Microprocessor and Its applications, New Age International (P) Ltd.

2. Nicholas Carter and Raj Kamal, Computer Architecture and Organization, Schaum's Outlines Series

3. Dr. Raj kamal, Digital Systems: Princ

Course Name: **MSc (CS/IT) 1st Semester**

Subject Code: **CS-4205**

Subject Name: **Programming and Problem-Solving Using C**

Aim of the Subject

To learn the concept of programming and enable students to develop the logical skill to solve complex problems and handle projects

Learning Outcomes

The students are expected to learn following after completion of the course:

- Formulate the algorithms for simple problems.
- Correct syntax errors as reported by the compilers.
- Identify and correct logical errors encountered during execution.
- Represent and manipulate data with arrays, strings and structures.
- use pointers of different types.
- Create, read and write to and from simple text and binary files.

Unit 1

Introduction to Computer based Problem Solving; Algorithms and flowcharts; Programming Languages; Classification of Programming Languages; Characteristics of a program; Rules/conventions of coding, documentation, naming convention; Structured Programming; Modular Programming; Programming

Environment: Assembler, Interpreter, Compiler, Linker and Loader.

Unit 2

Fundamentals of C programming; History of C; Structure of C Program; Character set, Identifiers and Keywords; Data types; Constants and Variables; Operators and Expressions, Type Conversion, Operator Precedence and Associativity; Basic Input/Output operations; Decision control structures :if-else, switch-case ; Loop control structure : while, do-while, for; Jump statement : break ,continue ; goto

statement.

Unit 3

Array: One dimensional array -Declaration, initialization of one dimensional arrays; Two dimensional array -Declaration, initialization of two dimensional arrays; multi-dimensional array. Strings: Declaring and initializing string, reading and writing strings, string manipulation

functions, array of strings. Function: Need of user-defined function, Arguments, return value, return statement; passing parameters

– call by value, call by reference; Scope, visibility and lifetime of variables; Nesting of functions; passing arrays to function; passing strings to function. Recursion: basics, comparison with iteration, types of recursion. Storage Classes.

Unit 4

Pointer: Declaring and initializing pointer variables, chain of pointers, Pointer expression, Pointer arithmetic, Array of pointer and its limitations; Pointers as Function arguments; Function returning pointer, Dynamic Memory management functions. Structure: Defining a Structure, Declaring & initializing Structure Variables, Membership Operator, Array in structure, Array of Structure, Structure

within structure, Pointer to structure. Union: Defining union, Declaring & initializing union Variables; Bit Fields; Enumerated data type; typedef; Bitwise operators.

Unit 5

Command line arguments; File handling: Defining, opening and closing a file, input/output operations on file, merging files; C preprocessors: Macro substitution, file inclusion, compiler control directive.

Text Book(s)

1. Herbert Schildt, "C The Complete Reference", Osborne/McGraw-Hill, 4 th Edition, 2000.

2. Behrouz A. Forouzan and Richard F. Gilberg, "Computer Science: A Structured Programming Approach Using C", Cengage Learning, 3rd Edition, 2007.

Reference Material(s)

1. B.W. Kernighan, D.M. Ritchie, "The C Programming Language", Prentice Hall of India, 2nd Edition, 1988.

2. E Balagurusami, "Programming in ANSI C", Tata McGraw-Hill, 6th Edition, 2012.

3. Byron S Gottfried, "Programming with C", Tata McGraw-Hill, 3rd Ed

Course Name: **MSc (CS/IT) 1st Semester**

Subject Code: **CS-5511**

Subject Name: **Operating Systems**

Aim of the Subject

General understanding of structure of modern computers purpose, structure and functions of operating systems, illustration of key OS aspects by example

Learning Outcomes

The students are expected to learn following after completion of the course:

- By the end of the course student should be able to describe the general
- architecture of computers describe, contrast and compare differing
- structures for operating systems understand and analyze theory and
- implementation of:

Unit 1

Introduction: Evolution of operating systems, operating system concepts; activities,

functions and services of operating system; Computer Systems: Mainframe,

Desktop, Multiprocessors, Distributed, Clustered, Real time and Hand held systems.

Compu ter Sys tem Opera tions, Storage hierarchy, Hardware pro tec tion, System calls,

System structures. Process Management: Process concepts, Process scheduling,

Operation on processes.

Unit 2

Cooperating processes, Inter-process communication. Threads: multithreading

models, threading issues, thread examples. CPU Scheduling: concepts, scheduling

criteria, scheduling algorithms, algorithm evaluation. Process synchronization:

Critical section problem, Mutual exclusion and synchronization Techniques of inter

process: Synchronization hardware, semaphore, classical problems of synchroniza tion, cri tical regions and moni tors. Deadlock: deadlock characterization,

deadlock handling methods.

Unit 3

Memory Management: Concepts, single user memory management. Partition memory allocation: paging, segmentation and segmentation with paging, Virtual memory management: concept, demand paging, process creation, page replacement, allocation of frames and thrashing.

Unit 4

File Management: File concepts, access methods, directory structure, file system mounting, sharing and protection of files. File system structure and implementation, allocation methods, free space management, reliability of file system. Unix file system.

Unit 5

Device Management: Goals of input/output software design, Structure of device hardware and software. Layers of I/O software, structure of device drivers, Disk driver, disk arm scheduling algorithms, terminal driver, clock driver etc.

Text Book(s)

1. A. Silberschatz, P. Galvin and Gagne, Operating System Concepts, Addison Wesley, 6th Edition, 1994.

Reference Material(s)

1. Operating systems, 4rth Edition, William Stallings, Pearson Education, 2003.

SCSIT, DAVV

Course Name: **MSc (CS/IT) 1st Semester**

Subject Code: **CS-4116**

Subject Name: **Discrete Structures**

Aim of the Subject

To give better understanding about the subject so that student are good in problen solving skills as well as they can understand few more subject that are based on Discrete structure.

Learning Outcomes

The students are expected to learn following after completion of the course:

- Basic concepts of sets, permutations, relations,
- graphs, trees and finite state machines.
- It will represent discrete
- objects and relationships using abstract mathematical structures.

Unit 1

The Foundations: Logic, Sets and Functions: Introduction to set theory, set

operations, fuzzy sets, mathematical logic, prepositions, prepositional equivalences, predicates and quantifiers. Importance of Quantifiers. Functions, functions for computer science.

Mathematical reasoning: Introduction to Methods of proof, mathematical induction. Use of mathematical induction to solve different problems. Importance of recursions in computer science, scope of recursions, Recursive definitions, recursive algorithms.

Unit 2

Combinatorics: The basics of counting, The sum rule, The product rule, The

Pigeonhole Principle, Permutations with repetitions, Permutations without repetitions, Circular Permutations. Applications of combinations. Applications of Combinatorics to solve Committee problems. Applications of Combinatorics to understand Telephone

numbering plan, understanding Internet addresses, Advanced counting techniques,

recurrence relations, solving recurrence relations, algorithm design, Basic understanding of complexities, basic problems of complexity of algorithms.

Unit 3

Relations: Relation definition , Importance of relations in computer science,

MSc (CS/IT) 1st SEM

Relations and their properties, Unary relations , Binary relations, Ternary relations , n-ary relations and their applications, closures of relations, equivalence relations, partial ordering. Representing relations, relation matrix, relation graph, composite relation. Operations on relations – union, intersection and join. Concepts of least upper bond, Greatest lower bond, maximal element, minimal element, Greatest element, Least element of a partially ordered set, lattices, sub lattices, chains and antichains.

Unit 4

Graphs: Introduction to Graphs, Importance of graph theory in computer science,

Graph terminology, representing graphs, graph types, graph models, and graph

isomorphism. Euler and Hamiltonian Paths, shortest path problems, planar graphs,

graph colouring, chromatic number, Euler's formula, Kuratowski's theorem. The four

colour problem, Applications of Graph Colouring, Introduction to Trees, applications of trees, tree traversal, trees and sorting, Spanning trees, minimum spanning trees.

Unit 5

Languages and Grammars: Introduction to Languages and Grammars, solving

problems for validity of statements according to the grammar. Importance of Language theory in Computer Science, Importance of Derivation trees, solving problems of Derivation trees, Importance of Parsing, Phrase-Structure Grammars, Types of Phrase structure grammars.

Text Book(s)

Kenneth H. Rosen "Discrete Mathematics and its Applications", 7th edition,

McGraw-Hill Education.

Reference Material(s)

1. Kolman, Busby and Ross "Discrete Mathematical Structures", 5th edition, Pearson
   Education.

2. Narsingh Deo "Graph Theory with Applications to Engineering & Computer
    Science", 4th edition, Prentice Hall of India.

3. James L. Hei

Course Name: **MSc (CS/IT) 1st Semester**

Subject Code: **IC-4916**

Subject Name: **Communication Skills and Report Writing**

Aim of the Subject

To improve the confidence, communication skills and presentation capabilities of students that will help them in placements and corporate life.

Learning Outcomes

The students are expected to learn following after completion of the course:

- Improved skills in personal interviews and group discussions
- Development of power of expression
- Improved Writing Skills
- Improved Presentation Skills

Unit 1

Fundamentals of Communication :

Definitions, Importance, Forms of communication, Process of communication, Channels, Barriers and Strategies to overcome barriers of communication

Unit 2

Listening:

Definitions, Importance, Benefits, Barriers, Approaches, Exercise and cases.

Group Discussions :

Definitions, Importance, Process, Points to be borne in mind while participating, Do's and Don'ts.

Unit 3

Presentation Skills :

Do's and Don'ts.

Interviews:

Types of Interviews, Points to be borne in mind as an Interviewer or an

Interviewee. Commonly asked questions. Do's and Don'ts.

Unit 4

Transactional Analysis, Johari Window.

Written Communication:

Report Writing, Business Correspondence, Preparation of Manuals and Project Report, Minutes of meeting, Notes and Circulars.

Unit 5

Intense practice of Presentations, Group Discussions and Interviews.

Text Book(s)

1. Communication – K. K. Sinha

2. Organizational Behavior - Fred Luthans

3. Organizational Behavior - Stephen Robbins

Reference Material(s)

1. Communications Skills – M.V. Rodrigues

2. Business Communication - Lesikar and Flately