

**GOVT. HOLKAR [MODEL, AUTONOMOUS] SCIENCE
COLLEGE INDORE
Academic Year 2024-2025**



Affiliated to Devi Ahilya Vishwavidyalaya, Indore

Syllabus for M.Sc.

Computer Science

(Faculty of Computer Science)

DEPARTMENT OF COMPUTER SCIENCE

M.Sc. Computer Science

Academic Year 2024-2025

Govt. Holkar (Model Autonomous) Science College, Indore

Computer Science Department

Syllabus Session 2024-25

Programme: M.Sc. Computer Science

Class: M.Sc. I Sem.

S.No	Paper	Course Title	Course Code	Credits	CCE (Max)	CCE (Min.)	External Assessment Max.	External Assessment Min.	Total Max.	Total Min.
1	Core 1	Computer & Communication Fundamentals	CS11	4	25	9	75	26	100	35
2	Core 2	Discrete Structure	CS12	4	25	9	75	26	100	35
3	Core 3	Operating System	CS13	4	25	9	75	26	100	35
4	Core 4	Programming & Problem solving Through "C-Language"	CS14	4	25	9	75	26	100	35
5	Practical 1	Practical based on Theory paper 1 & 2)		3			75		75	26
6	Practical 2	Practical based on Theory paper 3 & 4		3			75		75	26
7	Seminar 1			1			25		25	9
8	Seminar 2			1			25		25	9
				24	100		500		600	

Mr. Mohit Gupta
Student
Clause 06

Mr. Manish Kumar
Industrial Person
Clause 05

Dr. Ugrasen Suman
Subject Expert
Clause 04

Dr. Sharad Gangele
Subject Expert
Clause 03

Dr. Sanjeev Sharma
Subject Expert
Clause 03

Dr. Pradeep Sharma
Convener & HoD

M.Sc. (CS) I -Semester
CS-11: Computer and Communication Fundamentals
Academic Year 2024-2025

Min. Marks: 26

Max. Marks: 75

Course Outcomes: -

1. Student will understand the fundamental concepts of data communication and computer networking.
2. Understand how errors detected and corrected that occur in transmission.
3. How collisions to be handled when many stations share a single channel.
4. They will know about routing mechanisms and different routing protocols.
5. Student will know about usage of different application layer protocols.

Unit	Topic
I	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.
II	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. Boolean Algebra and Logic Gates : Basic Definitions, Basic Theorems and properties of Boolean Algebra, Boolean Functions, Canonical and standard forms, Other Logic operations, Digital Logic gates, Integrated Circuits. Gate-Level Minimization: The K-Map Method, 3 and 4 variable K-Map, Product of sums simplification, Sum of Products simplification, Don't care conditions, NAND and NOR implementations, Exclusive-OR function.
III	Combinational Logic: Combinational Circuits, Analysis Procedure, Design Procedure, Binary half adder, binary full adder, binary full subtractor, binary parallel adder, carry propagation delay and Propagation delay calculation of various digital circuits. Carry look ahead generator fast adder , Decimal Adder, Binary multiplier, Magnitude comparator, Code converters like binary to gray, BCD to excess 3. Decoders, Encoders, Multiplexers, Demultiplexers.
IV	Analysis of clocked sequential circuits: State diagrams, State equations for D, JK and T Flip flops. State reduction methods using all Flip Flops. Mealy and Moore Models. Shift Registers- Serial in Serial out, Serial in Parallel out, Parallel in Serial out and Parallel in Parallel out. Designing of Asynchronous (Ripple) Counters, Design of Synchronous Counters. Synchronous Sequential logic : Sequential circuits, Latches, Flip Flops : SR, D, JK, T, Master Slave JK Flip flop. Characteristic equations and Excitation tables of flip flops.

V	Communication Systems: Basics of communication systems, Types of communication, Transmission impairments, analog vs. digital transmission, requirements of communication systems, channel capacity. Shannon's theorem. Data rate of a channel, Physical Communication Media- Bounded Media: Twisted Pair, Coaxial Cable, Optical Fiber. Unbounded Media – Microwave Communication, Radio wave Communication, Satellite Comm. Time Division Multiplexing and Frequency Division Multiplexing. Data communications and its components, Half Duplex and Full Duplex Transmission. Asynchronous and synchronous transmission LAN, MAN, WAN. Network Topologies- Bus, Star, mesh, Ring. Categories of networks: Introduction of Communication Protocols like OSI and TCP/IP model.
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Required Text(s):

- Digital Design by M. Morris Mano.
- Computer Architecture By Dr. Rajkamal.
- Data communications and networking By A. Forouzan
- Computer Fundamentals – Architecture and Organisation By B. Ram.
- Computer networks by Andrew Tanenbaum
- Principles of digital communication system & computer networks By K.V.K.K. Prasad
- Computer organization and architecture by William Stallings.

M.Sc. (CS) I -Semester
CS-12: Discrete Structure
Academic Year 2024-2025

Min. Marks: 26

Max. Marks: 75

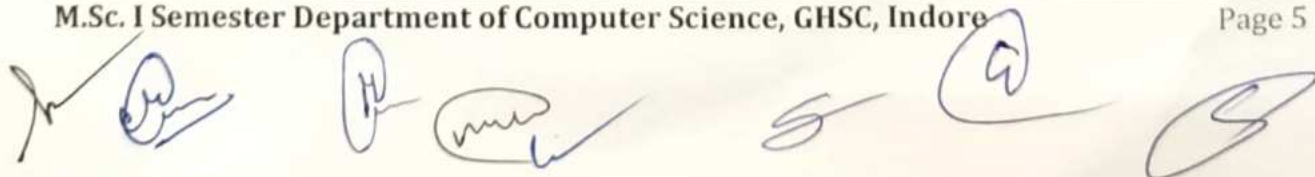
Course Outcomes: -

1. Be able to reason at multiple levels of detail and abstraction, being aware, in particular, of the applicability and limitations of tools from mathematics and theoretical computer science.
2. Recognize the context in which a computer system may function, including its interactions with people and the physical world.
3. Able to communicate with, and learn from, experts from different domains throughout their careers.
4. Possess a solid foundation that allows and encourages them to maintain relevant skills as the field evolves.
5. To be able to manage their own career development and advancement.

Unit	Topic
I	The foundation: Logic, Sets and Functions: Introduction, logic, propositional equivalences. Predicates and quantifier, set, set operations, fuzzy sets, functions for computer science, sequences and summations.
II	Mathematical reasoning: Methods of proof, mathematical induction, recursive definitions, recursive algorithms. Languages and Grammars: Introduction to Languages and Grammars. Phrase-Structure Grammars, Types of Phrase structure grammars.
III	Combinatorics: The basics of counting, The Pigeon Hole Principle, Permutations and combinations, Advanced counting techniques, Algorithms, Complexity of Algorithms.
IV	Relations: Relations and their properties, n-ary relations and their applications, representing relations, closures of relations, equivalence relations, partial ordering. recurrence relations, solving recurrence relations.
V	Graph: Introduction to graphs terminology, representing graphs and graph isomorphism, connectivity, Euler and Hamiltonian Paths, shortest Path problems, planar graphsm, graph colouring, chromatic number, Euler's formula. Kuratowski's theorem, The Four Colour problem, applications of graph colouring, introduction to trees, application of trees, tree traversal,trees and sorting, spanning trees, minimum spanning trees.

Required Text(s):

- Kenneth H,Rosen, Discrete Mathematical and it's application, 6th Edition, Tata McGraw Hill, 2007.
- C.L Liu, "Elements of Discrete Mathematics, 2nd Edition, Tata McGraw Hill, 1985.
- Kolman, Busby & Ross Discrete Mathematical Structures, 5th Edition, Pearson education, 2003.
- Trembly. J.P & Manohar. P,Discrete Mathematical Structures with Applications to Computer Science, 1975



**M.Sc. (CS) I -Semester
CS-13: Operating System
Academic Year 2024-2025**

Min. Marks: 26

Max. Marks: 75

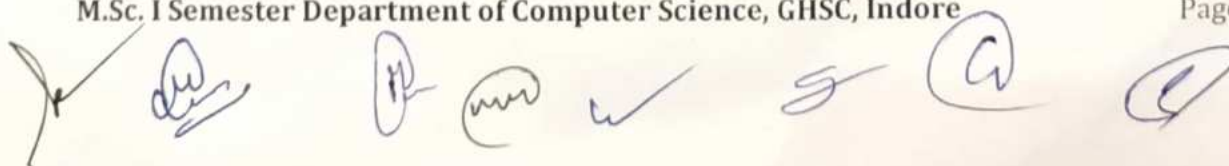
Course Outcomes:

1. Introduction and evaluation of Operating system along with various types.
2. Schedule CPU time using scheduling algorithm for processors.
3. Apply page replacement policies for dynamic memory management.
4. Design and construct the following OS components: System calls, Schedulers, Memory management systems, Virtual Memory and Paging systems, Deadlock prevention and avoidance.
5. Working with linux OS. Introduction to various linux commands and vi editor etc.

Unit	Topic
I	Introduction: Evolution of operating systems, operating system concepts, operating system Services, System Calls, Batch Processing, Time Sharing operating systems, real time systems. Process Management: Process Concept, Scheduling, operations on process, cooperating process. CPU Scheduling: basic Concepts, Scheduling Criteria & Algorithms.
II	Concurrent Process: IPC, Techniques of inter process communication, message driven operating systems, Critical Section Problem, Mutual Exclusion, Synchronization, Semaphore, Deadlock handling techniques.
III	Memory Management: Concepts, Single user memory management, Partition memory allocation, Virtual Memory Concepts, Virtual memory management using paging and segmentation techniques.
IV	File Management: Operations on a file, Structure of File System, File Access Methods, Directory structure, sharing and protection of file, Directory structure & implementation, Allocation Methods, Free Space Management.
V	Device Management: Goal of input /output software design, Structure of device hardware and software, Layers of I/O software, Structure of device driver, disk driver, disk arm scheduling Algorithms, terminal driver, function of clock driver, printer, mouse, scanner etc. Case Studies: Unix/Linux, Windows operating system.

Required Text(s):

- A. Silberschatz and P. Galvin ,Operating System Concepts, 6th Edition, Addison Wesley, 2003.
- William Stallings, Operating systems, 4th Edition, Prentice Hall, 2000.
- D.Dhamdhare, Operating System: a concept based approach, 1st Edition, Tata McGraw Hill, 2003.
- A.S. Tanenbaum , Modern Operating System, 3rd Edition, Prentice Hall of India



M.Sc. (CS) I-Semester
CS-14: Programming & Problem Solving Through "C"
Academic Year 2024-2025

Min. Marks: 26

Max. Marks: 75

Course Outcomes:

1. General Knowledge of Programming types, Problem solving concepts, usage of Algorithm/ Flowchart. Writing, compiling and debugging programs in C language.
2. Students will learn how to design structure of c programs, using tokens.
3. Formatted and unformatted I/O, control statement and Looping. Design programs containing decision structures.
4. Array (1-d, 2-d), Functions & Recursion, string handling.
5. Structure, preprocessor directives (macros).

Unit	Topic
I	Overview of Problem solving: Introduction to computer based Problem solving, Programming concepts with flowcharting and algorithms , classification of Programming languages, Programming environment {Assemblers, compilers, interpreters, linkers and loaders}. Developing and debugging flowcharts for programming problem.
II	Fundamentals of C programming: Overview of C - Various constructs of C program, coding style, data types, constants and variables, expressions and operators, basic input/output operations and formatting characters, decision making and branching, looping constructs, Arguments to main, Enumerations and bits fields, typedef, type casting, Storage class.
III	Array and their Applications: Arrays {one dimensional and multidimensional array}, String Handling, Searching (Linear and binary) and sorting (selection, bubble, insertion) techniques, matrices operations.
IV	Advanced Programming Concepts: Structures and union, Functions {Standard and User defined function, parameter passing, scope rules}, Recursion {Using recursion, conversion of recursive program to non-recursive}. Dynamic memory allocation and pointer {Uses, pitfalls, pointer to various user defined and standard data types}.
V	More Advanced Programming Concepts: Pre-processors {define, include, macro's, ifdef...}.Introduction to file handling. Header files creation, introduction to Graphics.

Required Text(s):

- B.W. Kerighan & D.M. Ritchie, The C programming Language, 2nd Edition Prentice Hall, 1998.
- Herbert Schildt, C++ The Complete Reference, 4th Edition McGraw-Hill 2000.
- Yashavant Kanetkar, Let Us C, 8th Edition, Infinity Science Press 2008.
- Ashok N. Kamthane, "Programming with ANSI and Turbo C", Pearson Education.

