Holkar Science College, Indore
Department of Computer Science

M.Sc. Computer Science
Semester I
2010-2011

CS-101	**Computer and Communication Fundamentals**
CS-102	**Discrete Structures**
CS-103	**Programming & Problem solving Through "C"**
CS-104	**Operating System**
CS-105	**Communication Skills**

Student Evaluation

Internal Examination	**15**
External Examination	**35**
Total	**50**

M.Sc. (C. S.) I Semester
CS-101 Computer & Communication Fundamentals
2010-2011

Unit 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.

Unit 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.

Unit 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.

Unit 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.

Unit 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.

Required Text(s):

- Digital Design by M. Morris Mano. Third addition
- 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. (C. S.) I Semester
CS-102 Discrete Structure
2010-2011

Unit I

The foundation: Logic, Sets and Functions: Introduction, logic, prepositional equivalences. Predicates and quantifier, set, set operations, fuzzy sets, functions for computer science, sequences and summations.

Unit 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

Unit III

Combinatorics : The basics of counting, The Piegeon Hole Principle, Permutations and combinations, Advanced counting techiques, recurrence relations,solving recurrence relations, Algorithms, Complexity of Algoritms

Unit IV

Relations: Relations and their properties, n-ary relations and their applications, representing relations, closures of relations, equivalence relations, partial ordering.

Unit 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. (C. S.) I Semester
CS-103 Programming & Problem solving Through "C"
2010-2011

Unit 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.

Unit II

Fundaments 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.

Unit III

Array and their Applications: Arrays {one dimensional and multidimensional array}, String Handling, Searching and sorting techniques, matrices operations.

Unit 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}.

Unit V

More Advanced Programming Concepts: Pre-processors {define, include, macro's, ifdef…}.Introduction to file handling. Header files creation, 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.

M.Sc. (C. S.) I Semester
CS-104 Operating System
2010-2011

Unit 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, IPC.
CPU Scheduling: basic Concepts, Scheduling Criteria & Algorithms.

Unit II
Concurrent Process: Mutual Exclusion, Synchronization. Techniques of inter process communication, message driven operating systems. Deadlock handling techniques.

Unit III
Memory Management: Concepts, Single user memory management. Partition memory allocation. Virtual memory management using paging and segmentation techniques, Virtual Memory Concepts.

Unit 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.

Unit 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.Dhamdhere, 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. (C. S.) I Semester
CS-105 Communication Skill
2010-2011

Unit I
Fundaments of Communication (OHP & PPP):
Definitions, importance, forms of communication, process of communication, channels, barriers and strategies to overcome barriers of communication.

Unit II
Listening (PPP):
Def, Importance, Benefits, barriers, approaches, be a better listener, exercises and cases.
Advance Communication (PPP and Exercises on handouts): Why communication? Art of communication, V3 communication, Key elements of IP communication, Quizzes, exercises and cases / incidents for practice.

Unit III
Group Discussions:(PPP)
Definitions, importance, process, points to be borne in mind while participating, Dos and Don'ts. Practice- if time permits or to be covered in PDP

Unit IV
Interview (PPP):
Types of, Points to be borne in mind as an interviewer or an Interviewee, commonly asked questions, Dos and Don'ts. Practice- if time permits or to be covered in PDP.

Unit V
Transactional Analysis(PPP):
Transactional analysis, Johari Window, FIRO-B (PPP)
Written Communication: Report writing, documentation, business correspondence, preparation of manuals and project reports.

Required Text(s):

- OB by Fred Luthans
- OB by Stiphen P. Robbins
- Masterson, Johan & et. al (1989), "Invitation to Effective Speech Communication, Scott, Foreman and Co.
- Chturvedi, P.D. and Chaturvedi Mukesh (2004), "Business Communication"Pearson Education, Singapore Pvt. Ltd.
- Business Communication by ICMR, Feb 2001.
- Toropov Brandon (2000), "Last Minute Interview Tips", Jaico Publishing House Mumbai.
- Heller Robert (1998), "Essential DK Managers: Communication Clearly" Clearly",Dorling Kindersley, London.
- Decker Bert ( ) "The Art of Communication",
- Bone Diane (),"The Business of Listening",a Fifty-Minute Series Book Crisp Publications, Inc, California.