Department of Computer Science & Application

Bilaspur University, Bilaspur (C. G.)

Five Years Integrated B.Sc./M.Sc.(Computer Science)

Scheme and Syllabus

2014-15

SEMESTER: I

Course Code	Course Name	T	P /T	C	Sessional Marks	End Semester Marks	Total Marks
MCS 101	Communication Skill	4	1	5	25	75	100
MCS 102	Mathamtics-1	5	-	5	25	75	100
MCS 103	Digital logic and Switching Theory	3	2	5	25	75	100
MCS 104	Information Technology	5	-	5	25	75	100
MCS 105	Programming in C	3	2	5	25	75	100
MCS106	Programming in C Lab	-	3	3			50

MCS 101: COMMUNICATION SKILL

Unit-I Fundamental of Communication: Definition, Importance, Process, Form of Communication, Dimension of Communication, Channels of Communication, Barriers of Communication, Qualities of a good communicator.

Unit-II Verbal and Non-Verbal Communication: Audio/Visual Communication, Effective Speaking, Interpersonal Communication, Non-Verbal Communication: Kinesics, Proximics, Paralanguage, Activity: Short Classroom presentation.

Unit-III Listening Skill and Self Assessment: Definition and Importance, Intelligent Listening, Barriers of Listening and qualities of overcoming barriers, SWOT analysis.

Unit-IV Writing Skills: Use of Grammars, brief description & detailed Illustrations, Business correspondence, Presentations, Report Writing, Projects, notice and Circulars.

Unit-V Effective Use of Communication Skills(Practical Approach) Basics of Phonetics, Presentation Skill-Do's and Dont's, Extempore, Debate, Role Plays, Interview, Group Discussion.

MCS 102: MATHEMATICS-1

UNIT-I

Mathematical logic:Statements and Notations, Connectives, Normal forms, The Theory of inference for the statement calculus, the propositional calculus, the Predicate calculus, Inference theory of the predicate calculus.

UNIT-II

Set Theory:Basic concept of set theory, Operations on sets – union, intersection etc., Functions: Mapping, Injection, Surjection, Composition of Function and Inverse function, Relationsand ordering**:** Relation definition , Importance of relations in computer science, Relations and their properties, Unary relations , Binary relations, Ternary relations , n-ary relations and their applications, closures of relations, equivalence relations, partial ordering, Equivalence Class, properties and partition of a set, Representing relations, relation matrix, relation graph, composite relation, Operations on relations – union, intersection and join.

UNIT-III

Counting Principles:Cardinality of Set, Basics of Counting,the Product Rule, the Sum Rule, the Inclusion-Exclusion, Principle. The Generalized Pigeonhole Principle and its Applications.

Algebric Structures: Algebraic systems Examples and General Properties, Definition and elementary properties of Groups, Semigroup, monoid, rings, fields and Applications of group.

UNIT-IV

Lattices And Boolean Algebra With Applications: Poset, Hasse diagram, Lattices, Complemented lattice, Bounded lattice and Distributive lattice. Boolean Functions : Introduction, Boolean variable, Boolean Function of degree n, Boolean identities, Definition of Boolean Algebra, Boolean Functions, representation and minimization of Boolean functions

UNIT-V

Graph**:** Definition, Elementary terminologies and results, Graphs as Models, Special types of graphs, Isomorphism. Adjacency and Incidence Matrix of a Graph, Subgraphs, induced subgraphs,Vertex deletion, Edge deletion, Complement of a graph and self-complementary graphs; Union, Intersection and Product of graphs, Fusion of vertices, Walk, Trail, Path; Cycle: Definitions and elementary properties;Connected Graphs : definition and properties,Distance between two vertices, eccentricity, centre, radius and diameter of a graph, Isthmus, Cut-vertex : Definition and properties; Cutset, edge-connectivity, vertex connectivity, Weighted Graph and Dijkstra's Algorithm.

TEXT BOOK

1. "Discrete Mathematical structures with Applications to Computer Science", JP Trembly and R. Manohar, TMH International Edition (Latest Edition)
2. "Graph theory and its application to Engineering and Computer Science", Narsing Deo, PHI (Latest Edition)

REFERENCE BOOK

1. "Discrete Mathematics", Seymour Lipshutz & Marc Lipson, TMH
2. "Discrete Mathematics and Its Applications", Kenneth. H. Rosen, TMH
3. "Discrete Mathematics with Graph Theory" Goodaire and Parmenter, EEE.

MCS 103: DIGITAL LOGIC AND SWITCHING THEORY

UNIT-I:
Number Systems & Codes:Philosophy of number systems,Decimal, Binary, Octal,Hexadecimal, Gray, Excess-(3, 64), BCD(8421), 84-2-1 etc. Conversion, number system arithmetic, complements (n-1's and n's), Signed and Unsigned numbers, representation of negative numbers, Fixed point representation and IEEE floating point representation.

UNIT-II:
Logic Gates, Boolean Algebra & Switching Functions:Fundamental postulates of Boolean algebra, Basic theorems and properties, Canonical and Standard forms, Truth Tables, OR, AND, NOT, XOR, Universal (NOR and NAND) Gates, Multilevel NAND/NOR realizations.

Minimization of Switching Functions:Standard representation of logic function (SOP and POS), Minimization technique- K Map method, Prime implicants, don't care combinations.

UNIT-III:
COMBINATIONAL LOGIC DESIGN: Design using conventional logic gates, Encoder, Decoder, Adders, Substractors, Multiplexer (MUX), De-Multiplexer, MUX Realization of switching functions, Code-converters (BCD-EXCESS-3), Hazards and Hazard free realizations.

UNIT-IV:
SEQUENTIAL CIRCUITS: Classification of sequential circuits (Synchronous, Asynchronous, Pulse mode, Level mode with examples), Basic flip-flops- SR, JK, T and D, Master Slave Flip Flop, clocked Flip Flop,Triggering and excitation tables, race around condition, Steps in synchronous sequential circuit design, Design of modulo-N Ring & Shift counters.,

UNIT-V
DIGITAL HARDWARE DEVICES: Logic families: TTL, ECL and CMOS, Tri state logic; electrical characteristics, Bipolar-Transistor Characteristics, RTL and DTL circuits, Logic families.

MEMORY DEVICES: ROM, RAM, EPROM, CDROM, Flash memory. Programmable logic devices: architecture and characteristics.

TEXTBOOKS:

1. "Switching & Finite Automata theory", Zvi Kohavi, TMH,2nd Edition.
2. "Digital Design", Morris Mano, PHI, 3rd Edition, 2006.

REFERENCE BOOKS:

1. An Engineering Approach To Digital Design – Fletcher, PHI.
2. Digital Logic – Application and Design – John M. Yarbrough, Thomson
3. Fundamentals of Logic Design – Charles H. Roth, Thomson Publications, 5th Edition, 2004.
4. Digital Logic Applications and Design – John M. Yarbrough, Thomson Publications, 2006.
5. Malvino A.P, Digital Principles and Applications, Tata McGraw Hill.
6. Computer Fundamentals: Architecture and Organization

MCS 104: INFORMATION TECHNOLOGY

UNIT-I

Introduction – Basic concept of IT, concept of data and information, History of computer, generation and classification of computer, organization of computers, Input and ouyput devices, storage devices, data and file organization

UNIT-II

Software and its need, types of software: system software, application software, utility software, firmare. Operating system :Types, job and objective. Language translator. Introduction and evolution of programming language , Types of programming language, Generation of programming languages, programming paradigms: procedural oriented and object oriented programming

UNIT-III:

Communication and network technology: Communication process, Communication and system elements, Analog and digital signal, mode of communication, communication media : wired and wirelesss. computer network: types. Criteria, advantages and disadvantages, Topology, LAN and other network related protocols, OSI reference model and TCP/IP model

UNIT-IV

Internet: Technical foundation of internet , history of internet, Internet service provider(ASP), ARPANET, Services available on Internet, Internet application : Email, WWW, and file transfer , Internet addressing , client server computing , Domain name system(DNS), Internet security- Firewall , Encryption

UNIT-V

Application of IT and latest IT trends : IT in business, Industry, home, education, entertainment, science and engineering and medicine. Ecommerce , M-commerce

Latest IT trends : Artificial intelligence, Data mining, Overview of geographic information system(GIS) , Cloud computing, Information communication technology(ICT)

TEXTBOOKS:

1. "Fundamental of computer ", V. Rajaraman, PHI Publication
2. "Introduction to information technology", V. Rajaraman, PHI Publication
3. "Information Technology today" , S. jaiswal
4. "Fundamental of IT", Leon and Leon , Leon Tec world
5. "Introduction to Information Technology", Aksoy and Denardis, Cengage learning

MCS 105: PROGRAMMING IN C

UNIT-I

COMPUTER FUNDAMENTALS, INTRODUCTION TO C: The C character set, identifiers and keywords, data types, constants, variables and array declaration, expressions, statements, symbolic constants.

OPERATORS: Arithmetic, Relational, Logical, Conditional, Bitwise, COMMA operatoretc., library functions, data input/output, preparing and running complete C program.

UNIT-II

CONTROL STATEMENTS: preliminaries, if-else, nested if- else, goto statements, switch, break, continue, while, do-while, for, nested loops.

ARRAYS: Defining an array, array declaration and assignments, processing an array, passing arrays to a function, multi dimensional arrays.

UNIT-III

FUNCTIONS:A brief overview, defining a function, accessing a function, passing arguments to a function, specifying arguments data types, function prototypes, recursion. Program structure, storage classes, automatic variables, external variables, static variables.

STRING: Introduction to string, Operation, Built-in String Function::strlen(),strcmp(),stricmp(),strncmp(),strincmp(),strcpy(),strcat(),strrev() and their implementation.

UNIT-IV

POINTERS: Fundamental, pointer declarations, passing pointers to a function, pointers and one dimensional arrays, operations on pointers, pointer to pointer, array of pointers, passing functions to other functions, dynamic memory allocation, preprocessor, macro expansion:#define, macro v/s function, file inclusion:#include, conditional compilation:#ifdef,#ifndef.

UNIT-V

STRUCTURES AND UNIONS:defining a structure, processing a structure, user define data types, structures and pointers, passing structure to a function, self referential structure, union and enumeration.

TEXT/REFERENCES BOOKS:

1. "Programming with C", E. Balaguruswamy, TMH (Latest Edition)
2. "Exploring C", Yashavant P. Kanetkar, BPB, (Latest Edition)
3. "Understanding Pointers in C", Yashavant P. Kanetkar, BPB, (Latest Edition)
4. "Programming with C", Gottfried, Schaum's Outline Series (Latest Edition)
5. "Programming with C", Rajaraman R, PHI (Latest Edition)
6. "Programming with ANSI C", B.T. Holmes, BPB (Latest Edition)
7. "The C Programming Language", Kernighan & Ritchie, PHI (Latest Edition)

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SEMESTER: II

Course Code	Course Name	T	P/T	C	Sessional Marks	End Semester Marks	Total Marks
MCS 201	Computer Organization & Architecture	4	1	5	25	75	100
MCS 202	Mathamatics-2	4	1	5	25	75	100
MCS 203	Microprocessor and Assembly Language Programming	4	1	5	25	75	100
MCS 204	Environment Study	4	1	5	25	75	100
MCS 205	Object Oriented Programming with C++	4	1	5	25	75	100
MCS 206	Practical C++	-	3	3	-	-	50

MCS 201: COMUTER ORGANIZATION AND ARCHITECTURE

UNIT-I

Computer Organization: Introduction, Von Neumann Architecture, Harvard Architecture, Functional Units and Components in Computer Organization, Program Development Tools, Machine Language, Assembly Language, Instruction Codes, Computer Registers, Computer Instructions, Instruction cycle.

UNIT-II

Central Processing Unit: Stack organization, Instruction formats, Addressing modes, DATA Transfer and manipulation, Program control, Reduced Instruction Set Computer (RISC), Complex Instruction Set Computer (CISC).

UNIT-III

Pipeline & Vector Processing: Basic Concepts in Pipelining, speed-up, throughput, efficiency, instruction pipeline, Instruction Pre-fetch and Branch Handling , Data Buffering, Internal Forwarding, Data Dependant Hazards.

UNIT-IV

The Memory System: Memory Hierarchy, Main memory, Auxiliary memory, Associative memory, Cache memory, Virtual memory, Memory management hardware.

UNIT-V

Input-Output Organization: Peripheral Devices, Input-Output Interface, Asynchronous data transfer Modes of Transfer, Priority Interrupt, Direct memory Access, Memory mapped I/O, Input –Output Processor (IOP).

TEXT BOOKS:

1. "Computer System Architecture", M.Moris Mano, 3rd Edition, PHI / Pearson, 2006.
2. "Computer Organization and Architecture", William Stallings 7th Edition, PHI/Pearson, 2006.

REFERENCE BOOKS:

1. "Computer Organization", Car Hamacher, Zvonks Vranesic & Safwat Zaky, 5th Edition, TMH, 2002.
2. "Computer Architecture and Organization", John P. Hayes, TMH International Editions, 1998.
3. "Computer Architecture and Organization", Raj Kamal, Nicholas Carter, 2nd Edition, TMH Education, 2009
4. "Introduction to computer architecture", Stones S. Galgotia Publication
5. "Computer Organization and Architecture design for Performance", 4th edition - W. Stallings, PHI
6. "Computer Engineering - Hardware Design", M. Morris Mano, PHI
7. "Computer Architecture and parallel processing", Kai Hwang & Faye Briggs, McGraw hill, 1985

MCS 202: MATHEMATICS-2

UNIT–I

Errors and precision, errors due to round off, Solution of Algebraic and Transcendental Equations: Introduction, Bisection Method, Method of False Position, Newton-Raphson Method.

UNIT-II

Interpolation: Introduction, solving problems using Newton's Backward Interpolation formula, Newton's Forward Interpolation formula, Gausses forward Interpolation Formula, Gausses Backward Interpolation formula, Lagrange's Interpolation formula, Newton divided difference formula.

UNIT–III

Curve Fitting: Graphical method, Laws reducible to the linear laws, Principal of least square, Method of least squares, fitting a curve of type $y= a+bx^2$, $y= ax+bx^2$, $y=ax+b/x$, $y= ax^2+bx$, $y=ax^b$, $y=ae^{bx}$, $xy^a=b$, Method of group averages

UNIT-IV

Numerical Differentiation- Forward Difference formula, Backward Difference formula, Numerical Integration : Quadrature formulae , Errors in Quadrature formulae, Rombergs Method, Euler –Maclaurin formula.

UNIT–V

Numerical solution of Ordinary Differential equations: Picards method, Taylors series method, Eulers method, Modified Eulers method, Runges method, Runge-kutta method

TEXT /REFERENCE BOOKS:

1. "Numerical Analysis", S.S. Sastry, PHI
2. "Numerical Method in Engineering and Science", Dr. B.S. Grewal, Khanna Publishers,2010
3. "Computer Oriented Numerical Methods", Rajaraman, PHI
4. "Numerical Computations", Venkataraman
5. "Computer Oriented Numerical Methods", Stoer, Bullrich, Springer Verlag, 1980

MCS-203 MICROPROCESSOR AND ASSEMBLY LANGUAGE PROGRAMMING

UNIT-1

Fundamental definition of Microprocessor, evolution of Microprocessor, Microprocessor Instruction set and Computer Languages, From large scale to single chip microcontrollers, Von Neumann and Harvard architecture, RISC vs. CISC, Application: Microprocessor Controlled Temperature System.

UNIT-2

Register organization of 8086, Architecture, signal description of 8086, Physical memory organization , General Bus operation, I/O addressing capability, Special processor activities, Minimum mode 8086 system and timings, Maximum Mode 8086 system and timings, The processor 8088.

UNIT-3

8086/8088 instruction set and assembler directives: Machine language instruction format, Addressing mode of 8086, Instruction set of 8086/8088, Assembler directives and operators.

UNIT-4

Assembly language programming Examples, Machine coding programs
Special architectural features: stack structure of 8086/8088, interrupt and interrupt services routine , interrupt cycle of 8086/8088, Non maskable interrupt, Maskable interrupt.

UNIT-5

Case study of Intel i series of processors.

TEXT BOOKS:

1. "Advanced microprocessor and Peripherals", A .K. Ray and K.M.Bhurchandi, TMH, 2000.
2. "Micro Controllers", Deshmukh, TMH.
3. "Microprocessors Architecture, Programming and Applications", Ramesh S. Goanker, Wiley Eastern, 1994 or (Latest Edition)

REFERENCE BOOKS:

1. "Micro Processors & Interfacing", Douglas U. Hall, 2007."The 8088 and 8086 Micro Processors", 4th Edition, PHI, 2003.
2. "Micro Computer System 8086/8088 Family Architecture, Programming and Design", Liu and GA Gibson, 2nd Edition, PHI
3. "Introduction to Microprocessors", Aditya P. Mathur, TMH, 1995

MCS 205: OBJECT ORIENTED PROGRAMMING WITH C++

UNIT-I

Introduction, Procedure-Oriented Programming paradigm, Object-Oriented Programming paradigm, Procedure oriented Vs Object oriented, basic characteristics of OOP's: object, class, encapsulation, inheritance, reusability, polymorphism and overloading, static and dynamic binding, message passing, benefits of OOP's and application of OOP's.

UNIT-II

C++ Basics: Overview, Environment Setup, Basic Syntax, Comments, Basic Data types, Tokens, identifiers, Keywords, Constants/Literals, Variables, Variable Scope, Modifier Types, Storage Classes, Operator, array, Strings, pointer, References, Date & Time, I/O statements, namespace, Program structure, typecasting, control statements: if statement, if- else statement, nested if-else statement, ladder if-else, switch statement, for loop statement, while loop statement, do-while loop statement.

UNIT-III

Objects and classes : Basics of object and class and abstract class in C++, private and public members, static data and function members, function prototype, inline functions, function overloading, friend functions, default arguments, constructors and their types, destructors, friend class, dynamic allocation operator new and delete.

UNIT-IV

Inheritance: Concept of Inheritance, types of inheritance: single, multiple, multilevel, hierarchical, hybrid, protected members, overriding, virtual base class, resolving ambiguity.

Polymorphism: Pointers in C++, Pointes to objects, this pointer, virtual class, virtual and pure virtual functions.

UNIT-V

I/O , Files and Streams : Concept of streams, cin and cout objects, C++ stream classes, Unformatted and formatted I/O, File stream, C++ File stream classes, File management functions(read(), write(), put(), get(),tellg() tellp(), seekg() seekp()), File modes, Namespaces, Preprocessor (include, define,typedef).

TEXT/REFERENCE BOOKS:

1. "Object-Oriented Programming with C++", E. Balaguruswamy, TMH
2. "C++ The Complete Reference", Herbert Shildt, Osborne,TMH, latest
3. "Object-oriented programming with C++", Robert Lafore, Macmillan computer
4. "Tech yourself C++", Herbert Schildt, Osborne, TMH
5. "C & C++ Complete reference", Herbert Shieldt, Osborne, TMH
6. "Object-Oriented programming in C++", Nabajyoti Barkakati, PHI
7. "C++ Primer Plus", Stephen Prata, Galgotia Publications, 1996
8. "Object-Oriented analysis and Design with applications", Grady Booch

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SEMESTER: III

Course Code	Course Name	T	P /T	C	Sessional Marks	End Semester Marks	Total Marks
MCS 301	Data structure using c and C++	3	2	5	25	75	100
MCS 302	Mathamtics-3	5	-	5	25	75	100
MCS 303	Operating System	3	2	5	25	75	100
MCS 304	Data Communication and networking	4	1	5	25	75	100
MCS 305	Data Structure& Operating System Lab	-	5	5	25	75	100

MCS 301: DATA STRUCTURE USING C AND C++

UNIT 1

Introduction of Data structure, Data types: primitive, non-primitive data types, ADT, Linear and non linear data structure, Complexity and its Notation,

List Structures: Arrays: One dimensional, Multidimensional arrays, allocation methods, address calculations, sparse arrays. Linked List: Singly and Doubly Linear link lists, singly and doubly circular linked list: Definitions, operations (INSERT, DELETE, TRAVERSE) on these list. (Insertion operation includes – insertion before a given element, insertion after a given element, insertion at given position, insertion in sorted linked list)

UNIT 2

STACKS: Stack: Definition, Operations PUSH, POP, TRAVERSE, implementations using array and linked list, Applications of stack: Infix, Prefix, Postfix representation and conversion using stack, Postfix expression evaluation using stack, use of stack in recursion, Stacks in C++ Using Templates

QUEUES: Introduction, and Types of Queues: Priority Queue, Circular queue, Double Ended Queue, operations (INSERT, DELETE, TRAVERSE), implementation using array and linked list and applications

UNIT 3

Definition of trees and their types, Binary trees, Properties of Binary trees and Implementation operation (Insertion, deletion, searching and traversal algorithm: preorder, post order, in-order traversal), Binary Search Trees, Implementations, Threaded trees, AVL Trees, Balanced multi way search trees: 2-3 tree, Red Black tree, B tree, B+ tree, their applications

UNIT 4

SORTING: Types of sorting, Sequential Sort, Insertion Sort, Bubble Sort, Quick Sort, Merge Sort, Heap Sort, Radix sort, complexity analysis of sorting techniques

SEARCHING: Linear or sequential search, Binary search, Hashing, collision resolution methods.

UNIT 5:

Definition of Graph and their types, adjacency and incident (matrix & linked list) representation of graphs, Graph Traversal – Breadth first Traversal, Depth first Traversal, Connectivity of graphs; Connected components of graphs, Weighted Graphs, Shortest path Algorithm, spanning tree, Minimum Spanning tree, Krushkal and prims algorithms.

TEXT/REFERENCE BOOKS:

1. "Data structures using C", Tenenbum, PHI, 1996
2. "Fundamentals of Data Structures", Horowitz and Sahani, Computer Science Press, 1978
3. "Data structures and Algorithms", Aefred V. Aho, Jhon E. Joperoft and J.E. Ullman.
4. "An Introduction to Data Structures with Applications", Jean Paul Trembley and Paul Sorenson, TMH, International Student Edition, 1985
5. "Data Structures and Program Design in C", R. Kurse, Leung & Tondo, 2nd Edition, PHI publication

MCS 302: MATHEMATICS

UNIT-1

Matrix Theory: Definition, Type of Matrix, Elementary row and column operations on a matrix, Rank of matrix – Normal form – Inverse of a matrix using elementary operations –Consistency and solutions of systems of linear equations using elementary operations, linear dependence and independence of vectors Eigen Value and Eigen Vector, - Characteristic roots and vectors of a matrix - Caley-Hamillton theorem and its applications, Reduction to diagonal form - Reduction of a quadratic form to canonical form – orthogonal transformation and congruent transformation.

UNIT-2

Successive differentiation, Leibnitz Theorem and applications, Taylor's and Maclaurin's series, curvature, asymptotes, curve tracing.

UNIT-3

Functions of two or more variables, limit and continuity, partial derivatives, total differential and differentiability, derivatives of composite and implicit functions, Jacobians, higher order partial derivatives, homogeneous functions, Euler's Theorem and applications. Taylor's series for functions of two variables (without proof), maxima-minima of function of two variables, Lagrange's method of undetermined multipliers, differentiation under integral sign (Leibnitz rule).

UNIT-4

Probability and Distribution – Definition, set notation of probability, Addition & Multiplication law of probability, Bayes theorem, Random Variable, Discrete & continuous probability distribution, moment generating function, probability generating function, Binomial distribution, Poisson Distribution and Normal Distribution.

UNIT-5

Sampling and Inference- Sampling Distribution, Testing of Hypothesis, central limit theorem, Students t distribution, Chi-square Test, F Distribution, Fishers z Distribution.

TEXT/REFERENCE BOOKS:

1. Higher engineering Mathematics, B.S. Garewal, Khanna Publishers

MCS 303: OPERATING SYSTEM

UNIT-I: INTRODUCTION
Introduction: Definition, Computer-System Architecture, Types of Operating System, Micro Kernel and Monolithic Operating System, Special-Purpose Systems, Operating-System Operations, Computing Environments, operating system services, User Operating System Interface, System Calls and their types.

UNIT-II: PROCESS MANAGEMENT
CPU Scheduling: concepts, scheduling criteria, scheduling algorithms.

Inter-process communication, Mutual exclusion problem and critical section. Process synchronization, Classical IPC problems: Producer Consumer problem, Dinning Philosophers problem, semaphores.

Deadlock: Necessary Conditions, deadlock handling methods: Deadlock Prevention, Deadlock detection and recovery, Deadlock avoidance, Bankers Algorithm.

UNIT-III: MEMORY
Memory Management: Background, Swapping, Contiguous Memory allocation, Paging, Segmentation.

Virtual Memory Background, Demand Paging, Page Replacement, Thrashing.

UNIT-IV: FILE MANAGEMENT
File System Implementation, File Concept, Access Methods, Directory Structure, File Sharing, Protection. File System Structure, File System Implementation, Directory Implementation, Allocation Methods, Free-space Management, Recovery.

UNIT-V: I/O MANAGEMENT
I/O Hardware, Application I/O Interface, Kernel I/O Subsystem, Transforming I/O to Hardware Operations, Streams, Performance. Disk Structure, Disk Scheduling, Disk Management.

TEXT/REFERENCE BOOKS:

1. "An Introduction to Operating Systems", H. M. Dietal, Addition Wesley
2. "Modern Operating Systems", Andrew S Tanenbaum.
3. "Operating System Concepts", 2nd Edition - Peterson & Silberschatz, Addison Wesely
4. "Operating Systems", Mardrick and Donovan, Mcgraw Hill
5. "Principles of Operating Systems", Ullman, Galgotia Publications.
6. "Operating System Concepts", Galvino & Silberschatz, Addison Wesely,(Latest Edition)

MCS- 304 COMPUTER NETWORKS

UNIT-I OVERVIEW OF DATA COMMUNICATION AND NETWORKING:

DATA COMMUNICATIONS: components, data representation, direction of data flow (simplex, half duplex, full duplex); Networks: distributed processing, network criteria, physical structure (type of connection, topology), categories of network (LAN, MAN, WAN),

INTERNET: brief history, internet today; Protocols and standards; Reference models: OSI reference model, TCP/IP reference model, their comparative study.

UNIT-II PHYSICAL LEVEL:

ANALOG & DIGITAL TRANSMISSION: transmission Impairments, Data Rates Limits, Digital to Digital Conversion, Line coding Scheme,

ANALOG TO DIGITAL CONVERSION: PCM, PAM, Delta Modulation, Transmission Modes, Parallel, Serials Asynchronous and Synchronous Communication

DIGITAL TO ANALOG CONVERSION: ASK, FSK, PSK, QPSK Constellation Diagram, QAM

ANALOG TO ANALOG CONVERSION: AM, FM, PM, Bandwidth Utilization, Multiplexing: FDM, WDM and TDM

Switching

TRANSMISSION MEDIA: Guided Media: Twisted Pair, Coaxial and Fiber Optic, Unguided Media: Wireless, Radio Waves, Microwaves and Infrared

UNIT-III DATA LINK LAYER:

FLOW CONTROL: Protocols: Stop & wait ARQ, Go-Back- N ARQ, Selective repeat ARQ, HDLC;

MEDIUM ACCESS SUB LAYER: Point to point protocol, LCP, NCP, FDDI, token bus, token ring; Reservation, polling, concentration;

MULTIPLE ACCESS PROTOCOLS: Pure ALOHA, Slotted ALOHA, CSMA, CSMA/CD, FDMA, TDMA, CDMA; Traditional Ethernet, fast Ethernet.

UNIT-IV NETWORK LAYER:

INTERNETWORKING & DEVICES: Repeaters, Hubs, Bridges, Switches, Router, Gateway;

ADDRESSING: Internet address, classful address, subnetting, classless address

ROUTING: techniques, static vs. dynamic routing, and routing table for classful address

ROUTING ALGORITHMS: shortest path algorithm, flooding, distance vector routing, link state routing

PROTOCOLS: ARP, RARP, IP, ICMP, IPV6; Unicast and multicast routing protocols.

UNIT-V TRANSPORT LAYER AND APPLICATION LAYER:

PROCESS TO PROCESS DELIVERY: UDP; TCP; Congestion control algorithm: Leaky bucket algorithm, Token bucket algorithm, choke packets; Quality of service: techniques to improve Qos DNS; SMTP, SNMP, FTP, HTTP, Firewalls.

MODERN TOPICS: Wireless LAN: IEEE 802.11; Introduction to blue-tooth, VLAN's, Cellular telephony & Satellite network.

TEXT BOOKS:

1. "Data Communications and Networking", B. A. Forouzan, TMH, (Latest Edition)
2. "Computer Networks", A. S. Tanenbaum, 4th Edition, Pearson Education/PHI
3. "Data and Computer Communications", W. Stallings, 5th Edition, PHI/ Pearson Education

REFERENCE BOOKS:

1. "Computer Networking -A top down approach featuring the internet", Kurose and Rose, Pearson Education
2. "Communication Networks", Walrand, TMH (Latest Edition)
3. "Internetworking with TCP/IP, vol. 1, 2, 3", Daglous E. Comer, 4th Edition Pearson Education/PHI

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SEMESTER: IV

Course Code	Course Name	L	P/T	C	Sessional Marks	End Semester Marks	Total Marks
MCS 401	Introduction to Java	4	1	5	25	75	100
MCS 402	Operations Research	4	1	5	25	75	100
MCS 403	System Analysis and Design	4	1	5	25	75	100
MCS 404	Database Management System	4	1	5	25	75	100
MCS 405	Java and DBMS Lab	-	5	5	25	75	100

MCS-401 INTRODUCTION TO JAVA

UNIT-1

Overview of JAVA : The genesis of java, An overview of java, Java virtual machine (JVM) ,Java development kit (JDK) ,Java Vs C++, Data types, Literals, Variables, and Arrays, Operators, Control statements.

UNIT-II

Introducing Class: Class fundamentals, Closer look at Methods and class ,Nested and inner class ,Exploring Java.lang, String handling ,Constructor ,this keyword, Garbage collection and finalize() method. Writing simple JAVA program.

UNIT-III

Inheritance: Basics ,Types of inheritance ,Access specifier ,using super, method overriding ,Abstract class ,constructor in multilevel inheritance ,using final with inheritance ,Dynamic method dispatch ,Abstract class ,

UNIT-IV

Package and Interface: Defining package, CLASSPATH, Access protection ,Importing package ,Defining and implementing interface ,Variable in interface ,Extending interface, Nested interface.

UNIT-V

Exception handling and Multithreading: Using try and catch ,multiple catch classes, Nested try statements , throw ,throws and finally ,Built in exception ,Uncaught exception , Creating own exception class , Java Thread Model: Main thread ,Creating own Thread ,Life cycle of thread, Thread priorities ,Synchronization and messaging, Interthread communication ,Suspending ,Resuming and stopping thread.

TEXT/REFERENCE BOOK

1. Java: The complete reference By Naughton P and schildt H. ,Osborne Tata Mcgraw-Hill. 2. Java Programming By E.Balguruswami
3. Core JAVA for beginners By Rashmi Kanta Das ,Vikas Publication.
4. Core JAVA : A Comprehensive Study by Mahesh P. Matha , PHI publication.

MCS 402: OPERATIONS RESEARCH

UNIT-I

Introduction to Operations Research: Introduction and History, Definition and concept, Characteristics or significant features of Operations research, General methods for solving Operations Research Models, Phases of Operations Research methods, Scope, Shortcomings, Applications, Techniques.

UNIT-II

Linear Programming: Introduction, Salient features of Linear programming (Terminology), Advantages, Limitations, Applications, Formulation of linear programming model, Simplex method.

UNIT-III

Transportation Problems: Introduction, North West Corner Method, Vogel's Approximation Method, Optimality test: Stepping stone method and MODI method.

UNIT-IV

Assignment Models: Introduction, mathematical formulation of the problem, Hungarian method, Sample Problems, Special case in assignment.

UNIT-V

Sequencing Problems: Introduction, general sequencing formula, Processing n jobs through two machines, Processing n jobs through three machines, Processing n jobs through m machines.

TEXT BOOKS:

1. Manohar Mahajan, "Operations Research", Dhanpat Rai & Co., 2013.
2. P. Sankara Iyer, "Operations Research", Tata McGraw-Hill, 2008.
3. A.M. Natarajan, P. Balasubramani, A. Tamilarasi, "Operations Research", Pearson Education, 2005.

REFERENCE BOOKS:

1. J K Sharma., "Operations Research Theory & Applications , 3e", Macmillan India Ltd, 2007.
2. P. K. Gupta and D. S. Hira, "Operations Research", S. Chand & co., 2007.
3. J K Sharma., "Operations Research, Problems and Solutions, 3e", Macmillan India Ltd.
4. N.V.S. Raju, "Operations Research", HI-TECH, 2002.

MCS-403: SYSTEM ANALYSIS AND DESIGN

UNIT-I

THE SYSTEM CONCEPT; Elements of a system, types of system. Introduction to system development life cycle, Recognition of need, prototyping.

UNIT-II

Introduction to system analysis, determining the users information requirements, problem definition, Background analysis, fact-finding, fact analysis.

Introduction to structured analysis, the tools of structured analysis, Feasibility study; oral representation, Data analysis, Cost/ Benefit analysis

UNIT-III

INTRODUCTION TO SYSTEM DESIGNS: The Process and stages of Systems Design, Design methodology, structured design, structured walkthrough, Major development activities, Data validation, Introduction Input/output and forms Design

UNIT-IV

INTRODUCTION TO SYSTEM TESTING: The Test Plan, Quality assurance, Post implementation review, Software maintenance, Procedure for Hardware/Software selection

UNIT-V

Project Management and Control, Project Control, Gantt Chart, PERT and CPM, System Security.

TEXT BOOKS:

1. System Analysis and Design, Elias. M. Awad, Galgotia Publication.

REFERENCE BOOKS:

1. Kendall and Kendall, System analysis and Design, PHI.
2. Igor Hawryszkiewycz, Introduction to System analysis and Design, PHI

MCS 404: DATA BASE MANAGEMENT SYSTEMS

UNIT-1

Introductory Concepts: Introduction, Instance and schema, View of Database system, Database languages, Data Base architecture, Database Administrator

UNIT-2

Database Design and ER- Model – Introduction, Entity, Relationship, Attributes, Constraints, ER Diagram, Reduction to Relational Schema, Specialization, Generalization, Aggregation.

UNIT-3

Relational Database Design: Functional Dependency, 1NF, 2NF, 3NF, BCNF, 4NF, 5NF, Comparison of BCNF and 3NF, Closure of set of functional Dependency, Closure of Attribute Sets, Canonical Cover, Lossless Decomposition, Dependency Preservation

UNIT-4

Relational Database-Structure of Relational Database, Schema, Keys, Relational Operation- Selection, Projection, Natural Join, Cartesian Production, Union,

UNIT-5

SQL- Basic Data Types, Create Table, Drop Table Alter Table, Queries on Multiple Relation, Join Operation, String Operation, Set Operation, Grouping, Nested Subqueries

TEXT/REFERENCE BOOKS:

1. "Fundamentals of Database System", R. Elmasri & S. Navathe
2. "Data Base Management System", Henry F. Korth & Abraham Silberschats, TMH, 1991.
3. "An Introduction to Database Management System", Vol I &II, Date C.J., Addison Wesley, 1981, 1983