CENTRAL UNIVERSITY OF JAMMU

Integrated M.Sc. (Computer Science)- MCA Programme

- **About the Course**

The integrated M.Sc./MCA is two/three years full time post graduation course spread over four semesters. If the candidate quits after completing first two years (four semesters)he/she will be entitled to get **M. Sc. Computer Science** degree and if on the other hand he completes all the three years (six semesters) then he will be entitled to get **MCA** (Master of Computer application) Degree.

Eligibility

Candidates, who have passed Bachelor's Degree (10+2+3) from a recognized University with not less than 50% of total marks (45% in case of SC/ST and persons with disabilities), with Information Technology /Computer Applications/ Electronics as one of the subjects.

- **Mode of Selection**

The admission to M.Sc./MCA integrated programme will be through All India Central Universities Common Entrance Test. The admission shall be made strictly on merit, based on composite score determined as under:

Components of Composite Score	**Weightage**
Score obtained in the Admission Entrance Test	70%
Marks obtained in the Qualifying Degree Examination	30%
Total	100%

Tie, if any, shall be resolved on the basis of the score obtained by the candidates in the admission entrance test.

Number of Seats

Total number of seats: 30

CENTRAL UNIVERSITY OF JAMMU
FOR EXAMINATION TO BE HELD FROM DECEMBER 2014
M.Sc. (Computer Science)-MCA First Semester

Scheme of Syllabus

Course No.	Title	Credits	Total Marks
MCSA101	Programming Methodology and C Language	4	100
MCSA102	Computer Organization And Architecture	4	100
MCSA103	Operating System	4	100
MCSA104	Database Management Systems	4	100
MCSA150	Laboratory- Practical's based on MCSA101 & MCSA104	8	200
	Elective course offered by other Departments	4	100
Total		28	700

CENTRAL UNIVERSITY OF JAMMU
FOR EXAMINATION TO BE HELD FROM MAY 2014
M.Sc. (Computer Science)-MCA Second Semester

Scheme of Syllabus

Course No.	Title	Credits	Total Marks
MCSA201	Data structures using C	4	100
MCSA202	Object Oriented Programming Using C ++	4	100
MCSA203	Computer Networks And Data Communication	4	100
MCSA204	Discrete Mathematics	4	100
MCSA250	Laboratory- Practical's based on MCSA201 & MCSA202	8	200
	Elective course offered by other Departments	4	100
Total		28	700

CENTRAL UNIVERSITY OF JAMMU
FOR EXAMINATION TO BE HELD FROM DECEMBER 2014
M.Sc. (Computer Science)/MCA Third Semester

Scheme of Syllabus

Course No.	Title	Credits	Total Marks
MCSA301	Analysis & Design of Algorithms	4	100
MCSA302	Internet & Java Programming	4	100
MCSA303	Theory of Computation	4	100
MCSA304	Software Engineering	4	100
MCSA350	Laboratory- Practical's based on MCSA301 & MCSA302	8	200
	Elective course offered by other Departments	4	100
	Total	28	700

CENTRAL UNIVERSITY OF JAMMU
FOR EXAMINATION TO BE HELD FROM MAY 2015
Integrated M.Sc. (Computer Science)/MCA Fourth Semester
Scheme of Syllabus

Course No.	Title	Credits	Total Marks
MCSA401	Advance Technology(.NET Programming)	4	100
MCSA402	Computer Graphics	4	100
MCSA403	Artificial Intelligence	4	100
	Elective-I	4	100
MCSA450	Minor Project	8	200
	Elective course offered by other Departments	4	100
	Total	28	700

CENTRAL UNIVERSITY OF JAMMU
FOR EXAMINATION TO BE HELD FROM DEC 2015
Integrated M.Sc. (Computer Science)-MCA Fifth Semester
Scheme of Syllabus

Course No.	Title	Credits	Total Marks
MCSA501	Neural Networks And Genetic Algorithms	4	100
MCSA502	Data Warehousing And Data Mining	4	100
MCSA503	Network Security & Cryptography	4	100
	Elective-II	4	100
MCSA550	Laboratory- Practical's based on MCSA501,MCSA502 & MCSA503	8	100
	Elective course offered by other Departments	4	100
Total		28	700

CENTRAL UNIVERSITY OF JAMMU
FOR EXAMINATION TO BE HELD FROM MAY 2016
Integrated M.Sc. (Computer Science)-MCA Fifth Semester
Scheme of Syllabus

Course No.	Title	Credits	Total Marks
MCSA-600	Major Project	16	400
Total		16	400

Elective-I	
MCSA411	Probability and Statistics
MCSA412	Numerical Computing
MCSA413	Microprocessors
MCSA414	Computer Based Optimization Techniques
MCSA415	Compiler Design
MCSA416	Information Systems

Elective-II	
MCSA511	Image Processing
MCSA512	Mobile Computing
MCSA513	Grid And Cloud Computing
MCSA514	Advanced Database Systems
MCSA515	Parallel Processing And Distributed Systems
MCSA516	Simulation and Modeling

Integrated M.Sc. (Computer Science)-MCA First Semester

Course title: Programming Methodology and C Language COURSE No. MCSA-101
Internal Assessment=25 Mid-term Exam.=25 End –Term Exam. = 50 Total Marks= 100
DURATION OF EXAM: 3 HOURS Lectures: 4 hours per week

UNIT – I

Introduction to problem solving and notion of algorithm: Flow charting, Pseudo code, Algorithms, Corresponding C-program, Testing the code; Fundamental data types in C: Integer, Short, Long, Unsigned, Character, Single and double precision floating point, Complex, Boolean, Constants; Basic input/ output in C: printf, scanf, eof errors.

UNIT – II

Operators and Expressions: Using numerical and relational operators, Mixed operands and type conversion, Logical operators, Bitwise operators, Operators precedence and associativity; Functions in C: Standard function, Defining a function, Inter function communication- Passing arguments by value, reference, recursion; Scope rules, Global variables.

UNIT – III

Conditional statements in C: If and Switch statements, if and else, nested if and else, Use of break and default with switch; Loops and iterations in C: while, do-while, for loops; use of break and continue; Arrays in C: Notation and representation, Manipulating array elements, Multi-dimensional arrays, arrays of unknown and varying size.

UNIT – IV

Structures in C: Purpose and usage of structure, Structure declaration, Assigning of structures; Pointers in C: Pointers and address arithmetic, Pointer declarations and operations, Pointers as function arguments, dynamic memory allocation.

UNIT – V

Sequential search, Sorting arrays, Strings, Text files; Standard C pre-processors: Defining and calling macros, Passing value to the compiler; Standard C library: File input/ output: fread, fopen, fwrite etc.; String handling functions, Math functions.

REFERENCE BOOKS:

1. Problem Solving and Program Design in C by Jeri R. Hanly, Elliot B. Koffman; Pearson Addison-wesely, 2006.
2. Computer Science- A Structured Srogramming Approach Using C by Behrouz A. Forouzan, Richard F. Gilberg; 3rd Edition(India Edition), 2007.
3. Balagurusamy, E., Programming in ANSI C, McGraw-Hill
4. Jeri R. Hanly & Elliot P. Koffman, Problem Solving and Program Design in C, Addison Wesley.
5. Yashwant Kanetker, Let us C, BPB
6. Norton, Peter, Introduction to Computer, McGraw-Hill
7. Leon, Alexis & Leon, Mathews, Introduction to Computers, Leon Tech World
8. Rajaraman, V., Fundamentals of Computers, PHI
9. Rajaraman, V., Computer Programming in C, PHI

Integrated M.Sc. (Computer Science)-MCA First Semester

Course title: Computer Organization and Architecture COURSE No. MCSA-102
Internal Assessment=25 Mid-term Exam.=25 End –Term Exam. = 50 Total Marks= 100
DURATION OF EXAM: 3 HOURS Lectures: 4 hours per week

UNIT – I

Number System: Binary, Octal, Hexadecimal and Decimal, 1's and 2's Complements, Inter conversion of numbers. Codes: BCD Code, Character codes – ASCII, EBCDIC, Gray code.

Binary Addition, Binary Subtraction, Signed Numbers, Addition /Subtraction of numbers in 2's compliment notation, Binary Multiplication, Binary division, Floating point representation of numbers, Arithmetic operations with normalized floating point numbers.

UNIT – II

Binary Logic: Boolean algebra, Boolean functions, Truth tables, Canonical and Standard forms, Simplification of Boolean functions, Digital logic gates.

Boolean Expressions- Variables and Literals, Boolean Expressions–Equivalent and Complement, Theorems of Boolean Algebra, Minimization Techniques, SOPs & POSs forms, Karnaugh Map Method.

Sequential circuits and its types, Flip-Flops, Latches, Registers and Counters.

UNIT – III

Combinational Circuits, Implementing Combinational Logic, Arithmetic Circuits –Basic Building Blocks, Adder- Subtractor, BCD Adder, Magnitude Comparator, Parity Generator and Checker, De-multiplexers and Decoders, Encoders, Read Only Memory (ROM), Programmable Logic Array (PLA).

R-S Flip Flop,J.K Flip Flop, Master-slave Flip Flops, T-flip Flop, D-flip Flop.

UNIT – IV

Synchronous Counter, Modulus of a Counter, Ripple Counter, Propagation Delay in Ripple Counters, Binary Ripple Counters, Up/Down Counters, Decade and BCD Counters , Pre-settable Counters, Shift Register, Controlled Shift Registers.

RAM Architecture, Static RAM (SRAM), Dynamic RAM (DRAM)

UNIT-V

CPU Organization: Processor organization, Machine instructions, instruction cycles, instruction formats and addressing modes, microprogramming concepts, and micro program sequencer.

I/O Organization: I/O interface, Interrupt structure, transfer of information between CPU/memory and I/O devices, and IOPs.

REFERENCE BOOKS:

1. Hayes, J.P., Computer Architecture and Organization, McGraw Hill
2. Tanebaum A.S., Structured Computer Organization, Prentice Hall of India Pvt. Ltd.
3. Stallings W., Computer Organization and Architecture, Prentice Hall of India Pvt. Ltd.
4. Mano, M.M.: Digital Logic and Computer Design, Prentice-Hall of India.

5. Mano, M.M.: Digital Design, Prentice-Hall of India.
6. Tokheim: Digital Electronics, TMH.
7. Fundamentals of computers by V. Rajaraman

Integrated M.Sc. (Computer Science)-MCA First Semester

Course title: Operating System **COURSE No. MCSA-103**
Internal Assessment=25 Mid-term Exam.=25 End –Term Exam. = 50 Total Marks= 100
DURATION OF EXAM: 3 HOURS **Lectures: 4 hours per week**

UNIT – I

Introduction: Definition of The Operating System, Functions Of An Operating System, Different Types Of Systems - Simple Batch System, Multi-Programmed Batched System, Time Sharing System, Personal Computer Systems, Parallel Systems, Distributed Systems, Real Time Systems, Computer System Structure- operation, I/O structure, storage structure, hardware protection, Operating System Services.

UNIT – II

Process Management: Process, Process Concept, Process Scheduling, Operation On Processes, Cooperating Processes, Threads, Inter-Process Communication, CPU Scheduling–scheduling criteria, scheduling algorithms, FCFS, SJF, priority scheduling, round robin scheduling, multilevel queue scheduling, multilevel feedback queue scheduling, multiple processor scheduling, real time scheduling.

Process Synchronization: The Critical Section Problem, Synchronization Hardware, Semaphores, Classical Problems of Synchronization, Critical Regions.

UNIT – III

Memory Management: Logical & Physical Address Space, Swapping, Continuous Allocation (single partition, multiple partition), Internal , External fragmentation, Paging, Segmentation, Segmentation With Paging, Virtual Memory, Demand Paging, Performance Of Demand Paging, Page Replacement, Page Replacement Algorithms, FIFO, optimal, LRU, LRU approximation algorithms, counting algorithms Thrashing, Demand Segmentation.

UNIT – IV

Deadlocks: Deadlock Characterization, Methods For Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery From Deadlock.

I/O Management: I/O system, I/O strategies, buffering.

File System Interface: File Concept, Access Methods–sequential, direct, index, Directory Structure–single-level, two–level, tree-structured, acyclic-graph, general graph.

UNIT – V

File System Implementation: File System Structure, Allocation Methods-contiguous allocation, linked allocation, indexed allocation, Free Space Management, Directory Management, Directory Implementation, Efficiency and Performance.

Secondary Storage Structure: Disk Structure, Disk Scheduling, FCFS, SSTF, SCAN, C-SCAN, Look Scheduling, Selection of A Scheduling Algorithm, Disk Management-disk formatting, boot block, bad blocks.

Case Study : UNIX, LINUX , WINDOWS.

REFERENCE BOOKS:

1. Silberschatz, Galvin, "Operating System Concepts", Addison Wesley Publishing Company, 1989.
2. William Stallings, "Operating Systems", Macmillan Publishing Company.
3. Deitel H.M., "An Introduction To Operating System", Addison Wesley Publishing Company, 1984.
4. Tanenbaum, A.S., "Modern Operating System", Prentice Hall of India.
5. Milenkovic M, "Operating system-concepts and design", McGraw Hill, International editions.

Integrated M.Sc. (Computer Science)-MCA First Semester

Course title: Database Management Systems **COURSE No. MCSA-104**
Internal Assessment=25 Mid-term Exam.=25 End –Term Exam. = 50 Total Marks= 100
DURATION OF EXAM: 3 HOURS **Lectures: 4 hours per week**

UNIT- I

Basic Concepts: File Systems vs. DBMS, Purpose of Database Systems, view of data, Characteristics of the Data Base Approach, Advantages and Disadvantages of DBMS. Conventional Data Models: An overview of Network and Hierarchical Data Models.

Data Base Systems Concepts and Architecture: Relational Data Model, DBMS architecture, Data Independence, Database design, Data storage and querying, Database users and DBA, Database Languages.

UNIT- II

Entity Relationship Model: E-R Diagrams, Constraints Entity Types, Entity Sets, Attributes & keys, Relationships, Relationships Types, Design of an E-R Database Schema, Reduction of an E-R schema to relational schemas and vice-versa, Design issues.

Relational Data Model: Relational model concepts, Integrity constraints over Relations, Aggregation, Generalization and Specialization.

UNIT- III

Relational Algebra and Relational calculus– Basic Operations.

Relational Data Base Management System: Introduction to software-RDBMS, Basic structure, Date Base Structure & its manipulation.

SQL: DDL, DML, and DCL, views & Queries in SQL, Specifying Constraints & Indexes in SQL.

UNIT- IV

Relational Data Base Design: Features of good relational designs, need for Normalization, Functional Dependencies, Multi-valued Dependencies,Join dependencies Decomposition, Normal forms (1 NF, 2 NF, 3 NF, & BCNF, 4 NF, , 5 NF, Domain key normal form) ,Loss less joins, closures and covers.

UNIT- V

Transaction Processing Concepts: Introduction to Transaction Processing, Transaction & System Concepts, ACID Properties of Transaction, Schedules, Serializability of Schedules.

Concurrency Control Techniques: Locking Techniques-Two Phase Locking, Time stamp ordering, Multi-version schemes, Deadlock handling

Recovery Techniques: Recovery concepts, Recovery Techniques in centralized DBMS.Two Phase commit, Save points, Shadow Paging.

Data Base Security: Introduction to Data base Security issues.

REFERENCE BOOKS:

1. Korth & Silberschatz: Database System Concept, 4th Edition, McGraw Hill International Edition.
2. C.J. Date: An Introduction to Data Bases Systems 8th Edition, Addison Wesley N. Delhi.
3. Bipin C. Desai: An Introduction to Database System, Galgotia Publication, N. Delhi.
4. Nawathe, Database Concepts
5. Ivan Bayross: SQL, PL/SQL- The Program Language of ORACLE, BPB Publication.
6. Peter Rob, Carlos Colonel: Database system Design, Implementation, and Measurement, Cengage Learning, 2nd Ed.
7. Raghu Ramakrishnan & Johannes Gehrke: Database Management Systems, 2nd edition, Mcgraw Hill International Edition.

M.Sc. (Computer Science)/MCA Second Semester

COURSE TITLE: Data Structure Using C **COURSE No.:** MCSA-201

Internal Assessment=25 Mid-term Exam.=25 End –Term Exam. = 50 Total Marks= 100

DURATION OF EXAM: 3 HOURS Lectures: 4 hours per week

UNIT - 1

Preliminaries: Concept & notation, common operation on data structures, algorithm complexity, time-space trade off between algorithm, physical & logical representation of different data structures. Arrays: Arrays defined, representing arrays in memory, various operation (traversal, insertion, deletion), Multidimensional arrays, Sequential allocation, Address calculation, Sparse arrays. Linked List: Definition, type (linear, circular, doubly linked, inverted), representing linked lists in memory, advantages of using linked list over arrays, various operations on Linked list (traversal, insertion, deletion)

UNIT- 2

Stacks: Definition & concepts of stack structure, Implementation of stacks, Operation on stacks (push & pop), Application of stacks (converting arithmetic expression from infix notation to polish and their subsequent evaluation, quick sort technique to sort an array, recursion). Queue: Definition &concept of queues, implementation of queue, operation on queues (insert & delete), Type of queues (circular queue, priority queue).

UNIT - 3

Trees Structures: Tree, Binary Trees, Tree Traversal Algorithms (Pre-Order, In-Order, Post-Order), Threaded Trees, Trees in various sorting & Searching Algorithms & their Complexity (Heap Sort, Binary Search Trees). Graphs: Description of graph structure, Implementing graphs in memory, Graph traversals (Depth First Searching, Breadth first searching, Shortest Paths Problems)

UNIT-4

Storage Management: Fixed block storage allocation, First-fit Storage Allocation, Storage Release, Buddy System, Garbage Collection. Sorting & Searching: Selection sort, Bubble sort, Merge sort, Radix sort, Quick sort, Sequential search, Linear search and their complexity.

Unit - 5

File Structures, Concepts of fields & records, Classification of files, File operations, File organizations, variable length records and text files. Indexing structures like B – trees, ISAM. Hashing techniques for Direct Files

Laboratory Work: Implementation of various algorithms in C.

REFERENCE BOOKS:

1. Symour Lipschutz,'' Theory and Problems of Data Structures'', St. Schaum's Outline series in Computers, Tata McGraw – Hill.
2. Horowitz, E. , and Sahni, S. , ''Fundamentals of data structures'' , Computer Science Press.
3. Tanhenbaum, A.M., and Augenstein, M.J. , "Data Structures with C" , Prentice – Hall.
4. "Tremblay & Sorenson , An introduction to Data Structures with Applications:, Tata McGraw – Hill.
5. Aho, A.V. , Hopcraft, and Ullman, J.E., ''Data structures and Algorithms'' , Addison Wesley.
6. Thomas Coremen, Introduction to Algorithms, Second edition, Prentice Hall of India (2007) 2nd ed.
7. Mark Allen Weiss, Data Structures & Algorithm analysis in C, Dorling Kingsley (2002) 3rd ed.

M.Sc. (Computer Science)/MCA Second Semester

COURSE TITLE: Object Oriented Programming using C++ **COURSE No.:** MCSA202
Internal Assessment=25 Mid-term Exam.=25 End –Term Exam. = 50 Total Marks= 100
DURATION OF EXAM: 3 HOURS Lectures: 4 hours per week

UNIT - 1

Introduction: Evolution of OO Methodology, Basic Concepts of OO Approach, Comparison of Object Oriented and Procedure Oriented Approaches, Advantages of OOPs, Applications of OOPs. OO Concepts: Abstraction, Encapsulation, Inheritance, Polymorphism, Basic program construction, working with variables and constants in C++.

UNIT - 2

Programming in C++ : Input output statements, cin, cout, comments, escape sequence, manipulators, type conversion, operators, and library functions. Control statements, Structures, Enumeration, Functions, passing arguments to functions, reference arguments, overloaded functions, inline functions, default arguments, variables and storage class and returning by reference, Arrays and Strings.

UNIT - 3

Objects and Classes: Concept of Object and Classes, defining class, C++ objects as physical objects, object data types, object as function argument, constructors and destructors, constructor as function argument, overloaded constructors, copy constructors, returning objects from functions, this pointer, new and delete, structures and classes, static class data, static functions, friend functions, array of objects. Overloading unary and binary operator

UNIT - 4

Inheritance &Virtual Functions: Concept of Inheritance, derived class, base class, derived class constructors, overloading member functions, class hierarchies, public, private& protected inheritance, levels of inheritance, multiple inheritance, Virtual Inheritance, Virtual functions.

UNIT - 5

Files : File Input/Output, Using istream/ostream, implementation of Files, Functions of files, Templates, Function templates, Class templates, Exception handling

REFERENCE BOOKS:

1. Bjarne Stroustrup, The C++ Programming Language, (3rd edition), Addison Wesley.
2. Herbert Schildt, C++ The Complete Reference, McGraw Hill.
3. Robert Lafore, Object Oriented Programming In C++, Galgotia publ.
4. E. Balagursamy , Object Oriented Programming using C ++ ,Tata Mcgraw Hill.

5. D. Ravichandran," Programming with C++", Tata Mcgraw Hill.
6. Scott Meyers, Effective C++: 50 Specific Ways to Improve Your Programs andDesigns, Addison Wesley.
7. S. B. Lippman and J. Lajoie, "C++ Primer", 3rd Edition, Addison Wesley.
8. Bruce Eckel, "Thinking in C++", President, Mindview Inc., Prentice Hall, 2nd Ed.

M.Sc. (Computer Science)/MCA Second Semester

COURSE TITLE: Data Communication & Networks **COURSE No.:** MCSA203

Internal Assessment=25 Mid-term Exam.=25 End –Term Exam. = 50 Total Marks= 100

DURATION OF EXAM: 3 HOURS Lectures: 4 hours per week

UNIT - 1

Introduction to Data communication, Advantages of Networks, Structure of communication networks, Point to Point and Multi-drop Circuits, Data flow and Physical Circuits, Network Topologies, Topologies and design goals, Hierarchical Topology, Horizontal Topology, Star Topology, Ring Topology, Mesh Topology, Network models Channel Speed, bit rate, Baud, Band Width and frequency spectrum, Modem.

UNIT - 2

Connection oriented and connection less Networks, Classification Of communication protocols, Polling and selection systems, Selective and Group Polling, stop and wait Polling, Multiplexing: Definition, TDM, FDM, Phase Multiplexing, Carrier Sense System. Transmission Media: Guided Media, Unguided Media: wireless, switching, circuit switched networks, datagram networks. Reference Models: OSI Reference Models and TCP/IP Reference Models.

UNIT - 3

Analog & Digital System: Advantages , Signal Conversion, Analog to Digital techniques, Asynchronous and Synchronous transmission, Data Link layer, Design issues, Frame, Error detection and correction, Flow Control, Elementary Data link protocols, Character-Oriented and Bit-oriented Protocols, Sliding window protocols. Channel allocation methods, TDM, FDM, ALOHA, Carrier sense Multiple access protocols, Collision free protocols, Ethernet, Token Bus, Token ring.

UNIT - 4

Network Layer, Store and Forward Packet Switching, Connectionless and Connection-oriented services, Virtual Circuit, Routing Algorithms, Shortest path, Flooding, Link State, Distant vector, Hierarchical, Broadcast and Multicast Routing. Congestion, Congestion control algorithms.

UNIT - 5

TCP/TP Protocol, IP Addresses, Classes of IP Addresses, Subnets, IPv6, Network layer in the Internet and ATM, Internet Control Protocols, ARP, RARP, BOOTP, DHCP, OSPF, BGP.

Transport Layer: Protocol Stack-UDP, TCP, SCTP, Transport Services Primitives, Sockets, Socket Programming with TCP and UDP.

Application layer, Name service (DNS) Domain Hierarchy, Name servers, Name resolutions, traditional applications, SMTP, MIME World wide web-HTTP,FTP.

REFERENCE BOOKS:

1. Data communication & Networking, Fourth Edition by Behrouza A. Forouzan, TMH.
2. Computer Networks, A.S Tanenbaum, 4th edition, Pearson Education.
3. Introduction to Data communications and Networking, W.Tomasi, Pearson education.
4. Data and Computer Communications, G.S. Hura and M.Singhal, CRC Press,Taylor and Francis Group.
5. An Engineering Approach to Computer Networks-S. Keshav, 2nd Edition, Pearson Education.
6. Understanding communications and Networks, 3rd Edition, W.A. Shay, Cengage Learn.
7. Computer Network , S.S.Shinde, New Age International Publisher.
8. Data & Computer communication, William Stallings, Pearson

M.Sc. (Computer Science)/MCA Second Semester

COURSE TITLE: Discrete Mathematics **COURSE No.:** MCSA 204

Internal Assessment=25 Mid-term Exam.=25 End –Term Exam. = 50 Total Marks= 100

DURATION OF EXAM: 3 HOURS Lectures: 4 hours per week

UNIT-1: Fundamentals of Set Theory: Set operations, Algebra of sets, combination of sets, Finite and Infinite sets, Classes of sets, Power Sets, Multi sets, Cartesian Product, Representation of relations, Types of relations, Binary Relations, Equivalence relations and partitions, Partial ordering relations and lattices, Mathematics Induction, Principle of Inclusion & Exclusion, Propositions. Function and its types, Composition of function and relations, Cardinality and inverse relations. Functions & Pigeon hole principles.

UNIT-2: Propositional Calculus: Basic operations: AND (^), OR (v), NOT (~), Truth-value of a compound statement, propositions, tautologies, contradictions.

Counting Techniques: Rules of Sum of products, Permutations with and without repetition, Combination.

UNIT-3:Recursion and Recurrence Relation : Polynomials and their evaluation, Sequences, Introduction to AP, GP and AG series, partial fractions, linear recurrence relation with constant coefficients, Homogeneous solutions, Particular solutions, Total solution of a recurrence relation using generating functions.

UNIT-4: Introduction to Algebraic Structures Definition, elementary properties of algebraic structures, examples of a Monoid, Submonoid, Semigroup, Groups and rings, Homomorphism, Isomorphism and Automorphism, Subgroups and Normal subgroups, Cyclic groups, Integral domain and fields, Cosets, Lagrange's theorem, Rings, Division Ring.

UNIT-5: Graphs and Trees: Introduction to graphs, Directed and Undirected graphs, Homomorphic and Isomorphic graphs, Subgraphs, Cut points and Bridges, Multigraph and Weighted graph, Paths and circuits, Shortest path in weighted graphs, Eurelian path and circuits, Hamilton paths and circuits, Planar graphs, Euler's formula, Trees, Rooted Trees, Spanning Trees & cut-sets, Binary trees and its traversals

REFERENCE BOOKS:

1. Elements of Discrete Mathematics C.L Liu, 1985, McGraw Hill
2. Schaum's Outline series: Theory and problems of Probability by S. Lipshutz, 1982, McGraw-Hill Singapore
3. Concrete Mathematics: A Foundation for Computer Science, Ronald Graham, Donald Knuth and Oren Patashik, 1989, Addison-Wesley.
4. Mathematical Structures for Computer Science, Judith L. Gersting, 1993, Computer Science Press.
5. Applied Discrete Structures for Computer Science, Doerr and Levasseur, (Chicago: 1985,SRA
6. Discrete Mathematics by A. Chtewynd and P. Diggle (Modular Mathematics series), 1995, Edward Arnold, London,
7. Discrete Mathematical Structures, B. Kolman and R.C. Busby, 1996, PHI
8. Discrete Mathematical Structures with Applications to Computers by Trembley & Manohar, 1995, Mc Graw Hill.

Integrated M.Sc. (Computer Science)/MCA Third Semester

Course title: Analysis and Design of Algorithms **COURSE No. MCSA-301**
Internal Assessment=25 Mid-term Exam.=25 End –Term Exam. = 50 Total Marks= 100
DURATION OF EXAM: 3 HOURS **Lectures: 4 hours per week**

UNIT -I
Introduction to Algorithms, Analyzing the Performance of an Algorithm, Space /Time complexity, Asymptotic Notation, Recurrence Relations, Performance measurement. Review of elementary data structures.

UNIT-II
Divide and Conquer:- General methods, Binary Search, Finding the Maximum & Minimum, Merge sort, Quick Sort & Selection sort, Stassen's Matrix, Multiplication.
Greedy Method :- General Methods, Optimal Storage on Tapes, Job Sequencing with Deadlines, Optimal Merge Patterns, Single Source, shortest path.

UNIT-III
Dynamic Programming: - General Methods, Multistage Graphs, I/O Knapsack, Reliability Design, Traveling Salesperson problem.
Back Tracking: - General Method, The 8- Queens Problem, Hamiltonian Cycles, Knapsack Problem.
Branch & Bound: - The method, I/O Knapsack Problem, Traveling Salesperson Problem.

UNIT-IV
Graph Algorithms: Review of graph algorithms, topological sort, strongly connected components, minimum spanning trees- Kruskal and Prims, Single source shortest paths, relaxation, Dijkstras algorithm, Bellman- Ford algorithm, Single source shortest paths for directed acyclic graphs, difference constraints and shortest paths, All pairs shortest paths- shortest paths and matrix multiplication, Floyd-Warshall algorithm, Johnsons algorithm.

UNIT-V
Lower Bound Theory: - Comparison Trees For searching & Sorting, Parallel Comparison trees, Lower Bounds through Reduction, Concept of Heap and Hashing.
NP-Hard and NP- Complete Problems: -Basic concepts, Non-Deterministic Algorithms, Polynomial Time Algorithms, and NP-hard & NP –complete classes, Look's Theorem, Introduction to Approximation Algorithms.

REFERENCE BOOKS:

1. Fundamentals of Computer Algorithms. by Ellis Horowitz, Sartaj Sahni.
2. Data Structure & Algorithm by J.M. Hopcraft , Ullman.
3. Introduction To Algorithms, Thomas H Cormen, Charles E Leiserson And Ronald L Rivest: 1990, TMH

Integrated M.Sc. (Computer Science)-MCA Third Semester

COURSE TITLE: INTERNET & JAVA PROGRAMMING **COURSE No.:** MCSA-302
Internal Assessment=25 Mid-term Exam.=25 End –Term Exam. = 50 Total Marks= 100
DURATION OF EXAM: 3 HOURS **Lectures: 4 hours per week**
Unit-1

Introduction: Internet, Internet communication media, Internet service providers, Internet services, E-Mail concepts, Video Conferencing set up, web servers, mail server, proxy server, Web browsers, search engines, cookies.

Unit- II

Core Java: Introduction, Operator, Data type, Variable, Arrays, Control Statements, Methods & Classes, Inheritance, Package and Interface, Exception Handling, Multithread programming, I/O, String handling, Networking.

Unit-III

Java Applet, creating simple applet program, Event handling, Introduction to AWT, AWT controls, Layout managers, Menus, Images, Graphics.

Unit-IV

Java Swing: Creating a Swing Applet and Application, Programming using Panes, Pluggable Look and feel, Labels, Text fields, Buttons, Toggle buttons, Checkboxes, Radio Buttons, View ports, Scroll Panes, Scroll Bars, Lists, Combo box, Progress Bar, Menus and Toolbars, Layered Panes, Tabbed Panes, Split Panes, Layouts, Windows, Dialog Boxes, Inner frame.

Unit-V

JDBC: The connectivity Model, JDBC/ODBC Bridge, java.sql package, connectivity to remote database, navigating through multiple rows retrieved from a database.

Java Beans: Application Builder tools, The bean developer kit(BDK), JAR files, Introspection, Developing a simple bean, using Bound properties, **Introduction to RMI (Remote Method Invocation):** A simple client-server application using RMI.

REFERENCE BOOKS:

1. Margaret Levine Young, "The Complete Reference Internet", TMH
2. Naughton, Schildt, "The Complete Reference JAVA2", TMH
3. Balagurusamy E, "Programming in JAVA", TMH
4. Dustin R. Callway, "Inside Servlets", Addison Wesley
5. Mark Wutica, "Java Enterprise Edition", QUE
6. Steven Holzner, "Java2 Black book", dreamtech

Integrated M.Sc. (Computer Science)-MCA Third Semester

COURSE TITLE: Theory of Computation **COURSE No.:** MCSA-303
Internal Assessment=25 Mid-term Exam.=25 End –Term Exam. = 50 Total Marks= 100
DURATION OF EXAM: 3 HOURS Lectures: 4 hours per week

UNIT I

Introduction:-Basic concepts of strings, Symbols, string Concatenation, alphabet, Language, Tree, States, Transition Tables, Sets, Relations, Finite Automata, Regular Expressions, Compilers and translators, structure of a compiler. Applications of automata theory.

UNIT II

Finite State Systems: - Deterministic Finite Automata (DFA) and Non- deterministic finite Automata (NFA),Equivalence of the DFA and NFA,Converting NDFA to equivalent DFA,Minimization of DFA,Finite Automata with Output(Moore and mealy machines), Transformation of a Mealy Machine into a Moore Machine, FSM properties and limitations.

UNIT III

Regular Expressions: - Regular expression designing, Equivalence of finite Automata and Regular Expressions, Algebraic method using Arden's theorem Conversion of NFA with ε moves into an equivalent

NFA without ε-moves, Construction of FA equivalent to a regular expression, Pumping lemma of regular sets, Closure properties of regular sets, Comparison of automata models, application of regular expressions and Finite automata.

UNIT IV

Context free Grammars, Derivation Tree(Left and right Derivation), Ambiguous Grammar(Removal of Ambiguity in the CFGs), Grammar Simplifications: Reduced Grammar, Removal of ε productions from a Grammar, Nullable Symbols, Removing Unit Productions, Applications of Context- free Grammar

Normal Forms: Chomsky Normal Form, Greibach Normal Form, Chomsky Hierarchy, Regular Grammars and FA.

Unit V

Pushdown Automata (PDA), Non-Deterministic PDA,Context-Free Grammars and Push-down Automata, Construction of a PDA from the Context-Free Grammar, Properties of Context-Free Languages,PDA with two Stacks.

Turing Machines: Turing Machine Model, Representation ,Non- deterministic Turing Machines, Recursive and Recursively Enumerable languages, Turing Machine Limitations(Unsolvability),Church‟s Hypothesis, Universal Turing machines, decidability, Halting problem.

REFERENCE BOOKS:

1. H. R. Lewis and C. H. Papadimitriou - Elements of the Theory of Computation, Prentice Hall.
2. J. E. Hopcroft, R. Motwani and J. D Ullman - Introduction to Automata Theory, Languages and Computation, Pearson Education Asia.
3. J. E. Hopcroft, and J. D Ullman - Introduction to Automata Theory, Languages and Computation, Addison Wesley.
4. J.C. Martin – Introduction to Languages and Theory of Computation, Tata Mcgraw Hill.
5. E. V. Krishna moorthy, "Introductory theory of Computer Science". East West Press Pvt. Ltd., New Delhi.
6. K. L. P. Mishra and N. Chandrasekaran - "Theory of Computations (Automata, languages and Computation)", Prentice Hall .
7. Rogers H., Theory of Recursive Functions and effective computing, Mcgraw- Hill.

Integrated M.Sc. (Computer Science)-MCA Third Semester

COURSE TITLE: Software Engineering **COURSE No.:** MCSA-304
Internal Assessment=25 Mid-term Exam.=25 End –Term Exam. = 50 Total Marks= 100
DURATION OF EXAM: 3 HOURS Lectures: 4 hours per week

UNIT – I

Software Engineering: Evolving Role of Software, Software Engineering challenges& approach, Changing nature of Software, Software Myths, Role of management in software development, Software Process and desired Characteristics.

Software Life Cycle Models: Water Fall Model, Incremental Process Models: iterative model, RAD model;Evolutionary Process Models: prototyping, spiral, Unified Process, Comparison of DLC Models, Other Software Processes, Selection of a Model.

UNIT – II

Software Requirements Analysis & Specifications: Software requirements & specifications, problem analysis, validation, metrics.

Software Architecture: Role of software architecture, Architecture views,data design: architectural level & component level, Component & Connector View ,architecture styles for C&C, Architecture issues ,Evaluating Architectures.
Software Project Planning: Project planning process: scope, resources, size estimation, cost estimation techniques: empirical, heuristic,analytical ,quality plan, Software Risk Management

UNIT – III
Software Design: Design phases and approaches to software design;,Function Oriented Design: Design principles, Module level Concepts, Notation & Specification, Structured Design Methodology, Verification. Object-Oriented Design: OO Analysis & Design, OO Concepts, Design Concepts, UML – Class Diagram, Sequence & Collaboration Diagram, Other diagrams & Capabilities, Design Methodology , Dynamic and Functional Modeling**.**

UNIT – IV
Detailed Design: PDL, Logic/Algorithm Design, State Modeling of Classes, Verification: Design Walkthroughs, Critical Design Review, Consistency Checkers.
Coding: Programming Principles & Guidelines, Coding Process, Refactoring, Verification.

UNIT – V
Software Testing: Testing fundamentals , unit testing, black box testing, white box testing, strategy for conventional software architecture, O-O architecture, validation testing ,system testing, defect analysis & debugging.
Software Maintenance & Certification: Software Maintenance types, characteristics, Process models, Estimation of Maintenance Costs, ISO Certification concept, software Reverse Engineering.

REFERENCE BOOKS:
1. Pankaj Jalote, "An Integrated Approach to Software Engineering", 3rd Edition, Narosa Publishing House, 2005.
2. K.K. Aggrawal and Yogesh Singh, "Software Engineering", 3rd Edition, New Age International (P) Ltd, 2008.
3. Pressman, R.S., "Software Engineering – A Practitioner's Approach", 6th Edition, McGraw Hills, 2010.
4. Mall Rajib, "Fundamentals of Software Engineering", PHI, New Delhi, 2011.
5. Richard Fairley, "Software Engineering Concepts", Tata McGraw Hills.

Integrated M.Sc. (Computer Science)/MCA Fourth Semester

COURSE TITLE: Advance Technology (.NET Programming) **COURSE No.:** MCSA-401
Internal Assessment=25 **Mid-term Exam.=**25 **End –Term Exam. =** 50 **Total Marks=** 100
DURATION OF EXAM: 3 HOURS **Lectures:** 4 hours per week

Unit-1
The .Net framework: Introduction, The Origin of .Net Technology, Common Language Runtime (CLR), Common Type System (CTS), Common Language Specification (CLS), Microsoft Intermediate Language (MSIL), Just-In –Time Compilation, Framework Base Classes.

Unit-II
C -Sharp programming (C#): Introduction, Data Types, Identifiers, Variables, Constants, Literals, Array and Strings, Objects, Classes, Inheritance, Polymorphism, Operator Overloading, Interfaces, Delegates and Events. Type conversion.
Unit-III

C# Using Libraries: Namespace System, Input-Output functions, Multi-Threading, Networking and sockets, Managing Console I/O Operations, Windows Forms, Error Handling.

Unit-IV

Advanced Features Using C#: Web Services, Window Services, ASP.Net Web Form Controls, ADO.Net. Distributed Application in C#, Unsafe Mode, Graphical Device interface with C#.

Unit-V

.Net Assemblies and Attributes: .Net Assemblies features and structure, private and share assemblies, Built-In attribute and custom attribute.

REFERENCE BOOKS:

1. Wiley," Beginning Visual C# 2008",Wrox
2. Fergal Grimes," Microsoft .Net for Programmers". (SPI)
3. Balagurusamy," Programming with C#", (TMH)
4. Mark Michaelis, "Essential C# 3.0: For .NET Framework 3.5, 2/e, Pearson Education
5. Shibi Parikkar, " C# with .Net Frame Work" , Firewall Media.

Integrated M.Sc. (Computer Science)/MCA Fourth Semester

COURSE TITLE: Computer Graphics **COURSE No.:** MCSA-402
Internal Assessment=25 **Mid-term Exam.=**25 **End –Term Exam. =** 50 **Total Marks=** 100
DURATION OF EXAM: 3 HOURS **Lectures:** 4 hours per week

UNIT –I

Introduction to Computer Graphics: Basics of Computer Graphics, Applications of computer graphics, Bitmap and Vector- Based Graphics, Random and Raster scan systems, Graphics input and output devices, Graphics software and standards, color models.

UNIT-II

Concept of Graphic Primitives: Coordinate system overview, points, lines, circles and ellipses as primitives. Line generation algorithms (DDA and Bresenhams),Circle and its properties, generation of circle (Bresenham‟s Method , midpoint algorithms), Point and Line clipping((cohen-sutherland, Liang-Barsky algorithms).

UNIT-III

Two-Dimensional transformations: Basic Transformations-Translation, Rotation, Scaling, Reflection, Shear Transformations, Combined Transformation, rotation about an Arbitrary point, inverse transformations

Three-dimensional transformations: Translation, rotation, scaling, rotation about an Arbitrary axis, reflection

UNIT-IV

Viewing Transformations: Introduction, objectives of viewing transformation. World Coordinates and Viewing Coordinates. Concept of projections: parallel projection, orthographic and oblique projections, isometric projections, perspective projections-concept of vanishing points, single point, perspective transformation, window-to-viewport transformations.

UNIT-V

Introduction to polygons and curves: Polygon representation methods -polygon surfaces, polygon tables, plain equation, polygon meshes. Hermite and Bezier curves and their properties. B-Spline Curves, Fractals and its applications.

Concept of visible surface detection. Methods of visible surface detection (depth buffer, scan line, area sub division)

REFERENCE BOOKS:

1. Hearn, D., Baker, and P.M.: Computer Graphics, Prentice-Hall.
2. A.P Godse "Computer Graphics", Technical Publication.
3. Rogers, D.F.: Procedural Elements for Computer Graphics, McGraw-Hill, 1985.
4. Harrington, S.: Computer Graphics: A Programming Approach, TataMcGraw- Hill, 1983.
5. Foley, J.D., Van Dam, A.: Fundamentals of Interactive Computer Graphics, Addison Wesley, 1982.
6. Zhingang Xiang,Roy Plastock,Computer Graphics,Schaum"s Outlines
7. Tosijasu, L.K.: Computer Graphics, Springer Verlog, 1983.
8. Rogers, D.F. McGraw Hill: Mathematical Elements of Computer Graphics,
9. Newman, W., Sproul, R.F.: Principles of Interactive Computer Graphics, McGraw-Hill, 1980.
10. Computer Graphics C Version, D.Hearn And P.Baker, Pearson Education

Integrated M.Sc. (Computer Science)-MCA Fourth Semester

COURSE TITLE: Artificial Intelligence **COURSE No.:** MCSA-403
Internal Assessment=25 **Mid-term Exam.=**25 **End –Term Exam. =** 50 **Total Marks=** 100
DURATION OF EXAM: 3 HOURS **Lectures:** 4 hours per week

Unit-I

Scope of AI: Games, theorem proving, Natural Language Processing, vision and speech processing, robotics, expert systems, AI techniques- search knowledge, abstraction.

Problem solving: State space search; Production systems, search space control: depth-first, breadth-first search, heuristic search - Hill climbing, best-first search, A* search, AO search, branch and bound. Alpha beta pruning, Problem Reduction, Constraint Satisfaction, Means-End Analysis

Unit-II

Knowledge Representation: Predicate Logic: Unification, modus pones, resolution, dependency directed backtracking. Rule based Systems: Forward reasoning: conflict resolution, backward reasoning: use of no backtracks.

Structured Knowledge Representation: Semantic Nets: slots, exceptions and default frames, conceptual dependency, scripts.

Unit-III

UNCERTAINTY: Non-monotonic reasoning, Logics Implementation, Probability and Bayes theorem- Certainty factors ,Bayesian networks, Dempster- Shafer theory

Learning: Concept of learning, learning automation, genetic algorithm, learning by inductions, Neural networks.

Unit-IV

Natural Language Processing: Definition, Phases Syntactic Processing, Semantic Analysis, Discourse and Pragmatic Processing. Applications of Natural Language Processing.

Unit-V

Expert Systems: Features, Characteristics-Architecture-Basic Activities-Stages in development, Structure of a knowledge base, Probability based Expert Systems – Tools, Need and justification for expert systems, knowledge acquisition, Case studies: MYCIN, RI.

Introduction to PROLOG

REFERENCE BOOKS:

1.E. Rich and K. Knight, "Artificial intelligence", TMH, 2nd ed., 1992.
2.N.J. Nilsson, "Principles of AI", Narosa Publ. House, 1990.

Reference books :

1.D.W. Patterson, "Introduction to AI and Expert Systems", PHI, 1992.
2.Peter Jackson, "Introduction to Expert Systems", AWP, M.A., 1992.
3.R.J. Schalkoff, "Artificial Intelligence - an Engineering Approach", McGraw Hill Int. Ed., Singapore, 1992.
4.M. Sasikumar, S. Ramani, "Rule Based Expert Systems", Narosa Publishing House, 1994.

Integrated M.Sc. (Computer Science)/MCA Fourth Semester

COURSE TITLE: Probability and statistics **COURSE No.:** MCSA-411
Internal Assessment=25 **Mid-term Exam.=**25 **End –Term Exam. =** 50 **Total Marks=** 100
DURATION OF EXAM: 3 HOURS
Lectures: 4 hours per week

UNIT-I Probability Theory

Concept of Probability, Random experiment: Sample spaces; classical probability and frequency, subjective probability. Probability of an event, conditional probability, mutually exclusive events; Random variable; classification of random variables; mean and variance of discrete random variable; mathematical expectations; variance and standard deviation; mode and median, moments of random variable, moment generating functions.

UNIT-II: Probability distributions

Discrete Probability Distributions: Binomial (Derivation, mean and variance and fitting of Binomial distribution), Poisson (Poisson as a limiting case of Binomial distribution, mean and variance and fitting of Poisson distribution).
Continuous Probability Distributions: Standard variables and normal distribution, mean and variance of normal distribution, computing normal probabilities, fitting of normal distribution in a given set of data, Student's T test and F-Static test.

UNIT-III. Basic Statistics

Basic Statistics: Measures of central tendencies:- Mean, Median, Mode; Measures of dispersion: Range variance and standard deviation; Frequency distribution and cumulative frequency distributions;
Linear correlation coefficient; Linear regression; Non-linear regression; Multiple correlation and multiple-regression;

UNIT-IV: Sampling Theory

Concept of Population, Sample, Importance of Sampling and its advantages, Sampling distributions, mean and standard deviation of the sampling distribution of means, Sampling distribution of proportions, mean and standard deviation of Sampling distribution of proportions, Sample Variance, Sampling distribution of variances

Estimating mean and variance: Estimator, Estimate, Estimation, interval estimation of population mean, interval, level of confidence, estimating population mean.

UNIT-V : Hypothesis Testing and Decision-making

Statistical decisions, hypothesis testing, type-1 and type-2 errors, level of significance, one tailed and tailed tests.
One sample hypothesis tests: Hypothesis tests of means - two tailed and one tailed.

Two sample hypothesis tests: Sampling distribution of the differences between sample means, two tailed and one tailed tests, two sample hypothesis test of percentages.

Chi-square analysis: Chi-square distribution, Chi-square testing, Computation of expected frequencies, testing of goodness of fit.

REFERENCE BOOKS:

1. AFFI, A.A.: Statistcal Analysis: A Computer Oriented Approach, Academic Press, Inc. 1979.
2. MORRIS, C., ROLPH, J.: Introduction to Data Analysis and Statistical Inference,Prentice-Hall, 1981.
3. SCALZO, F.: Elementary Computer Assited Statistics, Van Nostrand Reinherd Co. Ltd., 1978.
4. JOHNSTON, J.: Econometric Methods, McGraw-Hill.
5. HOGG, R.V., CRAIG, A.L.: Introduction to Mathematical Statistics, American Publishing Co. Pvt. Ltd.
6. YULE, U.G., KENDALL, M.G.: An Introduction to the Theory of Statistics, Charles Griffinand Co. Ltd.
7. DRAPER, N.A., SMITH, H.: Applied Regresion Analysis John-Wiley and Sons, Inc.
8. ANDERSON, T.W.: An Introduction to Multivariate Statistical Analysis, John-WileyandSons, Inc.
9. MORRISON, D.F.: Multivariate Statistical Methods, McGraw-Hill.

Integrated M.Sc. (Computer Science)-MCA Fourth Semester

COURSE TITLE: Numerical Computing **COURSE No.:** MCSA-412
Internal Assessment=25 **Mid-term Exam.**=25 **End –Term Exam.** = 50 **Total Marks=** 100
DURATION OF EXAM: 3 HOURS **Lectures:** 4 hours per week

Unit-I

Floating point Arithmetic: Representation of floating point numbers, Operations, Normalization, Pitfalls of floating point representation, Errors in numerical computation Iterative Methods: Zeros of a single transcendental equation and zeros of polynomial using Bisection Method, Iteration Method, Regula-Falsi method, Newton Raphson method, Secant method, Rate of convergence of iterative methods.

Unit-II

Simultaneous Linear Equations: Solutions of system of Linear equations, Gauss Elimination direct method and pivoting, Ill Conditioned system of equations, Refinement of solution. Gauss Seidal iterative method, Rate of Convergence.

Unit-III

Interpolation and approximation: Finite Differences, Difference tables Polynomial Interpolation: Newton's forward and backward formula Central Difference Formulae: Gauss forward and backward formula, Stirling's, Bessel's, Everett's formula. Interpolation with unequal intervals: Langrange's Interpolation, Newton Divided difference formula, Hermite's Interpolation Approximation of function by Taylor's series and Chebyshev polynomial

Unit-IV

Numerical Differentiation and Integration: Introduction, Numerical Differentiation, Numerical Integration, Trapezoidal rule, Simpson's rules, Boole's Rule, Weddle's Rule Euler- Maclaurin

Formula Solution of differential equations: Picard's Method, Euler's Method, Taylor's Method, Runge-Kutta methods

Unit-V

Curve fitting, Cubic Spline and Approximation: Method of least squares, fitting of straight lines, polynomials, exponential curves etc Frequency Chart: Different frequency chart like Histogram, Frequency curve, Pi-chart. Regression analysis: Linear and Non-linear regression, Multiple regression

REFERENCE BOOKS:

1. Rajaraman V., "Computer Oriented Numerical Methods", PHI
2. Gerald & Wheatley, "Applied Numerical Analyses", AW
3. Jain, Iyengar and Jain, "Numerical Methods for Scientific and Engineering Computations", New Age Int.
4. Grewal B. S., "Numerical methods in Engineering and Science", Khanna Publishers, Delhi
5. T. Veerarajan, T Ramachandran, "Theory and Problems in Numerical Methods", TMH
6. Pradip Niyogi, "Numerical Analysis and Algorithms", TMH
7. Francis Scheld, "Numerical Analysis", TMH

Integrated M.Sc. (Computer Science)-MCA Fourth Semester

COURSE TITLE: Microprocessor **COURSE No.:** MCSA413
Internal Assessment=25 **Mid-term Exam.=**25 **End –Term Exam. =** 50 **Total Marks=** 100
DURATION OF EXAM: 3 HOURS **Lectures:** 4 hours per week

Unit I

Introduction to microprocessors, overview of Microcomputer Structure and operation. Memory: Basic memory cell, 2D/3D Static RAM, Static and Dynamic Memory, Types of ROM, associative memory and interleaved memory, Random access, Sequential access, Direct access, virtual memory, Introduction to hardware, software and firmware,

Unit II

Microprocessor Architecture and its operations (8085), introduction to: address bus, data bus, control bus, memory map and Addresses, Input and Output devices: Peripheral-Mapped I/O and Memory-Mapped I/O, Pin Description of 8085, applications of microprocessors

Unit III

Introduction to 8085 Instructions: Instruction Set and Instruction Format, Data Transfer Instructions, Arithmetic Operations, Logic and Branch Operations, Programming Techniques with Additional Instructions, Looping, Counting and Indexing, Logic Operations, Rotate Compare.

Unit IV

Counters and Time Delay Programs, Stack and Subroutines, Conditional Call and Return Instructions & Code Conversions, BCD to Binary, Binary to BCD, BCD to Seven Segment L.E.D, ASCII to Binary, BCD Addition, BCD Subtraction, Introduction to Advanced Instructions and Applications, Multiplication, Subtraction with carry.

Unit V

Parallel Input/Output & Interfacing: - Basic Interfacing Concepts, Interfacing Output Displays, Interfacing Input Keyboards, Memory Mapped I/O, Interfacing Memory.

Programmable Interface Devices: - Basics of Programmable I/O, General Purpose Programmable Peripheral Devices – 8255A, 8259A, Direct Memory Access Controller – 8237, 8279, 8253, 8155.

REFERENCE BOOKS:

1. Microprocessor Architecture, Programming and Applications with 8085/8080 - Ramesh S. Gaonkar.
2. Introduction to Microprocessors - Aditya Mathur
3. Programming & Design - LIU & Gibson
4. Microprocessor & Interfacing - Douglas V. Hall

Integrated M.Sc. (Computer Science)-MCA Fourth Semester

COURSE TITLE: Computer Based Optimization Techniques **COURSE No.:** MCSC-414
Internal Assessment=25 Mid-term Exam.=25 End –Term Exam. = 50 Total Marks= 100
DURATION OF EXAM: 3 HOURS Lectures: 4 hours per week

UNIT-I

Overview: Introduction to Operation Research, techniques, tools, phases, limitations and applications in OR.

Linear programming-I: (Graphical method) Introduction, Formulation of a linear programming problem with different types of constraints, requirements, assumptions, merits and demerits, applications of LP, Graphical analysis, Graphical solution, Multiple, unbounded solution and infeasible problems and its applications

Linear programming-II: (Simplex method (SM)) Introduction, SM with several decision variables. Two phase simplex method, M-method, multiple, unbounded solution, infeasible problems, Sensitivity and duality analysis in LP, Dual Simplex Problems.

UNIT-II

Transportation Problem (TP): Structure and formulation of TP, Procedure for TP, Methods for finding initial feasible and optimal solution, Unbalanced TP, maximization TP, degeneracy problems in TP.

Assignment Problem (AP): Approach, procedure and maximization, unbalanced assignment problems,Hungarian Method.

Project Scheduling: Network analysis concept, CPM/PERT methods for scheduling of projects.

UNIT-III

Sequencing problems: Processing n-jobs through two, three, M machines, Processing of n-jobs through M machines.

Replacement decisions: Replacement of items that deteriorate with time (with and without change in money value), Staff replacement problem.

UNIT-IV

Integer and dynamic programming: Integer programming, formulation techniques, unimodularity, cutting plane method, branch and bound method.

UNIT-V

Dynamic programming: Methodology and its programming applications.

Game Theory: Basic terminology, solution methods of pure and mixed strategy games, principle of dominance, limitations.

REFERENCE BOOKS:

1. V K KAPOOR, Operations Research, Techniques for Management, Edition 7, Publishers: Sultan Chand and sons, 2004.
2. S S Rao optimization theory and applications, Wiley Eastern Ltd., New Delhi.
3. S.D.Sharma: Operations research, Kedar nath, Ram Nath & co.
4. H.A.Taha, Operations Research-An introduction, Macmillan Publishing co.inc.New york
5. Kanti Swarup, P K Gupta and Man Mohan, Operations Research, Sultan chand and sons, New Delhi.
6. Prem Kumar Gupta and D.S, Hira, Operations Research-An introduction, S.Chand and Company Ltd, New Delhi.

Integrated M.Sc. (Computer Science)-MCA Fourth Semester

COURSE TITLE: Complier Design **COURSE No.:** MCSA415

Internal Assessment=25 Mid-term Exam.=25 End –Term Exam. = 50 Total Marks= 100

DURATION OF EXAM: 3 HOURS **Lectures: 4 hours per week**

Unit – I

Overview of language processing – pre-processors – compiler – assembler – interpreters – linkers & loaders - structure of a compiler – phases of a compiler.

Lexical Analysis – Role of Lexical Analysis – Lexical Analysis Vs. Parsing – Token, patterns and Lexemes – Lexical Errors – Regular Expressions – Regular definitions for the language constructs – Strings, Sequences, Comments – Transition diagram for recognition of tokens, Reserved words and identifiers, Examples.

Unit – II

Syntax Analysis – Role of a parser – classification of parsing techniques – Top down parsing – First and Follow- LL(1) Grammars, Non-Recursive predictive parsing – Error recovery in predictive parsing.

Introduction to simple LR – Why LR Parsers – Model of an LR Parsers – Operator Precedence-Shift Reduce Parsing – Difference between LR and LL Parsers, Construction of SLR Tables. More powerful LR parses, construction of CLR (1), LALR Parsing tables, Dangling ELSE Ambiguity, Error recovery in LR Parsing.

Unit – III

Semantic analysis, SDT, evaluation of semantic rules, symbol tables, use of symbol tables. Runtime Environment: storage organization, stack allocation, access to non-local data, heap management, parameter passing mechanisms.

Unit – IV

Intermediate code , three address code, quadruples, triples, abstract syntax trees, basic blocks, CFG.

Unit – V

Machine independent code optimization - Common sub expression elimination, constant folding, copy propagation, dead code elimination, strength reduction, loop optimization, Machine dependent code optimization: Peephole optimization, register allocation, instruction scheduling, inter procedural optimization, garbage collection via reference counting.

REFERENCE BOOKS:

1. Compilers, Principles Techniques and Tools- Alfred V Aho, Monical S Lam, Ravi Sethi, Jeffrey D. Ullman,2nd ed, Pearson,2007.
2. C.N. Fisher and R.J. LeBlanc, "Crafting a compiler with C", Benjamin Cummings, 2003.
3. Principles of compiler design, 2nd ed, Nandini Prasad, Elsevier
4. Compiler construction, Principles and Practice, Kenneth C Louden, CENGAGE
5. J.P. Bennet, "Introduction to Compiler Techniques", Second Edition, Tata McGraw – Hill, 2003

Integrated M.Sc. (Computer Science)-MCA Fourth Semester

COURSE TITLE: Information systems **COURSE No.:** MCSA416
Internal Assessment=25 Mid-term Exam.=25 End –Term Exam. = 50 Total Marks= 100
DURATION OF EXAM: 3 HOURS Lectures: 4 hours per week

UNIT- I

Introduction: Definition, Data v/s Information, Types of Information -Strategic Information, Tactical Information, Operational Information; Information Quality, Dimensions of Information - Economic Dimension, Business Dimension, Technical Dimension; System Definition , types of Systems -Abstract and Physical Systems, Deterministic and Probabilistic Systems, Open and Closed Systems, User-Machine Systems; System Related Concepts -Boundary, Interface and Black Box, System Decomposition, Integration of Sub-Systems, Elements of a System.

UNIT -II

Information Systems Components: Data, Hardware, Software, Telecommunications, Data Processing concepts-Distributed Processing, Centralized Data Processing, Decentralized Data Processing, Distributed Databases, Client Server Computing, Internet, Intranet, Electronic Conferencing.

Factors affecting the value of information in organization- Completeness, Accuracy, Correctness, Timeliness etc. The Information Processing Cycle: Acquisition, Input, Validation, Processing, Storage, Retrieval, Output, Communication and Disposal.

UNIT -III

Types of information systems: Transaction processing system and its types, Office automation system (OAS) and its types, Management information system (MIS),Executive information system (EIS),Decision support system (DSS), Understanding Ethics of Information Systems , Information Privacy, Accuracy, Property and Accessibility.

Future of IS in an Organization, Business Process Reengineering

UNIT- IV

Information Systems Security and Control: Introduction to Information Security, Authentication, Authorization, Threats, Attacks, types of attacks, Intrusion Detection, Password Management, Malicious Softwares, Protection. Firewalls: Types and Design Principles.

UNIT- V

Support Systems For Management Decisions: Database Resource Management, Data Ware Housing- Overview And Concepts, Need for data warehousing, data marts, OLTP,OLAP and types, Data Mining, Intelligent Support Systems.

REFERENCE BOOKS:

1. Raja Raman. V. "System analysis and design "prentice-hall
2. Murdic, R.G. ROSE, J.E. & Claggt, J.R. "information systems for modern management "Prentice-Hall India.
3. Awadh, "System analysis and design"
4. Kenneth C. Laudon, "Management Information systems :Organization and Technology",6th Edition
5. Marakas, G.M. "Decision Support Systems in the 21st Century". Prentice Hall, Upper Saddle River, NJ, 2003.
6. Jaiswal S, "Management Information Systems"
7. O Brien, "Management Information Systems", Tata Mc Graw Hill
8. Effyoz, "Management Information System"Cengage Learning, New Delhi
9. "Network Security" by Atul Kahata