



R.K.D.F. UNIVERSITY, BHOPAL

M.Sc.(Computer Science)

REVISED SYLLABUS 2019-2020

SCHEME

Semester – I

No	Subject Code	Subject Title	Marks Allotted						
			Assignment Marks		Theory Marks		Practical Marks		Total Marks
			Max	Min	Max	Min	Max	Min	
1	MCS 511	OBJECT ORIENTED PROGRAMMING USING C++	20	08	80	32	-	-	100
2	MCS 512	ADVANCED OPERATING SYSTEM	20	08	80	32	-	-	100
3	MCS 513	EMBEDDED SYSTEM	20	08	80	32	-	-	100
4	MCS 514	ADVANCED DBMS	20	08	80	32	-	-	100
5	MCS 515	PRACTICAL I (Based on MCS 511 & MCS 512)	-	-	-	-	50	20	50
6	MCS 516	PRACTICAL II (Based on MCS 513 & MCS 514)	-	-	-	-	50	20	50
Total			80	32	320	128	100	40	500



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M.Sc.(Computer Science)

Syllabus

Semester – I

BRANCH	SUBJECT TITLE	SUBJECT CODE
M.Sc(Computer Science)	Object Oriented Programming using C++	MCS- 511

Unit-I

An overview of object oriented programming, Drawbacks of procedural programming, Concepts of OOP: Class, Object, Data abstraction, Encapsulation, Inheritance, Polymorphism, Dynamic Binding, Message Passing. An overview of C++ programming: basic programming construction, program statements, cout & cin, preprocessor directives. Variables, Constants and its types. escape sequence characters, input/output with cin and cout, cascading, expressions, the #define directive, Manipulators: the endl and setw manipulator, type conversions Data types, Primitive, Derived & User defined data types, Type modifiers (long, short, signed, unsigned). Operators: Arithmetic, Relational, Logical, Assignment, Ternary, Bitwise, Unary Operators.

Decision Making Statements : if, if-else statement, nested if-else, else if ladder, switch- case statement. Conditional statement.

Unit-II

Loops: The while loop, do-while loop, the for loop, for loop variable

Arrays: Introductions, defining and initializing arrays, accessing array elements, Single and multidimensional arrays. Character array, string variables, reading multiple lines, arrays of string.

Structures: Specifying the structure, accessing structure members, array of structures, nested structures, structures and classes, enumerated data types.

Functions: Function declaration and definition,, Calling the Function, comparison with library functions, passing arguments to functions: passing variables, passing by value, passing structure variables, Returning values from functions, returning structure variables, reference arguments

Unit-III

Object and Classes: Implementation of class and object in C++, access modifiers, object as data type, constructor, destructor, Object as function arguments, default copy constructor, parameterized constructor, returning object from function, Structures and classes, Classes objects and memory, static class data, Arrays of object, Arrays as class Member Data, The standard C++ String class, Run time and Compile time polymorphism.

Pointer and Virtual Function: Addresses and pointers, the address-of operator & pointer and arrays, Pointer and Function pointer, Memory management: New and Delete, pointers to objects, debugging pointers, Virtual Function, friend function, Static function, friend class, Assignment and copy initialization, this pointer, dynamic type information.



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Unit- IV

Operator overloading: Overloading unary operators, the operator keyword, operator return values, overloading binary operators, concatenating strings, multiple overloading, comparison operators, arithmetic assignment operators.

Inheritance: Derived Class and Base Class, specifying the derived class, accessing base class members, the protected access specifier, derived class constructors, overriding member functions, class hierarchies, -abstract base class, constructors and member functions, multilevel, multiple inheritance, member functions in multiple inheritance, ambiguity and multiple inheritance. Virtual base class, Function overriding, Virtual functions & dynamic binding. .

Unit- V

Files and Streams: Streams, the stream class hierarchy, stream classes, header files, string I/O, writing strings, reading strings, detecting end-of-file, character I/O, object I/O writing an object to disk, binary versus character files, reading an object from disk, the stream class, the open function, file pointers, specifying the position, specifying the offset the tellg function, closing files, redirection, IOS flags, redirecting input and output, command-line arguments, overloading the extraction and insertion operators.

References:

1. Object Oriented Programming In C ++ Robert Lafore, Galgotia
2. The Annotated C ++ Reference Manual, Manaret Ellis & Bjarne Strousstrup.
3. C ++ Printer Plus, Stephen Parata, Galgotia

Other Reference Books:

1. An Introduction To The OOP (Only Chapter 6), K.V. Witt, Galgotia
2. Jamsa's 1001 C/C ++ Tips, Kris Jamsa, Galgotia
3. A Treaties On Object Oriented Programming Using C ++ - B. Chandra, Narosa Publishing House.



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PRACTICAL

BRANCH	SUBJECT TITLE	SUBJECT CODE
M.Sc(Computer Science)	Practical - OOP Using C++	MCS- 511

List of Practical: OOP Using C++

1. Program to demonstrate encapsulation using of class.
2. Program to demonstrate use of array of objects
3. Program to demonstrate use of pointers
4. Program to demonstrate use of pointer to members of class
5. Program to demonstrate use of function overloading
6. Program to demonstrate inline function.
7. Program to demonstrate use of friend function
8. Program to demonstrate static data members & member functions of class.
9. Program to demonstrate use of different manipulations
10. Program to demonstrate objects as function arguments.
11. Program to demonstrate use of recursive function
12. Program to demonstrate use of constructor, constructor overloading & destructor
13. Program to demonstrate use of all types of Inheritance.
14. Program to demonstrate the virtual base class
15. Program to demonstrate the constructors in derived class.
16. Program to demonstrate use of unary & binary operator overloading
17. Program to demonstrate use of polymorphism (virtual function)
18. Program for reading and writing operations on text file.
19. Program for read, write, append & modify operations on binary file.
20. Program to demonstrate command line argument



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Syllabus

Semester – I

BRANCH	SUBJECT TITLE	SUBJECT CODE
M.Sc (Computer Science)	Advanced Operating Systems	MCS- 512

Unit-I:

Introduction: A brief description of its functional behavior & responsibilities as a resource manager and as an interface between hardware and user. Logical View and User View, Operating system need and services, Classification and Evolution and organization of OS, Hierarchical/Layered Organization of OS..

Processor Management: Process concept, Process Control Block, Process operations, Scheduling algorithms. Short terms and long term process scheduling policies, Scheduling criteria, multiple processor scheduling, scheduling Algorithm, FCFS, SJF, Priority and round robin scheduling, critical section, semaphores. Asynchronous parallel process, multithreading at system/user level, Inter process communication, Process Synchronization & Deadlock, Monitors, Deadlock prevention & avoidance, Deadlock Detection and deadlock Recovery

Unit-II:

Memory Management: Memory Management Techniques; Single partition allocation, multiple partition allocation, Swapping, paging and segmentation, segmented- paged memory management techniques; logical and physical address space; address mapping. Demand paging, Virtual memory, protection and address mapping hardware, page fault, Page replacement and page removal algorithms.

Unit-III:

Device Management and I/O Programming: Classification of device according to speed, Disk structure, disk scheduling, FCFS scheduling SSTF scheduling, access method and storage capacity; sharable and non sharable devices and their management; spooling concept of virtual device, I/O Processor; CPU-IOP parallel operation, CPU-IOP Communication; Device drivers; I/O Pr

Unit-IV:

Information Management & File System: Information-an important system resource, stored and maintained in files. File organization and access methods, logical and physical file structure; physical file system realized with device management function; file allocation methods, linked and index allocation, logical file implemented on physical file system. File protection and security, Directory structure, single level, two level, tree structure, Free Space Management, Allocation Methods, Efficiency & Performance, Recovery, FAT32, & NTFS.



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Unit-V:

Distributed Deadlock Detection -Introduction - deadlock handling strategies in distributed systems – issues in deadlock detection and resolution – control organizations for distributed deadlock detection – centralized and distributed deadlock detection algorithms –hierarchical deadlock detection algorithms. Agreement protocols – introduction-the system model, a classification of agreement problems, solutions to the Byzantine agreement problem, applications of agreement algorithms. Distributed resource management: introduction-architecture – mechanism for building distributed file systems – design issues – log structured file systems..

Case Studies: Single User System – MS-DOS, Multi User System – LIUNIX/ Solaris 2.0, Network OS-Novell Netware.

References:

1. James L. Peterson & A. Silberschatz: Operating System Concepts; 2nd Edn., Addison Wesley, World Student Edition
2. Andrew S. Tenenbaum : Modern Operating Systems; Prentice Hall, India
3. Dietel H.M.: An Introduction To Operating Systems; Addison Wesley, World Student Edition
4. Systems Programming & Operating Systems, 2nd Edn., Tata Mc Graw Hill
- 6.. Operating System : Achyut Godbole
7. System Programming & OS : D.M. Dhamdhare
8. Operating System : Galvin
9. Michael Budnick L.,Et AL., LAN Operating Systems; New Riders Publishing, Carmel,Indiana.

PRACTICAL

BRANCH	SUBJECT TITLE	SUBJECT CODE
M.Sc(Computer Science)	Operating System	MCS- 512

Practical for Operating System:

Following programs should be implemented in C++.

1. Program for FCFS scheduling
2. Program for SJF Scheduling
3. Program for Priority scheduling
4. Program for Round Robin scheduling.
5. Program for pager replacement algorithms
6. Study of Network and Distributed OS.
7. Case study of Linux/ Novell Netware/Windows NT etc.
(File handling Commands, Directory related commands, utility commands)



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Syllabus

Semester – I

BRANCH	SUBJECT TITLE	SUBJECT CODE
M.Sc (Computer Science)	EMBEDDED SYSTEM	MCS- 513

Unit I:

Introduction : Embedded Systems and general purpose computer systems, history, classifications, applications and purpose of embedded systems. Core of Embedded Systems : Microprocessors and microcontrollers, RISC and CISC controllers, Big endian and Little endian processors, Application specific ICs, Programmable logic devices, COTS, sensors and actuators, communication interface, embedded firmware, other system components, PCB and passive components..

Unit II:

Loop and Jump instructions, call instructions, time delay generation and calculation, pin description of 8051, I/O programming, Bit Manipulation, Immediate and register addressing modes, accessing memory using various addressing modes, Unsigned Addition and SuCSraction, Unsigned Multiplication and division, signed number concepts and arithmetic operations.

Unit III:

Logic and compare instructions, rotate and swap instructions BCD and ASCII application programs, single-Bit Instruction programming, Single bit operations with CY, reading input pins vs. Port Latch, programming 8051 Timers, counter programming, Basics of serial communication, 8051 connection to RS232, 8051 Serial Communication programming

Unit IV:

Difference between RISC and CISC Architectures

PIC Controller (Study Example Microchip: PIC 16F877)

(i) Memory organization ii) I/O ports

(iii) Indirect Addressing, INDF and FSR Registers

Unit V:

Introduction to ARM & Thumb Processor

ARM Controller (Study Example AT91M42800A)

(i) Architectural Overview.

(ii) Memory Map.

iii) Peripherals.

(iv) System Peripherals. v) User Peripherals.

(vi) Operating Modes

References:

1. 8051 Microcontroller & Embedded systems By Muhammad Ali Mazidi
2. PIC16F87X Data Sheet
3. AT91M42800A Data Sheet
4. 8051 Microcontroller by Kenneth Ayala
5. ARM Architecture Reference Manual Edited By David Seal.
6. Microcontroller, theory and application – Ajay Deshmukh.



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PRACTICAL

BRANCH	SUBJECT TITLE	SUBJECT CODE
M.Sc(Computer Science)	PRACTICAL- EMBEDDED SYSTEM	MCS- 513

List of experiments of Embedded System:

1. Simple assembly language program: Realization of Boolean expression using port.
2. Simple assembly language program: Running LEDs
3. Using Timer Counter for frequency measurement, by counting the number of pulses in fixed amount of time (e.g. 1 second)(Assembly Language Programm).
4. Using Timer/Counter for frequency measurement, by measuring the time period between two consecutive pulses (Assembly Language Program).
5. Write serial communication program in C. This program should:
 - a. Send a ASCII message to serial port (verify receipt of this message on a computer)
 - b. Then onwards, echo any character received (send characters from computer and verify receipt of echo).
- 6.. Study of minimum system based on ARM family micro-controller (e.g. LPC2104) and writing an Assembly Language Program for running LEDs.
7. Study of large system based on ARM family micro-controller, and writing C program to display a message on LCD.



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Semester – I Syllabus

BRANCH	SUBJECT TITLE	SUBJECT CODE
M.Sc(Computer Science)	ADVANCED DBMS	MCS- 514

UNIT-I

What is database system, purpose of database system, view of data, relational databases, database architecture, transaction management, Data Models The importance of data models, Basic building blocks, Business rules, The evolution of data models, Degrees of data abstraction. Database Design ,ER-Diagram and Unified Modeling Language Database design and ER Model:overview, ER-Model, Constraints, ER-Diagrams, ERD Issues, weak entity sets, Codd's rules, Relational Schemas, Introduction to UML.

UNIT-II

Relational database model: Logical view of data, keys, integrity rules. Relational Database design: features of good relational database design, atomic domain and Normalization (1NF, 2NF, 3NF, BCNF).

Query Processing: Query Processing Stages, Query Interpretation, Equivalence

of Expressions, Query Resource Utilization, Query Execution Statistics, Query Execution Plan, Estimation of Query Processing Cost, Table Scan, Sample Index Access, Fill Factor, Multiple Index Access, Methods for Joining Tables (Nested Loop, Merge Join, Hybrid Join, Multiple Join) Structure of a Query Optimizer,

UNIT-III

Transaction Processing & Concurrency Control: Concept and definition of transaction, ACID properties, serializability, Prioritization, states of transaction, Types of failure, desirable properties of transaction schedules and recoverability, serial usability of schedules, levels of transaction consistency, deadlocks, long duration transactions, transaction performance, transaction processing as implemented in contemporary database, management system. Concurrency Control, locking techniques, techniques based on time-stamp ordering, multiple granularity.

Crash Recovery: failure classification, recovery concepts, database backup, recovery concepts based on deferred update and on immediate update. Shadow paging, check points, on-line backup during database updates, crash recovery techniques.



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UNIT-IV

Distributed Database: Homogeneous and Heterogeneous databases, Architecture and design of distributed databases, Distributed data storage, Data fragmentation with reasons, Degree of fragmentation, Correctness, rules of fragmentation, horizontal, vertical and hybrid fragmentation, Distributed query processing, recovery in distributed systems, commit protocols for distributed databases, multi-database system.

Client/Server database: Evolution of client concept, Client/Server environment, characterization of Client/Server computing. Functions of clients server , application partitioning, the two-layer and three-layer architectures, communication between clients and servers.

UNIT-V

Object Oriented Databases: Complex data types, Array & Multiset Types in SQL, Object Identity & Reference types in SQL, Implementing Object Relational features, Persistent of Objects, Object Identity & Pointers, Object Relation Database, Object Oriented Vs. Object Relational.

Integrity, Security: Need for Database Integrity, Integrity Constraints, Non- Procedural and Procedural Integrity Constraints Specifications in SQL, Introduction to Database Security issues, Authorization and Use.

References:

1. Fundamental of Database Systems by R. Elmasri; S. Navate; Benjamin Cummings;
2. Introduction to database systems by C. J .Date
3. Database system concept by Korth
4. Principles of Database Management by James Martin
5. Relational database design for Micro computers Application by Prentice Hall (Jackson)
6. Database Management Systems by Bipin Desai



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PRACTICAL

BRANCH	SUBJECT TITLE	SUBJECT CODE
M.Sc(Computer Science)	PRACTICAL- ADVANCED DBMS	MCS- 514

List of Practical : Advanced DBMS

1. Creating database tables and using data types.
 - Create table, • Modify table, • Drop table
2. Practical Based on Data Manipulation.
 - Adding data with Insert, • Modify data with Update, • Deleting records with Delete
3. Practical Based on Implementing the Constraints.
 - NULL and NOT NULL, • Primary Key and Foreign Key Constraint
 - Unique, Check and Default Constraint
4. Practical for Retrieving Data Using following clauses.
 - Simple select clause, • Accessing specific data with Where, Ordered By, Distinct and Group By
5. Practical Based on Aggregate Functions.
 - AVG, • COUNT, • MAX, • MIN, • SUM, • CUBE
6. Practical Based on implementing all String functions.
7. Practical Based on implementing Date and Time Functions.
8. Practical Based on implementing use of union, intersection, set difference.
9. Implement Nested Queries & JOIN operation.
10. Practical Based on performing different operations on a view.
12. Practical Based on implementing use of triggers, cursors & procedures.
13. Make a Database connectivity with front end tools like – VB, VC++, D2K.



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SCHEME

Semester – II

No	Subject Code	Subject Title	Marks Allotted						
			Assignment Marks		Theory Marks		Practical Marks		Total Marks
			Max	Min	Max	Min	Max	Min	
1	MCS 521	DATA STRUCTURES, ALGORITHMS & ANALYSIS	20	08	80	32	-	-	100
2	MCS 522	S/W ENGINEERING & TESTING	20	08	80	32	-	-	100
3	MCS 523 – (a) / MCS 523 – (b) / MCS 523 – (c)	ADVANCED COMPUTER NETWORKS / Office Tools / Information Storage Management	20	08	80	32	-	-	100
4	MCS 524	NUMERICAL TECHNIQUES & DISCRETE MATHEMATICS STRUCTURE	20	08	80	32	-	-	100
5	MCS 525	PRACTICAL III (Based on MCS 521 & MCS 522)	-	-	-	-	50	20	50
6	MCS 526	PRACTICAL IV (Based on MCS 523 & MCS 524)	-	-	-	-	50	20	50
Total			80	32	320	128	100	40	500



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Semester – II

Syllabus

BRANCH	SUBJECT TITLE	SUBJECT CODE
M.Sc(Computer Science)	Data Structures Algorithms & Analysis	MCS- 521

Unit-I

Algorithm Specifications: Performance Analysis and Measurement (Time and space analysis of algorithms- Average, best and worst case analysis). Introduction To Data Structure: Data Management concepts, Data types – primitive and non-primitive, Types of Data Structures- Linear & Non Linear Data Structures..

Unit II

Queues. Representation of queue, Insert & delete operations on queue, Deques, Priority queues. Linked lists and their representation in memory, traversing a linked list, searching a linked list. Memory allocation, Insertion deletion operations on linked lists. Header linked lists, Two-way linked lists. Circular linked list

Unit-III

Trees, Binary trees & and their representation in memory, Traversing binary trees. Traversal algorithms, Header nodes: threads. Binary search trees, searching, inserting and deleting in binary trees. Heap and heapsort. Path length & Huffman's' algorithm. General trees.

Unit-IV

Graph theory, sequential representation of graphs, Linked representation, operations & traversing the graphs. graphs and its variants, breadth first search, depth first search. Greedy method, single source shortest path, minimum spanning trees, Prim's' algorithm.

Unit-V

Sorting, Time and Space Complexity of sorting, Insertion Sort, Selection Sort. Merging & Merge-sort, Radix sort, Hashing. Divide and conquer, binary search with its variants, Quick sort, Linear search and Binary search algorithms.

References:

1. Seymour Lipschutz: -Theory & Problems of Data Structures, Schaum's Outline Series (McGraw-Hill)
2. Ellis Horowitz, Sartaj Sahni – Fundamentals of Data Structures (CBS Publications)
3. Trembley, Sorenson:- An Introduction to Data Structures with Applications. (TMH)
4. Kutty: Data Structures using C++ (PHI)
5. Bhagat Singh, Naps : Introduction to Data Structures (TMH)
6. E Horowitz and S. Sahani, Fundamentals of Computer Algorithm, Galgotia Publications, 1991.
7. Aho, Hopcroft and Ullman, The Design and Analysis of Algorithms, Addison- Wesley Publication, 2000
8. Simon Harison, James ross, Algorithms, Wiley India, 2006



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PRACTICAL

BRANCH	SUBJECT TITLE	SUBJECT CODE
M.Sc(Computer Science)	PRACTICAL Data Structures Algorithms & Analysis	MCS- 521

Data Structure Algorithms and Analysis:

Implementation using C/C++/Java

1. Write an application to implement Tower of Hanoi Problem Algorithm.
2. Write an application to implement Abstract data type stack
3. Write an program to evaluate Post fix expression using stack
4. Write a program to implement Abstract data type queue.
5. Write a program to implement singly linked list that performs various operation such as insertion, deletion, searching a node in linear linked list.
6. Write a program to implement Preorder Traversal of a binary tree.
7. Write a Program to search a given element using Binary Search.
8. Write a Program to implement Selection Sort.
9. Write a Program to implement Merge Sort.
10. Write a Program to Perform insertion or search in a specified level of a stack implemented tree- structured symbol table.
11. Write a program to find minimum and maximum form a given array.

Software Testing:

At least 10 practical should be conducted on any s/w testing tool.



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Semester – II

Syllabus

BRANCH	SUBJECT TITLE	SUBJECT CODE
M.Sc(Computer Science)	Software Engineering and Testing	MCS- 522

Unit-I:

S/w Engineering Fundamentals: Definition of Software, The birth of s/w engineering, s/w Product:, Software development paradigms, software Characteristics and Application. Software Development life cycle, water fall model, Prototyping, Incremental & Spiral model, 4th Generation Techniques.

Project Management: Concepts, Software Process and Project Metrics; Software Measurements; Software Projects Planning: Objectives, Scope and Resources. Software Project Estimating, Decomposition Techniques. Empirical Estimation Models: COCOMO Model, Software Equation. Project Scheduling and Tracking.

Unit-II:

The Software Product and Software Process Software Product and Process Characteristics, Software Process Models: Linear Sequential Model, Prototyping Model, RAD Model, Evolutionary Process Models like Incremental Model, Spiral Model, Component Assembly Model, RUP and Agile processes. Software Process customization and improvement, CMM, Product and Process Metrics

System Design: Design concept and principles and its elements, effective modular design, Cohesion & Coupling, Feature of modern graphics interface (GUI). Design Methods: data design, interface design guidelines, procedural design.

Unit-III:

Software Quality Assurance: Definition of Quality and factors, QA, SQA, Software Quality Metrics, Process and Product Quality, The SEI Process Capability Maturity Model (CMM), ISO ,Six-Sigma. Software Quality Assurance, Need for SQA, SQA Activities, Building blocks of SQA, SQA Planning & Standards, Software Reliability, Reliability Measures.

Software Analysis and Testing Software Static and Dynamic analysis, Code inspections, Software Testing, Fundamentals, Software Test Process, Testing Levels, Test Criteria, Test Case Design, Test Oracles, Test Techniques, Black-Box Testing, White-Box Unit Testing and Unit, Testing Frameworks, Integration Testing, System Testing and other Specialized, Testing, Test Plan, Test Metrics, Testing Tools. , Introduction to Object-oriented analysis, design and comparison with structured Software Engg.

Unit-IV:

Levels of Testing Unit Testing, Integration Testing, System Testing, Acceptance Testing, Alpha testing & Beta testing, Static vs. Dynamic testing, Manual vs. Automatic testing, Testers workbench, 11 steps of testing process (Only steps should be covered)

Different types of Testing: Installation Testing, Usability testing, Regression testing, Performance testing, Load testing, stress testing, Security testing, Static & Dynamic testing, Static testing techniques, Review types : Informal Review, Technical or peer review, Walkthrough, Inspection, static analysis, Review meeting and reporting , Review guidelines & Review checklist, Data flow analysis, Control flow analysis, Cyclometric Analysis, Dynamic



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testing – need & Advantages

Unit-V:

Black Box & White Box Testing (Test Case Design Techniques): Functional Testing (Black Box), Equivalence partitioning, BVA, Decision table based testing, Cause-Effect graphing, Syntax testing (Concept & Test case generation only), Structural Testing (White Box), Coverage testing, Statement coverage, Branch & decision coverage, Path coverage, Validation testing Activities, Low level testing, High level testing, Black box Vs. White Box

Object Oriented Testing: Issues in OO testing, class testing, GUI testing, Object Oriented Integration & system testing.

Computer Aided Software testing tools (CAST): Static Testing Tools, Dynamic Testing Tools, Characteristics of Modern Tools. e.g. WinRunner, LoadRunner, Rational ROBO.

Reference Book:

1. Software Engineering – A Practitioners Approach Roger S. Pressman, 3rd /4th Edition, Mcgraw Hill, International Education.
2. An Integrated Approach To S/w Engineering, Pankaj Jolote, 1st / 2nd Edition, Narosa.
3. Software Engineering – A Programming Approach, D. Belie I. Moray, J. Rough, PHI.
4. Software Testing Techniques, Barrios Bier, 2nd Edition, Van N Ostrand Reinhold.
5. Software Engineering Concepts-Richard Fairley, CDAC. Tata McGraw-Hill Series.
6. ISO-9000 Standards (Relevant ToSoftware).
7. IEEE Standard For Software User Documentation, Std. 1063 1987.
8. Introducing Software Testing by Louise Tamres (Pearson pub)
9. Effective Methods for software Testing by William Perry
10. Software Testing in Real World by Edward Kit
11. Software Testing Techniques by Boris Beizer (Dreamtech pub)
12. Boris Beizer, -Software System Testing and Quality Assurancell, Van Nostrand Reinhold, New York, 1984.
13. Glenford Myers, -The Art of Software Testingll, John Wiley & Sons Inc., New York.



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M.Sc. COMPUTER SCIENCE

Semester – II

Syllabus

BRANCH	SUBJECT TITLE	SUBJECT CODE
M.Sc(Computer Science)	Advance Computer Networks	MCS- 523(a)

Unit-I:

Introduction: Layered network architecture, review of ISO-OSI Model. Data communication techniques: Pulse Code Modulation, (PCM), Data modems, Multiplexing techniques-Frequency-Division, Time-Division Transmission Media – Wires, Cables, Radio, Links, Satellite Links, Fiber-Optic Links.

Asynchronous Transfer Mode (ATM): Cells, Header and Cell Formats, Layers in ATM, Class 1,2,3,4 Traffic Random Access Data Networks, Concept of Random Access, Pure ALOHA: Throughput Characteristics Slotted ALOHA, throughputs for Finite and Infinite, Population S-ALOHAS. MARKOV Chain Model for S-ALOHA .

Unit-II:

Local Area Networks (LANs): IEEE 802.4 and 802.5 Protocols, Performance of Ethernet and Token ring protocols, FDDI Protocol, Distributed Queue Dual Bus (DQDB) protocol.

Network Layer Protocols: Design issues: Virtual Circuits and Datagrams.

Routing Algorithms: Optimality Principle, Shortest Path Routing-Dijkstra, Bellman-Ford and Floyd-Warshall Algorithm.

Unit-III:

Data Link Layer: Need, Services Provided, Framing, Flow Control, Error control. **Data Link Layer Protocol:** Elementary & Sliding Window protocol: 1-bit, Go-Back-N, Selective Repeat, Hybrid ARQ. **Protocol verification:** Finite State Machine Models & Petri net models. ARP/RARP/GARP.

Transport Layer Protocols: Design issues: Quality of Services, Primitives Connection Management: Addressing, Connection Establishment and Releases, Use of Timers, Flow Control and Buffering, Multiplexing, Crash Recovery. Elements of TCP/IP Protocol: User Datagram Protocol Connection Management, Finite State Machine.

Session Layer Protocols: Dialog Management, Synchronization, OSI Session Primitives Connection Establishment.

Unit-IV:

Error Detection: Parity Check Codes, Cyclic Redundancy Codes.

Queuing Models: Data Traffic Characteristics: Poisson Process Birth-Death Process: Markov Chain Models M/M/1 Queues: Delay and Little's Formula M/M/S/K Queues: Average Queue Length, Delay and Waiting Time Blocking Probability. M/G/1 Queues, Imbedded Markov Chains, Poolaczek-Kinchin Transform Formula, Delay Formula Using Residual Service Time.



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Unit-V:

Presentation and Application Layer Protocols: Presentation Concepts NMP- Abstract SyntaxNotation-1 (ASN-1), Structure of Management, Management Information Base.

Cryptography: Substitution Transposition Ciphers, Data Encryption Standards (DES) Chaining, Breaking DAS, Public Key Cryptography and Authentication Protocols, Electronic Mail, World Wide Web.

References

1. A. S. Tanenbaum: Computer Networks, 2nd Edition., PHI
2. J.F. Hays: Modelling And Analysis Of Computer Communication Networks, Plenum Press
3. D. Bertsekas And R. Gallager: Data Network, 2nd Edition, PHI, India
4. D.E. Comer: Internetworking With TCP/IP, Vol. 1,2, PHI
5. G. E. Keiser: Local Area Networks, McGraw-Hill, International Edition
6. W.Stalling: Data And Computer Communication, Maxwell-,Macmillan, International Edition

PRACTICAL

BRANCH	SUBJECT TITLE	SUBJECT CODE
M.Sc(Computer Science)	Advance Computer Networks	MCS- 523

Advance Computer Networks:

At least 10 practical should be conducted on above paper.

Numerical Methods & Discrete Mathematical Structures

At least 10 practical should be conducted on various algorithms of numerical methods.



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M.Sc.(Computer Science)

Semester – II

BRANCH	SUBJECT TITLE	SUBJECT CODE
M.Sc(Computer Science)	Office Tools	MCS- 523(b)

Unit I

Introduction to Windows: Features of Windows. Difference between CUI & GUI Interfaces, Hardware Requirement for Running Version of Windows. New Installation & Upgradation, Managing Hardware & Software - Installation of Hardware & Software, Desktop, Start Button, Start Menu, Wall Paper, Use of Recycle Bin, Computer, Network Icon, Using Scanner Web Camera, Printers, Searching files and programs, Multiple User Feature of Windows, Creating and Deleting User, Changing User Password, etc. Creating folder and shortcuts of application on desktop, Using Windows Explorer, Accessories, Control Panel: Display, Internet Options, User Accounts, Backup and Restore, Date and Time, Taskbar, Start Menu, Windows Firewall, Windows Update, Devices and Printers.

Unit II

System Tools - Backup, Character Map, Clipboard Viewer, Disk Defragmenter, Drive Space, Scandisk, System Information, System Monitor, Disk Cleanup, Browsing the Web with Internet Explorer and other browsers,

Accessibility Features of Windows - Sharing Folders and Drives, Browsing the Entire Network, Using Shared Printers. OLE - Embed/Link Using Cut and Paste an Embed/ Link, Using Insert Object Manage Embedded/Linked Object.

Introduction to Word Processing (MS Word), Advantages of Word Processing, Introduction & Installation Editing a File, Working with ‘options’ under file menu, Formatting Tool Bar, Setting margins, orientation and size of page. Using Paragraph Styles, Formatting Text, Inserting page number, Format Painter, Spell Check & Word Count, Newspaper Style Column, Drop Cap, Header & Footer, Endnote and Footnote.

Unit III

Advanced Features of MS-Word: managing page breaks and section breaks, Inserting Objects, Inserting Hyperlink, Cross reference, Bookmark. Inserting Illustrations (Smart Art, Shapes, Charts & Pictures), Adding symbols, signature & equations, Setting Up Printer, Printing options, Inserting watermark, Mail Merge, printing labels and envelopes, Mathematical Calculations, Using Macros, Table Handling, Creating Table of Contents & Index, Use of Thesaurus, saving document versions, comparing two versions of document, protecting document.

Unit IV

Introduction to Spread Sheet (MS Excel): Definition and Advantages of Electronic Worksheet Working on Spreadsheet, Range and Related Operations, Inserting, Deleting, Copying and Moving of Data Cells, Inserting and Deleting Rows and Columns, Protecting Cells, protecting worksheet and workbook, Printing a Worksheet, Graph Creation: Types of Graphs, Creating a Chart on Chart Sheet, Printing the Chart. Sort & Filter, Data Validation, Consolidate data, Goal seek, Data Table, Subtotal, Group & ungroup data. Freeze panes, split window, conditional formatting, inserting comment, pivot table, text



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to column / column to text, what-if-analysis. Importing data from access, from web and from other sources. built in functions- mathematical, logical, text, date & time, lookup and reference. Working with options' under file menu.

Unit V

Introduction to MS Power Point: Elements of Power Point, Exploring Menus of Power Point, Working with Dialog Boxes, Creating presentation with Auto content Wizard, Designing Presentation: Slide Setup, Adding Text, Formatting Text, Inserting Photo Album, WordArt, Graph, Object and Picture to Slide, Inserting , deleting and duplicating slides, Adding movie and sound to slide, Adding animation to slide, Custom Animation, Slide Transition, Protecting Presentation, Printing Slides, View Slide, Outline, Slide Sorter Notes and Slides Show.

Suggested List of Practicals

I. System Tools & MS Word

- 1) Usage of System Tools(Backup, Character Map, Clipboard Viewer, Disk Defragmenter, Drive Space, Scandisk, System Information, System Monitor, Disk Cleanup etc.)
- 2) Printing documents with even-odd pages on both sides on a network printer.
- 3) Revision of basic tools of MS-Word.
- 4) Implementing Newspaper Style Column, Drop Cap.
- 5) Use of Header & Footer, Endnote and Footnote
- 6) Learning to manage page breaks and section breaks
- 7) Inserting Objects, Hyperlinks, Cross reference, Bookmark, Illustrations, symbols, signature & equations, watermark.
- 8) Mail Merge, printing labels and envelopes, Mathematical Calculations, Using Macros.
- 9) Table Handling, Creating Table of Contents & Index.
- 10) Protecting documents.

II. MS Excel

- 1) Revision of basic formulae of MS-Excel.
- 2) Protecting cells, worksheet and workbook
- 3) Applying Sort & Filter, Data Validation, Conditional Formatting
- 4) Formulae: and, or, if, sumif, sumifs, countif, countifs
- 5) Implementing Pivot Table

III. MS Powerpoint

- 1) Adding animation to slide, Custom Animation, Slide Transition
- 2) Creation of Photo Album, with automatic transition of slides in 10 seconds with loopback on end
- 3) Creation of presentation with continuation of single audio during whole presentation(despite of slide change)
- 4) Printing using Handouts



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BRANCH	SUBJECT TITLE	SUBJECT CODE
M.Sc(Computer Science)	Information Storage Management	MCS- 523(c)

Unit I

Introduction to Storage Technology: Data proliferation and the varying value of data with time & usage, Sources of data and states of data creation, Data centre requirements and evolution to accommodate storage needs, Overview of basic storage management skills and activities, The five pillars of technology, Overview of storage infrastructure components, Evolution of storage, Information Life cycle Management concept, Data categorization within an enterprise, Storage and Regulations.

Unit II

Storage Systems Architecture: Intelligent disk subsystems overview, Contrast of integrated vs. modular arrays, Component architecture of intelligent disk subsystems, Disk physical structure components, properties, performance, and specifications.

Logical partitioning of disks, RAID & parity algorithms, hot sparing, Physical vs. logical disk organization, protection, and back end management, Array caching properties and algorithms, Front end connectivity and queuing properties, Front end to host storage provisioning, mapping, and operation, Interaction of file systems with storage, Storage system connectivity protocols.

Unit III

Introduction to Networked Storage: JBOD, DAS, SAN, NAS, & CAS evolution, Direct Attached Storage (DAS) environments: elements, connectivity, & management, Storage Area Networks (SAN): elements & connectivity, Fiber Channel principles, standards, & network management principles, SAN management principles, Network Attached Storage (NAS): elements, connectivity options, connectivity protocols (NFS, CIFS, ftp), & management principles, IP SAN elements, standards (SCSI, FCIP, FCP), connectivity principles, security, and management principles, Content Addressable Storage (CAS): elements, connectivity options, standards, and management principles, Hybrid Storage solutions overview including technologies like virtualization & appliances.

Unit IV

Introduction to Information Availability: Business Continuity and Disaster Recovery Basics, Local business continuity techniques, Remote business continuity techniques, Disaster Recovery principles & techniques.

Unit V

Managing & Monitoring: Management philosophies (holistic vs. system & component), Industry management standards (SNMP, SMI-S, CIM), Standard framework applications, Key management metrics (thresholds, availability, capacity, security, performance), Metric analysis methodologies & trend analysis, Reactive and pro-active management best practices, Provisioning & configuration change planning, Problem reporting, prioritization, and handling techniques, Management tools overview.



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Suggested List Of Practicals

1. Write a program for selection sort.
2. Write a program for quick sort.
3. Write a program for merge sort.
4. Write a program for linear search.
5. Write a program for binary search.
6. Write a program to implement insertion and deletion operation on queue using array.
7. Write a program to implement linked list.
- 8 . Write a program to implement binary tree.



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Syllabus

BRANCH	SUBJECT TITLE	SUBJECT CODE
M.Sc(Computer Science)	Numerical Methods & Discrete Mathematical Structures	MCS- 524

Unit-I:

Transcendental and polynomial equations. The roots of an equations; definitions and examples, intermediate value theorem and bisection method. The Regular-falsi method and examples, the secant method and examples, The Newton- Raphson Method and examples, choice of an iterative method and implementation.

System of linear algebraic equations: elements of matrix theory; algebra of matrices ,(basic operations) rank of a matrix and existence results for system of linear algebraic equation. Cramers role. The gauss elimination method for providing L-U decomposition of tranquilization method. The gauss –seidel iterative method, choice of the method and implementation.

Unit-II:

Numerical differentiation and integration: numerical differentiation: methods based on finite differences. Numerical Integration: The trapezoidal rule, the simpson's rule and gauss-lengendre integration method.

Numerical Solution of ordinary: differential equations. Ordinary differential equations of the first order basic concepts & various analytic methods (separable equation, equation educable to separable form, exact differential equation, integrating factors, linear first order differential equation). Reduction of higher order differential equations to the system of first order differential equations initial and boundary value problems: definitions and examples, Euler's method for solving the initial value problems, Rung-Kutta methods for the system of first order differential equations.

Unit-III:

Interpolation and approximation: Interpolation with equal intervals: finite difference tables, The Gregory Newton formula for forward & backward interpolation. Interpolation with unequal intervals: Newton's divided difference interpolation formula, language interpolation, the least square approximation

Unit-IV:

Desecrate structure: fundamentals set subsets and operations on sets; semi groups finite and infinite set, relation and properties of relations, equivalence relations.

Boolean Algebra, Posets and lattices: partial order relation, Poset, Lub, Gid, maximal and minimal elements of a posets. Def and examples of boolean algebra, lattices, distributive laws in lattices, complemented lattice's prepositional calculus, boolean functions , min and max, terms, simplification of boolean function with Karnaugh Map & Quine MC Cucky method.

Introduction to Combinatorices: Basic Thermo sonpermutations and combination, ordinary exponential generating functions recurrence equations.



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Unit-V:

Definitions of algorithms and complexity, Time and Space Complexity; Time space tradeoff, various bounds on complexity, Asymptotic notation, Recurrences and Recurrences solving techniques, Introduction to divide and conquer technique, example: binary search, merge sort, quick sort, heap sort, strassen's matrix multiplication etc, Code tuning techniques: Loop Optimization, Data Transfer Optimization, Logic Optimization, etc.

Finite State Machines and Languages: finite state machines, semigroups, machine languages and regular languages, simplification of machines.

References:

1. M.K. Jain, S.R.K. Lyengar And R.K. Jain, -Numerical Methods For Scientific And Engineering Computation (1993), New Age Int (P) Ltd. ,New Delhi.
2. I.R. Miler, J.E. Freund And R. Johnson, -Probability & Statistical for Engineers (1990), Prentice-Hall Of India, New Delhi.
3. S.D. Conte And C. De Boor -Elementary Numerical Analysis (Mc-Graw Hill Pub.
4. E. Kreyszing -Advanced Engineering Mathematics (Wiley Eastern Ltd. (7th Edition), New Delhi.
5. P.L. Meyer -Introductory Probability And Statistical Applications -, Oxford And IBH Pvt. Ltd. (Second Edition), New Delhi.
6. Korfhage R.R: Discrete Computational Structure-Academic Press.
7. Bernard Kolman & Robert C Busy: Discrete Mathematical Structure For Computer Science-PHII.
8. K.A. Ross & C.R.B. Wright: Discrete Mathematics- (PHI)
9. Narsingh Deo. Graph Theory With Application To Engineering And Computer Science- (PHI)
10. C.L. Liu :Elements Of Discrete Structure – McGraw Hill International Editors 1986.



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SCHEME

Semester – III

No	Subject Code	Subject Title	Marks Allotted						
			Assignment Marks		Theory Marks		Practical Marks		Total Marks
			Max	Min	Max	Min	Max	Min	
1	MCS 531	Programming in Java	20	08	80	32	-	-	100
2	MCS 532	Object Oriented Analysis and Design using UML	20	08	80	32	-	-	100
3	MCS 533	Computer Graphics	20	08	80	32	-	-	100
4	MCS 534	ELECTIVE- I 1. Digital image processing 2. Pattern recognition 3. Digital signal processing	20	08	80	32	-	-	100
5	MCS 535	PRACTICAL V (Based on MCS 531 & MCS 532)	-	-	-	-	50	20	50
6	MCS 536	PRACTICAL VI (Based on MCS 533 & MCS 534)	-	-	-	-	50	20	50
Total			80	32	320	128	100	40	500



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Semester – III

Syllabus

BRANCH	SUBJECT TITLE	SUBJECT CODE
M.Sc(Computer Science)	PROGRAMMING IN JAVA	MCS- 531

UNIT-I

Introduction: History and features of Java, Difference between C, C++ & JAVA. JAVA and Internet, WWW, Web Browsers, java supports system, Java Environment. JDK, JVM, Byte code

JAVA : Overview of Java, Installation, First Simple Program, Compilation process, JavaKeywords , Identifiers , Literals, Comments, Data Types, Variables, Dynamic initialization, typeconversion and casting, Operators, Control Statements.

Classes & Objects: Specifying classes, Methods and fields, creating objects. Passing objects to methods, returning objects, static fields & methods. Constructors, Garbage collection, Overloading methods & constructors this keyword

Unit-II:

Inheritances: Specifying sub class, types of inheritance, visibility control: public, private, protected, package. super keyword, Overriding methods, Dynamic method dispatch, Abstract methods and classes, final methods & classes,

Packages & Interfaces : Introduction to packages, naming conventions, package statement, creating packages, import statement, accessing package, use of CLASSPATH, adding class to package, hiding classes. Interface, implementing interfaces, multiple interfaces.

Multithreading: Creation threads, Extending Thread class, implements Runnable interface, stopping and blocking thread, Thread life cycle, thread priorities & Thread synchronization, using Thread methods.

Unit-III:

Exception Handling: Managing errors, types of errors, exceptions, syntax of exception handling code. try, catch, throw, throws and finally statements, multiple catch & nested try statements.

Java Input Output: Java I/O package, Byte/Character Stream, Buffered reader / writer, File reader / writer, File Sequential / Random. Reading numeric, character & strings data from keyboard.

Applet programming: Applet Vs. Application, Creating applets, life cycle, local & remote applets. <APPLET> tag & its attributes, adding applet to HTML file, Running applet.

Unit-IV:

Abstract Windows Toolkit (AWT): Components and Graphics, Containers, Frames and Panels, Layout Managers, Border layout, Flow layout, Grid layout, Card layout, AWT components. Event delegation Model, Event source and handler, Event categories, Listeners, Interfaces, Controls such as text box, radio buttons, checkboxes, lists, choice, command



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buttons, text area etc.

JDBC: Event Handling, Two Event Handling Mechanisms, The Delegation Event Model, Events, Event Sources, Event Listeners, Event Classes, The Mouse Event Class and others, JDBC: JDBCODBC bridge, the connectivity model, the driver manager, navigating the result set object contents, the JDBC exceptional classes, connecting to remote database.

Unit-V:

Networking with Java : Networking basics, Sockets, port., Internet addressing, java.net – networking classes and interfaces, Implementing TCP/IP based Server and Client

Servlets: Introduction Servlet API Overview, Writing and running Simple Servlet, Servlet Life cycle, Generic Servlet, HttpServlet, ServletConfig, ServletContext, Writing Servlet to handle Get and Post methods.

Reference:-

1. Horstman Cay, Cornell Gary, Core JavaTM2, Vol.1&2, 7th edition, Pearson Education.
2. Herbert Schildt, The Complete Reference, seventh edition, [TMH]
3. Programming with JAVA – A Primer by E. Balguruswamy (TMH)
4. Steven Holzner, JAVA 2 Programming Black Book, Wiley India.
5. Ivor Horton, Beginning Java 2, JDK 5 Ed, Wiley India.
6. Java 2 from scratch by Steven Haines the – PHI
7. Java database Programming – Maithew Siple – THM
8. Instant Java John A. Few, Stephen G. Rew (Sun Microsystems)
9. Experiments in JAVA - S.A. Relsel Shy – AWL



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PRACTICAL

BRANCH	SUBJECT TITLE	SUBJECT CODE
M.Sc(Computer Science)	PRACTICAL- PROGRAMMING IN JAVA	MCS- 531

List of Practical: Programming in Java

1. Program that demonstrate use of Arrays.
2. Program to demonstrate constructors.
3. Program to demonstrate method overloading.
4. Program that demonstrate static fields and static methods of class.
5. Program that demonstrate inheritance and its types
6. Program to demonstrate use of method overriding.
7. Program to demonstrate the use of abstract method and abstract class.
8. Program that demonstrate String operations (String class methods)
9. Program that demonstrate package creation and use in program.
10. Program to demonstrate interface.
11. Program to handle exceptions in program (system generated & user defined exceptions)
12. Program that demonstrate multithreading. (Creating thread using Thread class and implementing Runnable interface)
13. Program for Thread synchronization.
14. Program using Byte Stream & Character Stream classes.
15. Program for reading input from keyboard.
16. Program that demonstrate Applet programming.
17. Program that demonstrate 2D shapes on frames.
18. Write a program that demonstrate use of various controls and Layouts
19. Program that demonstrate text and fonts.
20. Program that demonstrate event handling for various types of events.
21. Program to demonstrate JDBC (Inserting, displaying & updating records)
22. Program to demonstrate socket programming. (Client & Server)
23. Program to demonstrate Servlets.



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Semester – III

Syllabus

BRANCH	SUBJECT TITLE	SUBJECT CODE
M.Sc (Computer Science)	Object Oriented Analysis and Design using UML	MCS- 532

Unit-I:

Introduction:

An overview - Object basics - Object state and properties, Behavior, Methods, Messages. Object Oriented system development life cycle. Benefits of OO Methodology. 1. Overview of Prominent OO Methodologies: a. The Rumbaugh OMT. b. The Booch methodology. c. Jacobson's OOSE methodologies. d. Unified Process. e. Introduction to UML. f. Important views & diagram to be modelled for system by UML.

Unit-II:

Unified Approach: Diagramming and Notational Techniques using the UML, UML Notation, {Analysis Diagramming Techniques.} == Introduction to all (ten) Diagram, {Design Diagramming Techniques}, Generalization Specialization. Aggregation and composition, Association, Cardinality, Navigability, Icons relationships and adornments.

Object-Oriented Systems Development Process:

Rational Unified Process, Four Major phases: Inception Elaboration, Construction, Transition, Requirements Engineering: Problem analysis, Understanding Stockholders need, Type of requirements, Use-case Model : Writing Requirements

Unit-III:

Analysis:

Behavioral Analysis, Domain Analysis or Business Object Analysis, Use-case Driven Object Oriented analysis : The UML approach., Develop use-case Model, Use- case Description, Documentation, Activity Diagram, Identify the classes., Introduction to different approaches for identifying classes, “Noun Phrase” approach OR , “Conman Class Pattern” approach Or , “CRC” approach Or, Usecase Driven Approach. Containment and Composition, Aggregation, Inheritance , SuCSypes and IS-A Hierarchies, Association and Link Relationships. Diagramming System Events.

Unit IV:

Design Phases:

Translating Analysis Concept into Design, Optimizing classes and Objects: The Multi-tiered Architecture View, ,Mapping System functions to objects., Object to Object Visibility, Collaboration Diagram, Sequential Diagram, Specification Class Diagram, Specifying Object Interfaces, Designing the Data Access layer, Design User Interface layer, Designing System Interfaces, Controls and Security.



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Unit V:

Design Refinement

GRASP: Designing objects with responsibilities — Creator — Information expert — Low Coupling — High Cohesion — Controller Design Patterns — creational — factory method — structural — Bridge — Adapter — behavioural — Strategy — observer —Applying GoF design patterns — Mapping design to code.

Persistent Object and Database Issues:

The Cood Data Management Domain, Object Persistence, Object-oriented Database Management System, Object- Oriented verses Relational Database, Mapping object to Relational Data structure.

Testing: Introduction to Testing Strategies, Impact of Object Orientation on Testing. Testing Business Process, Design Matrix, Discovering reusable pattern.

Reference

1. Object Oriented Analysis and Design with Applications, Grady Booch., Benjamin / Cummings , 1994.
2. Object –Oriented Modeling and Design. – J Rumbaugh , M Blaha , W . Premerlani
3. Principles of Object- Oriented Software Development , Anton Eliens , Addison Wesley.
4. Object Oriented System Development - Ali Bahrami . McGRAW-HILL International Edition.
5. Object-Oriented Software Engineering – Ivar Jacobson Pearson Education INC
6. Applying UML And Pattern - Craig Larman Pearson Education INC
7. UML Distilled - Martin flowler Pearson Education INC
8. The Unified Modeling Language User Guide – Grade Booch, James Rumbaugh , Ivar Jacobson. Pearson Education INC
9. The Unified Modeling Language Reference Guide – Grade Booch, James Rumbaugh , Ivar Jacobson. Pearson Education INC
10. Design Object- Oriented Software - Rebecea Wrifs- Brock. Brian Wilkerson, Lauren Wiener ,
11. Object Oriented Analysis and Design – Bennett , Simon McGraw Hill.
12. Designing Flexible Object Oriented System with UML – Charless Richter Techmedia
13. Instant UML – Muller – Apress LP
14. UML Instant – Thomas A Pendar – Wiley Publication
15. UML in Nutshell



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M.Sc.(Computer Science)

PRACTICAL

BRANCH	SUBJECT TITLE	SUBJECT CODE
M.Sc(Computer Science)	PRACTICAL- Object Oriented Analysis and Design using UML	MCS- 532

OOAD: At least 10 practical should be conducted on OOAD



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Semester – III

Syllabus

BRANCH	SUBJECT TITLE	SUBJECT CODE
M.Sc(Computer Science)	COMPUTER GRAPHICS	MCS- 533

Unit-I:

Introduction of computer Graphics and its applications, Overview of Graphics systems, Video display devices, Raster scan display, Raster scan systems, video controller, Raster scan display processor, Random scan display, random scan systems, color CRT monitor, Flat panel display, Interactive input devices, Logical classification of input devices, Keyboard, mouse, Trackball and spaceball, Joysticks, Image scanner, Light pens, Graphics software, Coordinates representations, Graphics functions.

Unit-II:

Point and Lines, Line Drawing Algorithms: Simple, DDA, Bresenham's Line Drawing algorithm, Circle and Ellipse drawing algorithm, Polygon drawing: Representation of polygon; Conventional methods for drawing polygons; Real time Scan Conversion and Run length encoding; Filled area primitives, character generation, Antialiasing.

Unit-III:

Basic transformation's, Translation, Rotation, Scaling, Matrix representation's & homogeneous coordinates, Composite transformation's, Reflection, Two dimensional viewing, Two dimensional clipping, Line, Polygon, Curve, Text. 3D-transformation, Projection, Viewing, Clipping,.

Unit-IV

Spline representation, Cubic spline, Bezier curve, Bezier surfaces, Beta spline, B- spline surfaces, B-spline curve, Hidden surfaces, Hidden lines, Z-buffer.

Unit-V

Fractal's geometry Fractal generation procedure, Classification of Fractal, Fractal dimension, Fractal construction methods. Color models, XYZ, RGB, YIQ, CMY & HSV, Shading algorithms, Shading model, Illumination model, Gouraud shading, Phong shading.

REFERENCES:-

1. Computer Graphics by M. Pauline Baker, Donald Hearn 2nd Edition PHI
2. Mathematical Element for Computer Graphics By. David F. Roger., J. Alan Adams, 2nd Edition Tata Mc GHill
3. Principles of Interactive Computer Graphics By. William. M. Newmann 2nd Edition Mc. GraHill
4. Procedural Element for Computer Graphics By. David F. Roger. Mc. Graw Hill.
5. Computer Graphics By A.P. Godse 2nd Edition TPPublication,
6. Computer Graphics By V.K. Pachghare, 2nd Edition Laxmi Publication
7. Multimedia by Gokul



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Semester – III

Syllabus

BRANCH	SUBJECT TITLE	SUBJECT CODE
M.Sc (Computer Science)	ELECTIVE- I (DIGITAL IMAGE PROCESSING)	MCS- 534

Unit-I:

Introduction to image processing, Two Dimensional Systems and Mathematical Preliminaries.

Unit-II:

Image Perception, Image Sampling and Quantization, Image Transforms, Image Representation by Stochastic Models.

Unit-III:

Image Enhancement, Image Filtering and Restoration.

Unit-IV

Digital Image Fundamentals: Brightness, Adaptation and Discrimination, Light and Electromagnetic Spectrum, Image Sampling and Quantization, Some Basic Relationships between Pixels Types of images..

UNIT-V

Image Reconstruction from Projections, Image Data Compression.

Reference:

1. Fundamentals of Digital Image Processing, A. K. Jain, Prentice Hall, (ISBN: 9780133361650) Oct 01, 1988
2. Digital Image Processing, 3rd Ed. Rafael C. Gonzalez, Richard E. Woods, Prentice Hall, ISBN 0-13-168728-x, 978-0-13-168728-8



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SCHEME

Semester – IV

No	Subject Code	Subject Title	Marks Allotted						
			Assignment Marks		Theory Marks		Practical Marks		Total Marks
			Max	Min	Max	Min	Max	Min	
1	MCS 541	ARTIFICIAL INTELLIGENCE	20	8	80	32	-	-	100
2	MCS 542 – (a) / MCS 542 – (b) / MCS 542 – (c)	INTERNET COMPUTING USING ASP.NET / Big Data Analytics / PHP & MySQL	20	8	80	32	-	-	100
3	MCS 543	DISSERTATION	-	-	-	-	250	125	250
4	MCS 544	PRACTICAL VII(BASED ON MCS 541 & MCS 542)	-	-	-	-	50	20	50
Total			40	16	160	64	300	145	500



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Semester – IV

Syllabus

BRANCH	SUBJECT TITLE	SUBJECT CODE
M.Sc(Computer Science)	Artificial Intelligence (A.I.)	MCS- 541

Unit-I:

General Issues and Overview of AI The AI problems, what is an AI technique, Characteristics of AI applications. Introduction to LISP programming: Syntax and numeric functions, Basic list manipulation functions, predicates and conditionals, input output and local variables, iteration and recursion, property lists and arrays.

Unit-II:

Use of Heuristics: Hill climbing, Best First Search A* Algorithm : Admissibility, AND/OR Graph- AO* Constraint Satisfaction : Cryptarithmic, Waltz Line Labeling.

Game Playing: Mimic Search, Alpha-Beta Pruning. **Knowledge Representation:** Predicate Logic, Well Formed Formulas, Quantifiers; Prenex Normal Form, Skolemization; unification, modus ponens; resolution refutation-various strategies.

Unit-III:

Rule Based Systems: Forward Reasoning: conflict resolution , backward reasoning: use of no backtrack structured knowledge representations : semantic net : slots inheritance frames-exceptions and defaults –attached predicates, conceptual dependency formalism.

Object Oriented Representations: AI Programming Languages: PROLOG , Syntax, Procedural and declarative meanings, prolog unification mechanism, anonymous variable, lists; use of fail, CUT, Not.

LISP: Basic Concepts, eval functions, functions and variables, scoping of LISP variables, iteration and recursion.

Unit-IV:

Handling Uncertainty: Probabilistic Reasoning , Bayes Net , Dempster Shafer Theory, use of Certainty Factors, Fuzzy Logic Nonmonotonic Reasoning, Dependency Directed Backtracking, Truth Maintenance Systems.

Learning: Concept of Learning, Learning Automation; The Genetic Algorithm, Learning by Induction, Neural Networks, Hopfield Networks, Perceptron-Learning Algorithm, Backpropagation Network Boltzmann Machine, Recurrent Networks. Planning: Components of Planning System , Plan Generation Algorithms, Forward State Propagation, Backward State Propagation , Non-Linear Planning Using Constraint Posting .



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Unit-V:

Expert Systems: Need & Justification for Expert Systems- Cognitive Problems, Expert System Architecture , Rule Based Systems, Non Production System, Knowledge Acquisition, Case Studies: Mycin, R1.

Natural Language Processing: Syntactic Analysis, Top Down and Bottom Up Parsing; Augmented Transition Networks, Semantic Analysis, Case Grammars.

References:

- | | |
|--|---|
| 1. Artificial Intelligence | - E. Rich & K. Knight, Tata MC-Graw Hill |
| 2. Introduction To AI And Expert Systems | - D.W . Paterson ., Paretic Hall Of India |
| 3. Introduction To Expert Systems | - Peter Jackson, Addison Wesley Pub. Company. |
| 4. A. I. and Engineering Approach | - R.J. Schalkoff. MC-Graw Hill Ed. |
| 5. Principles of AI | - N.J. Nilsson, Narrows Publishing House. |
| 6. Programming In Prolog | - Clocks & Melissa, Narrows Publishing House. |
| 7. Rule Based Expert System | - M. Sasikumar, S. Ramani, Narosa Pub. House |
| 8. Artificial Intelligence | - P.H. Winston 2 nd Edition, Addison-Wesley ,1984. |
| 9. Prolog From The Beginning | - H.Konigslerg & F.De .Bruyn, MC-Graw Hill Ed. |



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M.Sc.(Computer Science)

Semester – IV

Syllabus

BRANCH	SUBJECT TITLE	SUBJECT CODE
M.Sc(Computer Science)	Internet Computing with ASP.NET	MCS- 542(a)

Unit-I:

HTML Basics: Introduction to Internet, Applications, Web designing, web browser, web pages, home page, web site, web servers, www. Concepts of hypertext, hypermedia, versions of HTML, elements of HTML, syntax, sections of HTML, building & executing html documents, Various tags of HTML: Headings & Title, Text-level elements, Changing Colors font, size using FONT> Tag, Text alignment & paragraph Creating links with <A Href> tag, Inserting image using tag, Creating Table with <TABLE> tag, rowspan, colspan attributes. <FRAMESET> & <FRAME> tag, <FORM> tag, creating text boxes, buttons, checkboxes, radio buttons, hidden control, password, lists & dropdown list, textarea. Submitting a form, get & post method. ASP & HTML forms. Working with Cascading Style Sheet (CSS):

Unit-II:

ASP.NET Controls: Installing ASP.NET framework, overview of the ASP .net framework, overview of CLR, class library, overview of ASP.net control, understanding HTML controls, study of standard controls, validations controls, rich controls. Windows Forms: All about windows form, MDI form, creating windows applications, adding controls to forms, handling Events, and using various Tolls.

Unit-III:

ADO.NET: Overview of ADO.NET, from ADO to ADO.NET, ADO.NET architecture, Accessing data using data adapters and datasets, using command and data reader, binding data to data bind controls, displaying data in data grid.

Unit-IV:

XML in .NET: XML basics, attributes, fundamentals of XML classes: Document, text writer, text reader, XML validations, XML in ADO.NET, Data document

Unit-V:

Web Services: Introduction, State management, view state, session state, application state, service description language, building & consuming a web service. Web application development, Caching, Threading concepts, Creating threads in .NET, Managing threads, Thread Synchronization, features of .NET, role based security & code access security, permissions



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M.Sc.(Computer Science)

References:

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|------------------------------------|---|---------------------------------|
| 1. The Completer Reference ASP.NET | — | Mathew Macdonald (TMH) |
| 2. Professional ASP.NET | — | Wrox publication |
| 3. VB.NET Programming Black Book | — | Steven Holzner (Dreamtech pub.) |
| 4. Introduction to .NET framework | — | Wrox publication. |
| 5. ASP.NET Unleashed | — | bpb publication. |
| 6. Learn HTML in a weekend | — | Steven E. Callihan (TMH) |
| 7. Using HTML | — | Lee Anne Philips (PHI) |



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M.Sc.(Computer Science)

BRANCH	SUBJECT TITLE	SUBJECT CODE
M.Sc(Computer Science)	Big Data Analytics	MCS- 542(b)

Unit I

Introduction to Big Data: Introduction– distributed file system–Big Data and its importance, Four Vs, Drivers for Big data, Big data analytics, Big data applications. Algorithms using map reduce.

Unit II

Introduction to Hadoop: Hadoop Architecture, Big Data – Apache Hadoop & Hadoop EcoSystem, Moving Data in and out of Hadoop – Understanding inputs and outputs of Map Reduce- Data Serialization

Unit III

HDFS, HIVE AND HIVEQL, HBASE: HDFS-Overview, Installation and Shell, Java API; Hive Architecture and Installation, Comparison with Traditional Database, HiveQL Querying Data, Sorting And Aggregating, Map Reduce Scripts, Joins & Sub queries, HBase concepts, Advanced Usage, Schema Design, Advance Indexing, PIG, Zookeeper , how it helps in monitoring a cluster, HBase uses Zookeeper and how to Build Applications with Zookeeper.

Unit IV

SPARK: Introduction to Data Analysis with Spark, Downloading Spark and Getting Started, Programming with RDDs, Machine Learning with MLlib.

NOSQL: NoSQL databases, Why NoSQL?, Advantages of NoSQL, Use of NoSQL in Industry, SQL vs NoSQL, NewSQL.

Unit V

Data Analytics with R Machine Learning : Introduction, Supervised Learning, Unsupervised Learning, Collaborative Filtering. Big Data Analytics with Big R.

Suggested list of Practicals

1. Setting up a multi-node Apache Hadoop cluster from scratch
2. Performing file I/O using HDFS.
3. Implementing an end-to-end data pipeline with Hive
4. Creating User Defined Functions in Hive
5. Working with HBase Shell and loading data from Hive
6. Running a Map/ Reduce Job - Word Count
7. Using Eclipse to build Map/Reduce Applications
8. Deploying Map/Reduce Jobs on Cluster
9. Analyzing Stock Market Data using Pig/Latin
10. Working With Complex Data Types
11. Analyzing weather data using Hive
12. Working with Hbase Shell
13. Loading Data in HDFS, Hive & Hbase in Various formats



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M.Sc.(Computer Science)

BRANCH	SUBJECT TITLE	SUBJECT CODE
M.Sc(Computer Science)	PHP & MySQL	MCS- 542(c)

Unit I

BASICS OF PHP: Introduction to PHP, what does PHP Do?, Object Oriented Programming with PHP, language basics, installation of XAMPP/LAMP, syntax, comments, variables, constants and data types, expressions and operators, flow control statements, including html code in PHP, embedding PHP in web pages.

Unit II

FUNCTIONS & STRINGS: Defining a function, Calling a function, variable scope, function parameters, return values, predefined functions.

Strings: Creating & accessing string, searching and replacing strings, encoding and escaping, comparing strings, formatting strings, regular expression.

Unit III

Data & File Handling: PHP Forms: \$_GET, \$_POST, \$_REQUEST, \$_FILES, \$_SERVER, \$GLOBALS, \$_ENV, input/output controls, validation, Cookies and Sessions.

File Handling: File and directory, open, close, read, write, append, delete, uploading and downloading files. File exists, File Size, Rename. Reading and display all/selected files present in a directory.

Unit IV

MYSQL AN OVERVIEW: Introduction, phpMyAdmin, Entering queries, Creating and using a database, Creating and selecting a database, creating a table, loading data into a table, Retrieving information from a table, selecting all data, selecting particular rows, selecting particular columns, sorting, date, calculations, working with NULL values, pattern matching, counting rows, using more than one tables.

Unit V

MYSQL DATABASES IN PHP: Introduction, connecting to a MySQL database, querying the database, Retrieving and displaying the results, modifying data and deleting data through front end. Designing applications using PHP & MySQL.

Suggested list of Practicals

1. Create a simple HTML form and accept the user name and display the name through PHP echo statement.
2. Write a PHP script to demonstrate arithmetic operators, comparison operator, and logical operator.
3. Write PHP Script to input marks, generate result and display grade.
4. Write PHP Script for addition of two 2x2 matrices.
5. Write PHP script to obtain factorial of a number using function
6. Write PHP script to demonstrate string, date and math function.
7. Write PHP script to demonstrate
8. Create student registration form using text box, check box, radio button, select, submit button. And display user inserted value in new PHP page.
9. Write two different PHP script to demonstrate passing variables through a URL.
10. Write two different PHP script to demonstrate passing variables with sessions.
11. Write PHP script to demonstrate passing variables with cookies.
12. Write a program to keep track of how many times a visitor has loaded the page.
13. Write PHP script to demonstrate exceptional handling.



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14. Write a PHP script to connect MySQL server from your website.
15. Write a program to read customer information like cust_no, cust_name, Item_purchase, and mob_no, from customer table and display all these information in table format on output screen.
16. Write a program to edit name of customer to —Bobl with cust_no =1, and to delete record with cust_no=3.
17. Write a program to read employee information like emp_no, emp_name, designation and salary from EMP table and display all this information using table format.
18. Create a dynamic web site using PHP and MySQL.