

J. S. UNIVERSITY, SHIKOHABAD



M. Sc.
(Computer Science)

SCHEME
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[Effective from the session 2015-16]



J. S. UNIVERSITY, SHIKOHABAD

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

VISION

- To generate competent professionals to become part of the industry & research organizations at the national & international levels.
- To be in the frontier of computer science and engineering by creating the most conducive environment for quality academic and research oriented undergraduate and postgraduate education in computer science and engineering.
- To be renowned itself as a reputed organization in engineering education and research aimed towards betterment of society.

MISSION

- Creating the knowledge of fundamental principles and innovative technologies through research within the core areas of computer science and also in interdisciplinary topics.
- Empowering the youth in rural communities with computer education. Imparting moral and ethical values and interpersonal skills to the students.
- Provide exposure of latest tools and technologies in the area of engineering and technology.

PROGRAMME OUTCOMES

1. Get core competence in various subjects of Computer Science.
2. Recognize the organizational need and to engage themselves in continuing professional development.
3. Develops problem solving skills and is able to design and carry out innovative research projects.
4. Communicates effectively, comprehends knowledge, writes effective reports, designs documentation and makes effective presentations.
5. Realizes and promotes environmental sustainability through various eco-friendly measures that encourage judicious use of resources.
6. Postgraduate studies boost the self-directed career progress and outline the career paths. It improves the ability to tackle complex and challenging assessment tasks and helps in lifelong learning to be globally competent.
7. Takes up responsibilities in production, quality testing, designing and marketing which contribute to the growth of industry and thus increases employability.
8. Applies ethical principles and is committed to professional ethics, responsibilities in the field of research, is able to design, analyze, interpret data and find solutions for complex problems by applying the right tools. This study provides an excellent bridge between undergraduate study and Ph.D research.

PROGRAM SPECIFIC COUTCOME

1. Enrich the knowledge in the areas like Artificial Intelligence, Web Services, Cloud Computing, Paradigm of Programming language, Design and Analysis of Algorithms, Database Technologies Advanced Operating System, Mobile Technologies, Software Project Management and core computing subjects. Choose to study any one subject among recent trends in IT provided in the optional subjects.
2. Students understand all dimensions of the concepts of software application and projects.
3. Students understand the computer subjects with demonstration of all programming and theoretical concepts with the use of ICT.
4. Developed in-house applications in terms of projects.
5. Interact with IT experts & knowledge by IT visits.
6. Get industrial exposure through the 6 months Industrial Internship in IT industry.
7. To make them employable according to current demand of IT Industry and responsible citizen.
8. Aware them to publish their work in reputed journals.

STUDY AND EVALUATION SCHEME FOR

M. Sc. (Computer Science)

Previous Year

| S.No. | Subject Code | Name of Subject | Periods Per Week | | | | Evaluation Scheme | | | |
|----------------------------------|--------------|---|------------------|---|---|---|-------------------|----------|-------|----------|
| | | | L | T | P | D | Sessional | End Exam | Total | Duration |
| THEORY SUBJECT | | | | | | | | | | |
| 1 | MSCS-101 | Computer Organization | 3 | 1 | - | - | - | - | 100 | 3 |
| 2 | MSCS-102 | Programming with C++ | 3 | 1 | - | - | - | - | 100 | 3 |
| 3 | MSCS-103 | Relational Database Management System | 3 | 1 | - | - | - | - | 100 | 3 |
| 4 | MSCS-104 | Operating System | 3 | 1 | - | - | - | - | 100 | 3 |
| 5 | MSCS-105 | Data Communication and Networking | 3 | 1 | - | - | - | - | 100 | 3 |
| 6 | MSCS-106 | Software Engineering and Visual Basic | 3 | 1 | - | - | - | - | 100 | 3 |
| PRACTICA/DRAWING SUBJECTS | | | | | | | | | | |
| 7 | MSCS-102P | Programming with C++ Lab | - | - | 4 | - | - | - | 100 | 3 |
| 8 | MSCS-103P | Relational Database Management System Lab | - | - | 4 | - | - | - | 100 | 3 |
| 9 | MSCS-106P | Visual Basic Lab | - | - | 4 | - | - | - | 100 | 3 |
| Grand Total | | | | | | | | | 900 | |

STUDY AND EVALUATION SCHEME FOR

M. Sc. (Computer Science)**Final Year**

| S.No. | Subject Code | Name of Subject | Periods Per Week | | | | Evaluation Scheme | | | |
|----------------------------------|--------------|---|------------------|---|---|---|-------------------|----------|-------|----------|
| | | | L | T | P | D | Sessional | End Exam | Total | Duration |
| THEORY SUBJECT | | | | | | | | | | |
| 1 | MSCS-201 | Data and File Structure using C/C++ | 3 | 1 | - | - | - | - | 100 | 3 |
| 2 | MSCS-202 | Computer Graphics | 3 | 1 | - | - | - | - | 100 | 3 |
| 3 | MSCS-203 | JAVA | 3 | 1 | - | - | - | - | 100 | 3 |
| 4 | MSCS-204 | Discrete Mathematics | 3 | 1 | - | - | - | - | 100 | 3 |
| 5 | MSCS-205 | Web Application Development | 3 | 1 | - | - | - | - | 100 | 3 |
| 6 | MSCS-206 | Artificial Intelligence | 3 | 1 | - | - | - | - | 100 | 3 |
| PRACTICA/DRAWING SUBJECTS | | | | | | | | | | |
| 7 | MSCS-201P | Data and File Structure using C/C++ and Computer Graphics Lab | - | - | 4 | - | - | - | 100 | 3 |
| 8 | MSCS-203P | JAVA and Web Application Development Lab | - | - | 4 | - | - | - | 100 | 3 |
| 9 | MSCS-202P | Project | - | - | 4 | - | - | - | 100 | 3 |
| Grand Total | | | | | | | | | 900 | |

[MSCS-101] Computer Organization

COURSE OUTCOME:

- To understand the structure, function and characteristics of computer systems.
- To understand the design of the various functional units and components of computers.
- To identify the elements of modern instructions sets and their impact on processor design.
- To explain the function of each element of a memory hierarchy.
- To identify and compare different methods for computer I/O.

Unit-1

Digital computer: Data Type, Number System, Complements, Fixed-Point Representation, Floating Point representation, Gray Code, BCD code, ASCII Codes, Unicode, Error Detection codes, Logic gate, Boolean Algebra, Map Simplification, Combinational circuit, Sequential circuit, Decoders, Multiplexers, Flip Flops, Registers, Counters.

Unit II

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory, and Memory Management Hardware.

Unit III

Input- Output organization: Input-Output Interface, Asynchronous Data Transfer, Mode of Transfer, Priority Interrupt, Direct Memory Access (DMA), Input-Output Processor (IOP), Serial Communicati

Unit IV

Central Processing Unit: Stack Organization, Instruction formats, Addressing Modes, Data Transfer and manipulation, program Control, Reduced Instruction Set Computer (RISC), CISC Characteristics, RISC Characteristics. Control Design-hardwired Control, Micro-Programmed.

Unit V

Microprocessor Architecture: Introduction, Intel 8085- ALU, Timing and Control Unit, Register, Data and Address Bus, Pin Configuration, Intel 8085 Instruction, Opcode and Operand Instruction Word Size , Instruction Cycle. Instruction Set of Intel 8085: Introduction, Instruction and Data Formats, Addressing Modes, Status Flags, Symbols and Abbreviations, Intel 8085 Instruction.

Reference:

1. Computer System Architecture, By M. Morris Mano (Pearson, Prentice Hall)
2. Fundamentals of Microprocessor and Microcomputes By B.Ram (Danpat Rai Publications)
3. Microprocessor Architecture, Programming, and Application With the 8085 By Ramesh Gaonkar .

[MSCS-102] Programming with C++

COURSE OUTCOME:

1. Describe OOPs concepts
2. Use functions and pointers in your C++ program
3. Understand tokens, expressions, and control structures
4. Explain arrays and strings and create programs using them
5. Describe and use constructors and destructors
6. Understand and employ file management
7. Demonstrate how to control errors with exception handling

Unit I

Object Oriented System: Difference Between Procedural and Object Oriented Languages, Object Oriented Paradigm, Inheritance, Polymorphism, Abstraction, Encapsulation, Benefits and Application of OOPS. **Introduction to C++:** Character Set, Token, Constants, Variables and Data Types, Enumeration Types, Operators, Expressions, Operator Precedence and Associativity, Integer Overflow and Underflow, Input, Output, Conditional Statements, Scope of Variables, Type Conversion.

Unit II

Iteration : while, do while, for, Break, Continue, goto; **Pointers:** Introduction, implementation advantage and disadvantage. **Functions** - Standard and User-Defined Function, Recursive Function, Passing By Value And Reference, Function Overloading Pointer and Function: Function Returning Pointer, Passing pointer as argument, Reference and Functions. Structures and Pointers.

Unit III

Array: introduction, advantage, One, Two and Multidimensional, Passing Array to a Function, **Array and Pointers :** Pointer to One and Two Dimensional Arrays, Array of Pointers. Dynamic Arrays, String Processing. **Class:** Introduction to Class and Object, Declaring Members and Methods in a class, declaring objects.

Unit IV

Functions and objects: Calling member functions, Passing objects as arguments, Functions Returning Objects. Inline Function, Friend Functions and Its Usage, Abstract Class, Function Overriding. **Constructor and Destructor-** Needs and Its Usage, Types of Constructors, Destructor, Pointer to Objects, Pointers to Members, Dynamic Class and Objects, Static Data Members and Methods. **Inheritance** - Need of Inheritance, Types of Inheritance and its implementation.

Unit V

Operator Overloading: Need and Rules of Operator Overloading, Overloading Through Member Function and Friend Function. **Type Conversion-** Basic to Class, Class to Basic, One Class to Another Class. **Compile Time and Run Time Polymorphism-** Virtual Function and virtual class. String Class, Stream Classes in C++, Manipulators, Templates and File Handling,

References:

1. Object Oriented Programming With C++ By E. Balagurusamy (Tata Mcgraw Hill)
2. C++ The Complete Reference By Herbert Schildt (Tata Mcgraw Hill)
3. Object Oriented Programming With C++ By Schaum Series (Tata Mcgraw Hill)

[MSCS-103] Relational Database Management System

COURSE OUTCOME:

1. Understand the basic principles of database management systems.
2. Draw Entity-Relationship diagrams to represent simple database application scenarios
3. write SQL queries for a given context in relational database.
4. Discuss normalization techniques with simple examples. Describe transaction processing and concurrency control concepts.

Unit I

Introduction to DBMS: Components, Structure, Different Views of Data, Advantage, Data Models: Hierarchical, Network, Relational, Object Relational Models, Codd's Rules. **E-R Model :** Entities, Attributes, Associations, Relationship, Keys, E-R Diagram. **Normalization :** 1NF, 2NF, 3NF, 4NF, BCNF.

Unit II

Relational Database: Structure of Relational Database, **Modification of a Database:** Deletion, Insertion, Update, Selection, View, **Relational Algebra.** Set Theoretical Operations : Selection, Projection, Join Division, Cartesian Product, Referential Integrity. **Relational Calculus:** Tuple Relational Calculus, Domain Relational Calculus. **File Organization:** Heap, Serial, Sequential, Index Sequential, Hash-Indexing, B-Tree File Organization.

Unit III

Introduction to SQL: DDL, DML, DCL, Data Types, Table: Constraint, Domain, Entity, Referential Integrity, Create, Alter, Drop Table, Commands: Insert, Update, Delete With Where, Queries and SQL Functions, Sequence, View, Index, Granting Privilege, Report Writing.

Unit IV

Introduction to PL/SQL: Advantages, Character Set, Data Types, Control Structure, Transaction, Cursor, Locks, Error Handling, Procedure and Function, Triggers. **Recovery:** Reliability, Transactions, Reflecting Update to the Database and Recovery, Buffer Management, Virtual Memory and Recovery, Disaster Recovery.

Unit V

Concurrency Management: Serializability, Concurrency Control, Locking Scheme. Dead Lock and Its Resolution, Atomicity, Concurrency and Recovery. **Database Security Integrity and Control:** Security and Integrity Threats, Defence Mechanism.

References:

1. Database System Concepts By Korth, Silberschatz, Sudarshan (Mcgraw Hill)
2. An Introduction to Database Systems By Bipin C. Desai (Galgotia Publication.)
3. SQL, PL/SQL Programming By Ivan Bayross (BPB)
4. Commercial Application Development Using Oracle Developer 2000 By Ivan Bayross (BPB)

[MSCS-104] Operating System

COURSE OUTCOME:

1. After Explain the aim of operating system
2. Learn the overview of computer system hardware
3. Learn about handheld devices and real-time systems
4. Learn the operating system functions
5. Learn about symmetric and asymmetric multiprocessing
6. Learn between client-server and peer-to-peer models of distributed systems

Unit I

Introduction, **Operating System Structure** : CPU Management, File Management, Memory Management, I/O Management, **Types of Operating System** : Simple Batch Operating System, Multiprogramming Batch Mode Operating System, Time-Sharing System, Parallel System, Distributed System, Real Time System, **Network System, Distributed System.**

Unit II

Process : Process Concept, Process Control Block (PCB), Process States and Relationship, Process Switch, Threads. **Process Communication & Scheduling**: CPU – I/O Burst Cycle, CPU Scheduler, Pre-Emptive Scheduling, Scheduling Criteria, CPU Utilization, Throughput, Turnaround Time Waiting Time, Response Time, **Scheduling Algorithm** : FCFS(First Come First Serve), SJF(Shortest Job First), Priority Scheduling, RR(Round Robin) Scheduling, MLQ(Multi Level Queue) Scheduling, MLQ With Feedback.

Unit III

Memory Management: Swapping, Paging, Structure of the Page Table, Segmentation. **Virtual Memory Management** : Demand Paging, **Page Replacement** : Basic Page Replacement, FIFO (First In First Out), LRU (Least Recently Used), Optimal. **File System** : File Concept, Access Method, Directory Structure, Protection.

Unit IV

Process Co-Ordination : Synchronization, Critical Section Problem, Semaphores, Readers and Writers Problem, **Deadlocks** : Characterization, Deadlock and Starvation, Deadlock Prevention, Avoidance, Banker's Algorithm, Recovery from Deadlock.

Unit V

Linux/ Unix: Introduction, File System, Inode and Block Storage, File and Directory Structure and Permissions, File Related Commands, Shell and Kernel, Process- Init, Getty and Login Process, Killing, Changing Priority. Backup and restore files, installing and removing packages with yum rpm command, VI Editor. System administration: Managing user accounts-adding & deleting users, changing permissions and ownerships. **Shell Script**: Variables, Shell Programming- Decision Making, Loop Structure, Input and Output.

References:

1. Operating System Principals By Abraham Silberschatz, Peter Baer Galvin (John Wiley And Sons Inc.)
2. Operating System Concepts And Design By Milan Milen Kovic (Tata Mcgraw Hill)
3. Teach Yourself UNIX By Kevin Reichard, Eric F Johnson (BPB)
4. Using UNIX By Philiplaplane (Jaico Publishing House)
5. Unix Concept By Yashwant Kanetkar (BPB Publication)

[MSCS-105] Data Communication and Networking

COURSE OUTCOME:

1. Interpret the components, tools and techniques of communication systems
2. Illustrate the TCP/IP and OSI Reference model and identify their differences in implementation within and across enterprises.
3. Explain how information can be sent via communication interfaces and links.
4. Determine the various modulation and error detection and correction techniques and their application in communication systems.

Unit I

Data Communication, Networks, Protocol and Standards, Topology, **Transmission Mode** : Simplex, Half Duplex, Full Duplex, LAN, MAN, WAN, the OSI Model, TCP/IP Protocol, Analog and Digital Transmission, **Transmission Impairment**: Attenuation, Distortions, Noise-Performance-Throughput, Propagation Speed, Propagation Time.

Unit II

Transmission of Digital Data: Asynchronous and Synchronous Transmission, Switching- Circuit Switching, Packet Switching, Message Switching. **Transmission Media**: Guided, Unguided. **Encoding and Modulating**: Digital to Digital Conversion, Analog to Digital, Digital to Analog, Analog To Analog.

Unit III

Data Link Control: Line Discipline-Enquiry Acknowledge, Poll/Select, **Flow Control** : Stop And Wait, Sliding Window, **Error Control** : Automatic Repeat Request (ARQ), Stop and Wait ARQ, Sliding Window ARQ. **Medium Access Control** : IEEE 802.3, IEEE 802.4, IEEE 802.5, FDDI (Fiber Distributed Data Interface), **Bridges** : Simple, Multiport, Transparent, Spanning Tree Algorithm, Source Routing.

Unit IV

Routers: Routing Concepts, Routing Algorithm, Distance Vector Routing, Link State Routing, Flooding, Dijkstra Algorithm. Congestion Control, Congestion Avoidance, Discarding, Leaky Bucket Algorithm, **Firewall**: Benefit and Type of Firewall. **Internet** : Overview of TCP/IP, Network Layer – IP Addressing, Subnetting, Masking, IPV6 (Internet Working Protocol Version 6).

Unit V

Transport Layer : End to End Delivery Addressing, Reliable Delivery, Flow Control, Multiplexing, **Connection** : Establishment, Termination, **Network Security** : Privacy, Authentication, Integrity, Non-Repudiation. **Cellular Telephony**: Frequency Reuse Principal, Transmission, Receiving, Handoff, Roaming, First Generation, Second Generation, Third Generation.

References:

1. Data Communication and Networking By Forozan (Tata McGraw Hill)
2. Data Communication And Computer Networks By Dr. Madhulika Jain, Satish Jain (BPB)
3. Network Essentials By James Chellis, Charles Perkins,Matthew Strebe (BPB)

[MSCS-106] Software Engineering and Visual Basic

COURSE OUTCOME:

1. Design, create, build, and debug Visual Basic applications.
2. Explore Visual Basic's Integrated Development Environment (IDE).
3. Implement syntax rules in Visual Basic programs.
4. Explain variables and data types used in program development.
5. Apply arithmetic operations for displaying numeric output.
6. Write and apply decision structures for determining different operations.
7. Write and apply loop structures to perform repetitive tasks.
8. Write and apply procedures, sub-procedures, and functions to create manageable code.
9. Create one and two dimensional arrays for sorting, calculating, and displaying of data

Unit I

Software : Software Characteristics, Software Process, Process Characteristics, **Software Process Model** : Linear Sequential Model, Prototyping Model, Spiral Model, Software Quality, McCall's Quality Factors, **Software Requirement Analysis and Specification (SRS)** : Need Characteristics and Components. **Planning a Software Project**: COCOMO Model, Project Monitoring Plan and Risk Management.

Unit II

Design Principle : Abstraction, Modularity, Cohesion and Coupling, **Software Management** : Size Oriented Matrices, Function Oriented Matrices. **Testing** : Testing Fundamental, Functional Testing (Black Box), Structural Testing (White Box), Alpha And Beta Testing, **Testing Process** : Comparison of Different Testing, Level of Testing. **SCM** : Need for SCM, **Version control** : Introduction to SCM process – Software configuration items.

Unit III

Visual Basic: Integrated Development Environment of Visual Basic, Event Driven Programming, Controls and Events, Data Types, Variables, Constants, Control Flow Statements, Loop Statements Exit Statements, Arrays, Controls Array, Collections, procedures, Function, Recursive Functions, Working With Forms, **Controls**: Textbox, List Box, Combo Box, Options Button, Check Box, Timer, Scroll Bar, Slider, Progress Bar, Tool Bar, Status Bar.

Unit IV

Designing menus: Menu Bar, ContextMenu, access & shortcut keys; Common Dialogs Control: Open, Save, Print, Color , Font, Help, MsgBox & Inputbox. Multiple File Selection, Tree and List View Controls, Drawing: Graphics Controls, Co-ordinate Systems, Graphics Methods. Manipulating Color and Pixels with VB, Modules, Testing And Debugging Techniques.

Unit V

Database programming: Data controls, Data Aware Controls, Data Manager, **DAO (Direct Access Objects)**: Methods and Connectivity, ADO (ActiveX Data Objects), Connectivity with Oracle, Advantages of ADO over DAO, ODBC, Reports Writing: Data Report, Crystal Reports.

Reference:

1. Mastering Visual Basic 6 By Evangelos Petroustos (BPB)
2. Visual Basic 6 programming- Black Book By Steven Holzner (Dream Tech Press)
3. Beginners Guide to Visual Basic 6 By Reeta Sahoo and G.B. Sahoo (Khana Publication House)
4. Software Engineering: A Practitioner's Approach by Roger S. Pressman, McGraw Hill.

[MSCS-201] Data and File Structure using C/C++

COURSE OUTCOME:

1. Understand the concept of Dynamic memory management, data types, algorithms, Big O notation.
2. Understand basic data structures such as arrays, linked lists, stacks and queues.
3. Describe the hash function and concepts of collision and its resolution methods
4. Solve problem involving graphs, trees and heaps
5. Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data

Unit I

Algorithm: Efficiency & Analysis Algorithm: Time and Space complexity of Algorithm. **Abstract Data Type:** **Linked List-** Linear, Circular, Two Way List, Basic Operation on Linked Lists, Application of Linked List.

Unit II

Stack : primitive operations, stack Application- Infix, postfix, prefix and Recursion Array and Linked Representation of Stack. **Queue:** Primitive operation, Circular Queue, Priority Queue, D-queue, Array and Linked Representation of Queue.

Unit III

Searching : Linear Search, Binary Search; **Sorting:** Insertion Sort, Selection Sort, Quick Sort, Bubble Sort, Heap Sort, Shell Sort, Merge sort, Radix Sort, Comparison of sorting Methods.

Unit IV

Trees : Basic terminology, **Binary Tree :** Representation as Array and link List, Basic operation, **Tree Traversal :** Inorder, Preorder, Postorder, Application of Binary Tree. B-tree, Height Balance Tree(AVL Tree).

Unit V

Graph : Basic Terminology, Directed, Undirected, Weighted, Representation of Graphs, **Graph Traversal :** Depth First Traversal, Breadth First Search. **Files:** Definition and Concept, **File Organization :** Sequential, Relative, Index sequential and Multi key File Organization.

References:

1. Expert Data Structure with 'C' By R.B Patel (Khana Book Publishing Co.(P))
2. Data structure By Lipschutz (Tata McGraw Hill)
3. Data Structure By Yashvant Kanitkar (BPB)
4. An Introduction to Data Structures with Applications By Jean-Paul Tremblay, Paul G.Sarerson (Tata McGraw Hill)
5. Data Structure Using C and C++ By Yedidyah Langsam, Moshe J.Augenstein, Arora M. Tenenbaum (Prentice-Hall India)

[MSCS-202] Computer Graphics

COURSE OUTCOME:

1. Knowledge and understanding –

- Have a knowledge and understanding of the structure of an interactive computer graphics system, and the separation of system components.
- Have a knowledge and understanding of geometrical transformations and 3D viewing.
- Have a knowledge and understanding of techniques for representing 3D geometrical objects.
- Have a knowledge and understanding of interaction techniques.

2. Cognitive skills (thinking and analysis).

- Be able to create interactive graphics applications.

3. Communication skills (personal and academic).

- Use C++ builds functions or equivalent graphics tools (Java, Pascal) to perform item (3), above.

4. Practical and subject specific skills (Transferable Skills).

- Perform simple 2D graphics with lines, curves and can implement algorithms to rasterizing simple shapes, fill and clip polygons and have a basic grasp of anti-aliasing techniques.

Unit I

Introduction : Interactive graphics, Passive graphics, advantage of interactive graphics, classification of application, hardware and software requirement of computer graphics, Input and Output Devices of Computer Graphics, Working Characteristics of CRT, Raster Scan Display, Random Scan Display, Frame Buffer and Other Display Devices

Unit II

Scan Conversion : Point, Line, Circle, Ellipse, Representation of Various Line Drawing Algorithm, Circle Drawing Algorithm, Ellipses and Polygon Drawing Algorithm, Implementation of Algorithm using C++.

Unit III

2D Transformation : Translation, Rotation, Scaling, Homogenous Co-ordinates and Matrix Representation of 2D Transformation, Composite Transformation, **Clipping :** Method of Line Clipping, Polygon Clipping, and Exterior Clipping, **Curves :** Bezier and B-Spline Curve.

Unit IV

3D Graphics : Matrix Representation of 3D transformations, Translation, Rotation, Scaling, Composite Transformation, **Projection :** Perspective and Parallel Projection, **Visible Surface Detection Methods :** Back-face Deletion, Depth Buffer method, Scan-Line method, Depth Sorting method, Area subdivision method.

Unit V

Shading Modelling : Shading Model for Polygons, Surface details, Shadows, Transparency, **Graphics Standards :** GKS, PHIGS and requirements of Graphics software Standards, Color Models (RGB, CMY, HSV). **Solid Modeling :** Regularized Boolean set Operation, Primitive Instancing, Boundary Representation.

Reference:

1. Computer Graphics By Hearn and Baker (Prentice Hall India)
2. Introduction to Computer Graphics By Krihsnamurthy N (Tata McGraw Hill)
3. Theory and Problems of Computer Graphics (Schaum's Outline) By Zhigang X. and Plastock Ra. (Tata McGraw Hill)

[MSCS-203] JAVA

COURSE OUTCOME:

1. Use the syntax and semantics of java programming language and basic concepts of OOP.
2. Develop reusable programs using the concepts of inheritance, polymorphism, interfaces and packages.
3. Apply the concepts of Multithreading and Exception handling to develop efficient and error free codes.
4. Design event driven GUI and web related applications which mimic the real word scenarios.

Unit I

Java Basics : History, Characteristics, JAVA Virtual machine, Data Types, Token: Variables and its scope, Operators, Control Statements. Arrays; Classes: Class Fundamental, Methods, Constructors, this keyword, Garbage collection, finalize method. Inheritance: Method Overriding, Abstract class, Using final with inheritance.

Unit II

Packages and Interfaces, Exception Handling, Multithreading programming, Arrays, String Handling, String Buffer, Utility Classes, Vector, Stack, Wrapper Class. Applet : Building Applet Code, Applet Life Cycle, Adding Applet to HTML file, Passing parameter to Applet, Getting input from user.

Unit III

AWT : AWT Classes, Working With Frame Windows, Working With Graphics, Working With Colour, Adding And Removing Controls, Responding To Controls, Labels, Buttons, Checkbox, Checkbox Group, Choice Control, Lists, Scroll Bars, Text Field, Text Area. Menus, Dialog Box Handling Events. **Swings** : Icons and Labels, Text Field, Buttons, Combo box.

Unit IV

JDBC : class Methods, JDBC Components, Driver, Connecting to Database, Processing Results. Limitations of OOP; Servlet fundamentals : architecture, life cycle of a Servlet, initialization, Servlet and HTML, retrieving data in Servlet, GET and POST methods; Basics of networking using Java.

Unit V

Java Beans: Beans Architecture; **Problem in Modularization of cross cutting concerns**: scattering and Tangling, Introduction to Aspect-Oriented Programming(AOP), Separation of cross cutting concerns, Concept of Aspect, Introduction of AspectJ, Advantages of AOP Methodology.

References:

1. The Complete reference Java 2 By Patrick Naughton, Herbert Schildt (Tata McGraw Hill)
2. Programming in JAVA By E. Balagurusamy (TMH)
3. JAVA 2 programming Black Book By Steven Holzner et al. (Dreamtech Press)
4. AspectJ in Action By Ramnivas Laddad (Manning) (Willey DreamTech India New Delhi)

[MSCS-204] Discrete Mathematics

COUSRE OUTCOME:

1. Write an argument using logical notation and determine if the argument is or is not valid.
2. Demonstrate the ability to write and evaluate a proof or outline the basic structure of and give examples of each proof technique described.
3. Understand the basic principles of sets and operations in sets.
4. Prove basic set equalities.
5. Apply counting principles to determine probabilities.

Unit I

Set Theory: Sets and Elements, Universal Set, Empty Sets and Sub Set, Venn Diagrams, Set Operation, Algebra of Sets and Duality, Finite and Infinite Sets and Counting Principle, Classes of Sets, Power Sets, Partition, Mathematical Induction, Multi Sets, Logic and Propositional Calculus- Propositions and Compound Propositions, Basic logic operation, Truth Tables, Tautologies and Contradictions, Logical Equivalence, Algebra of Propositions, Logical Implication, Normal Forms.

Unit II

Relations: Product Set, Relation, Pictorial Representation of Relations, Matrix Representations, Type of Relations. Closure Properties, Equivalence Relations, **Functions and Algorithm** : Function, Mapping, Recursively Defined Function, Cardinality, Algorithm and Functions, Complexity of Algorithms.

Unit III

Order Sets: Properties, Hasse Diagram, Consistent Enumeration, Supremum and Infimum, Isomorphic Order Sets, Well Order Sets. Boolean Algebra- Basic Definition, Duality, Basic Theorems, Sum of Products Form, Logic Gates and Circuits, Karnaugh Map.

Unit IV

Counting: Basic Counting Principle, Factorial Notations, Binomial Coefficients Pascals's Triangle, Binomial Theorem, Permutations, Combinations, Pigeonhole Principle, Ordered and Unordered Partitions.

Unit V

Graph: Directed and Undirected graph, multigraph, Sub Graph , Isomorphic & Homomorphic Graph Hamilton Graphs, Complete, Regular and Bipartite Graphs, Tree Graphs. Basic Definitions, Sequential Representation of Directed Graph, Digraph and Relations, Adjacency Matrix, Warshall's Algorithm. Linked Representation of Directed Graph, Depth First Search(DFS) and Breath First Search(BFS), Binary Tree , Rooted Tree , Spanning Tree , Kruskal's and Prims Algorithms.

References:

1. Discrete Mathematics, Schaum's Series By Seymour LipSchutz, Marc Lipson, (Tata McGraw Hill)
2. Discrete Mathematics By Vinay Kumar (BPB)
3. Discrete Mathematical Structure By Dr. K.C.Jain, Dr. M.L. Rawat (College Book Centre)

[MSCS-205] Web Application Development

COURSE OUTCOME:

1. Structure and implement HTML/CSS.
2. Apply intermediate and advanced web development practices.
3. Implement basic JavaScript.
4. Create visualizations in accordance with UI/UX theories.
5. Develop a fully functioning website and deploy on a web server.
6. Find and use code packages based on their documentation to produce working results in a project.

Unit I

Internet Basics: Evolution of Internet, Basic internet terms (Client, Server, MODEM, Web site, Search engine, Browser, URL, ISP, Web server, Download & Upload, Online & Offline etc), Internet applications (Remote login, VoIP, Video Conferencing, Audio-Video streaming, Chatting etc).FTP and its Usages; Types of wireless communication (Mobile, WiFi, WiMAX, Bluetooth, Infrared), Anatomy of an e-mail Message, basic of sending and receiving, E-mail Protocol;

Unit II

Introduction to World Wide Web: Working of Web Browsers, Its functions, category, Hyper Text Transfer Protocol (HTTP); Component of Web Publishing, Domain Name Registration, Space on Host Server for Web Site, HTML: Designed Tools, HTML Editors, Issue in Web Site Creations and Maintenance, Elements of HTML & Syntax, Building HTML Documents, Backgrounds, Formatting tags, Images, Hyperlinks, div tag, List Type and its Tags, Table Layout, , Use of Frames and Forms in Web Pages. CSS Style Sheets, Forms, Tables.

Unit III

CSS: Elements of Style Sheets, Using Embedded Style Sheets and Linked Style Sheets, Inline Style Sheets, using Classes, Style Sheet Precedence, Div and Span. Java Script: Working with Variables, Operators, Control Structures, Built-in functions. Outputting to the browser, images, rollovers, handling events. Uses of Client side; Java Script and Server Side java script; **VB Script** : Working with Variables, Operators, Control Structures, Built-in Functions.

Unit IV

Basics of ASP.NET: Introducing ASP .NET, Creating ASP .NET applications, Web forms, Web controls, server controls, client controls, working with events, Rich web controls, Custom web controls, Validation controls client / server side; Calendar Control, Ad Rotator Control; Debugging ASP .NET pages. Advanced ASP .NET: ASP .NET configuration, State Management: Query String, Session, Cache, Cookies.

Unit V

Architecture Of ADO.NET, Create Connection Using ADO.NET Object Model, Connection Class, Command Class, Data adapter Class, Dataset Class. Display Data on Data Bound Controls and Data Grid. Database Accessing on Web Applications: Data Binding Concept With Web, Creating Data Grid, Web Services: Introduction, Remote Method Call Using XML, SOAP, Web Service Description Language, Building & Consuming a Web Service, Web Application Deployment.

References :

1. Web Enabled Commercial Application Development Using HTML, DHTML , Java Script, Perl CGI By Ivan Bayross (BPB)
2. Internet and Web Page Designing By V.K Jain (BPB)
3. ASP.NET 2.0 Black Book By Rudraksh Batra, Charul Shukla (Dream Tech Press)
4. ASP. NET Bible By Mridula Parihar and et al. (Hungry Minds, New York)

[MSCS-206] Artificial Intelligence

COURSE OUTCOME:

1. Demonstrate fundamental understanding of the history of artificial intelligence (AI) and its foundations.
2. Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning.
3. Demonstrate awareness and a fundamental understanding of various applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models.
4. Demonstrate proficiency developing applications in an 'AI language', expert system shell, or data mining tool.
5. Demonstrate proficiency in applying scientific method to models of machine learning.
6. Demonstrate an ability to share in discussions of AI, its current scope and limitations, and societal implications.

Unit I

Overview of Artificial intelligence: Defining the problem as a state and space search, Production system, Control Strategies, Knowledge Representation: Using Predicate Logic, computable Function and Predicates, Resolution.

Unit II

Knowledge : Procedure V/S Declarative Knowledge, Matching, Control Knowledge, Probability and Bayes Theorem, Certainty factors, and Rule based System, Frames, Frames, Scripts, and Semantic Nets.

Unit III

Search and control strategies : Preliminary concept, Uniform and Blind search, breadth first search, depth first Search, A, A*, AO*, Performance Comparison of various search technique.

Unit IV

Introduction to PROLOG programming : Syntax for Predicate calculus programming. Abstract Data Types (ADT) in PROLOG. Meta-predicates, Types and Unification, Meta Interpreters, Semantic Nets and Frames in PROLOG.

Unit V

Expert System : Introduction, Features Applications Expert System Shells, Rule Based System Architecture, Non-Production System Architecture, Frame Architecture, Decision Tree Architecture, Black Board System Architecture, Knowledge System Building Tools.

References:

1. Artificial Intelligence By Rich And Knight (Tata McGraw Hill)
2. A Stubble Field Artificial Intelligence By George F. Luger William (The Benjamin/ Cummings Publishing Company, Inc.)
3. Introduction to Artificial Intelligence and Expert Systems By Patterson (Prentice-Hall India)

[MSCS-202P] PROJECT

Practical Training and Project Work:

1. Project Work may be done individually or in groups in case of bigger projects. However if project is done in group each student must be given a responsibility for a distinct module and care should be taken to monitor the individual student.
2. Project Work can be carried out in the college or outside with prior permission of college.
3. The Student must submit a synopsis of the project report to the college for approval. The Project Guide can accept the project or suggest modification for resubmission. Only on acceptance of draft project report the student should make the final copies.

Submission Copy:

The Student should submit spiral bound copy of the project report. **Format of the Project:**

- (a) **Paper:** The Report shall be typed on White Paper of A4 size.
- (b) **Final Submission:** The Report to be submitted must be original.
- (c) **Typing: Font:-** Times New Roman **Heading:-** 16 pt., **Bold Subheading:-** 14 pt, **Bold Content:-** 12 pt. **Line Spacing:-** 1.5 line. **Typing Side :-** One Side **Font Color:-** Black.
- (d) **Margins:** The typing must be done in the following margin: **Left : 0.75” Right: 0.75” Top: 1” Bottom: 1” Left Gutter: 0.5”**
- (e) **Binding:** The report shall be Spiral Bound.
- (f) **Title Cover:** The Title cover should contain the following details: **Top:** Project Title in block capitals of 16pt. **Centre:** Name of project developer’s and Guide name. **Bottom:** Name of the university, Year of submission all in block capitals of 14pt letters on separate lines with proper spacing and centering.
- (g) **Blank sheets:** At the beginning and end of the report, two white blank papers should be provided, one for the Purpose of Binding and other to be left blank.

(h) Content:

- I). Acknowledgement
- II). Institute/College/Organization certificate where the project is being developed.
- III). Table of contents
- IV). A brief overview of project
- V). Profiles of problem assigned
- VI). Study of Existing System
- VII). System Requirement
- VIII). Project plan
 - o Team Structure
 - o Development Schedule
 - o Programming language and Development Tools
- IX). Requirement Specification
- X). Design
 - o Detailed DFD’s and Structure Diagram
 - o Data structure, Database and File Specification
- XI). Project Legacy
 - o Current Status of project
 - o Remaining Areas of concern
 - o Technical and Managerial Lessons Learnt
 - o Future Recommendations
- XII). Nomenclature and Abbreviations.
- XIII). Bibliography
- XIV). Source Code.