Sandip Foundation, Mumbai

Collaboration with

Karnataka State Open University, Mysore

COURSE STRUCTURE
&
SYLLABUS

M. Sc. COMPUTER SCIENCE

(SEMESTER SCHEME)

Course Structure for M. Sc in Computer Science

I SEMESTER

Course code	Name of the Subject	Credits	Theory		IA		Total
			Max Marks	Min. Marks	Max. Marks	Min. Marks	
MSCS-501	Discrete Mathematics	04	75	30	25	10	100
MSCS-502	Introduction to Java and Object Oriented Programming	04	75	30	25	10	100
MSCS-503	Computer Architecture	04	75	30	25	10	100
MSCS-504	Data Structure	04	75	30	25	10	100
MSCS-505	Practical – 1: OOP Using Java	02	75	30	25	10	100
MSCS-506	Practical – 2: Data Structures Using C	02	75	30	25	10	100
	Total	**20**	**450**		**150**		**600**

II SEMESTER

Course code	Name of the Subject	Credits	Theory		IA		Total
			Max Marks	Min. Marks	Max. Marks	Min. Marks	
MSCS-507	Analysis & Design of Algorithms	04	75	30	25	10	100
MSCS-508	DBMS	04	75	30	25	10	100
MSCS-509	Linux Internals	04	75	30	25	10	100
MSCS-510	Computer Networks	04	75	30	25	10	100
MSCS-511	Practical – 3: ADA and DBMS Laboratory	02	75	30	25	10	100
MSCS-512	Practical – 4: Linux Internals and Network Programming	02	75	30	25	10	100
	Total	**20**	**450**		**150**		**600**

III SEMESTER

Course code	Name of the Subject	Credits	Theory		IA		Total
			Max Marks	Min. Marks	Max. Marks	Min. Marks	
MSCS-513	Software Engineering	04	75	30	25	10	100
MSCS-514	Visual Technologies	04	75	30	25	10	100
MSCS-515	Computer Graphics and Visualization	04	75	30	25	10	100
MSCS-516	Elective – 1	04	75	30	25	10	100
MSCS-517	Mini Project	04	50	20	50	20	100
	Total	**20**	**350**		**150**		**500**

IV SEMESTER

Course code	Name of the Subject	Credits	Theory		IA		Total
			Max Marks	Min. Marks	Max. Marks	Min. Marks	
MSCS-518	Management Information System and ERP	04	75	30	25	10	100
MSCS-519	Elective – 2	04	75	30	25	10	100
MSCS-520	Major Project	12	200	80	100	40	300
	Total	**20**	**350**		**150**		**500**

M.Sc (CS) - FIRST SEMESTER SYLLABUS

MSCS-501: DISCRETE MATHEMATICS

MODULE – 1: MATHEMATICAL LOGIC AND SET THEORY

Unit- 1

Introduction, statements and notation- connectives, WFF- tautologies, logical implications, logical equivalence, duality, normal forms.

Unit- 2

Rules of inference, predicate calculus and inference theory7 of the predicate calculus problems.

Unit- 3

Basic concepts of set theory, principles of inclusion and exclusion, mathematical induction.

Unit- 4

Counting principles – rules of sum and products, permutations and combinations, pigeon hole principle – simple problems.

MODULE -2: RELATIONS:

Unit- 5

Properties, relation matrix and digraph of a relation.

Unit- 6

Partition and covering, equivalence relation, compatibility relations, composition of binary relations.

Unit- 7

Manipulation of relations, transitive closures.

Unit- 8

Warshall's algorithm – related problems.

MODULE–3: RECURRENCE RELATION AND GENERATING FUNCTIONS:

Unit- 9

Introduction, linear recurrence relation with constant coefficient (LLR) – backtrack method, homogenous solutions, particular solutions.

Unit- 10

Manipulation of numeric functions and generating functions, solution of LLR by using generating function – problems.

Unit- 11

Functions: Definitions and introduction, various types of functions, composition of functions, inverse function, characteristic function of set.

Unit- 12

Permutation function, hashing function, recursive functions – problems.

MODULE – 4: GRAPH THEORY:

Unit- 13

Introduction, basic terminology, multi graphs of weighed graphs.

Unit- 14

Paths and circuits, Eulerian and Hamiltonian circuits, traveling salesman problem.

Unit- 15

Trees – rooted trees, path lengths in rooted trees, prefix codes, binary search trees.

MSCS-503: COMPUTER ARCHITECTURE

MODULE – 1: BASIC STRUCTURE OF COMPUTERS

Unit- 1

Types of computers, functional units, basic operational concepts, bus structures.

Unit- 2

Performance – processor clock, basic performance equation, clock rate, performance measurement, historical perspective.

Unit- 3

Machine instructions and programs – numbers, arithmetic operations and characters.

Unit- 4

Memory location and addresses, memory operations.

MODULE – 2: INSTRUCTIONS

Unit- 5

Instructions and instruction sequencing, addressing modes.

Unit- 6

Assembly language.

Unit- 7

Basic input and output operations, stacks and queues, subroutines.

Unit- 8

Additional instructions, encoding of machine instructions.

MODULE – 3: INPUT/OUTPUT ORGANISATION

Unit- 9

Accessing I/O devices, interrupts – Interrupt hardware, enabling and disabling interrupts.

Unit- 10

Handling multiple devices, controlling device requests, exceptions.

Unit- 11

Direct memory access, buses, interface circuits.

Unit- 12

Standard I.O interfaces – PCI Bus, SCSI Bus, USB.

MODULE – 4: MEMORY SYSTEM:

Unit- 13

Basic concepts, semiconductor RAM memories.

Unit- 14

Read Only Memories (ROM), speed, size, and cost.

Unit- 15

Cache memories – mapping functions, replacement algorithms, performance considerations.

Unit- 16

Virtual memories, secondary storage.

MODULE – 5: ARITHEMTIC AND LOGIC UNIT

Unit- 17

Addition and subtraction of signed numbers, design of fast adders.

Unit- 18

Multiplication of positive numbers, signed operand multiplication, fast multiplication.

Unit- 19

Integer division, floating- point numbers and operations.

Unit- 20

Logic operations – Arithmetic Operations on Floating – Point Number.

MODULE – 6: BASIC PROCESSING UNIT

Unit- 21

Some fundamental concepts.

Unit- 22

Execution of a complete instruction.

Unit- 23

Multiple bus organisation.

Unit- 24

Hard wired control, microprogrammed control.

MSCS-504: DATA STRUCTURES

MODULE – 1: INTRODUCTION

Unit- 1

Concept of Data Structure and its importance, Relationship with algorithm.

Unit- 2

Classification of data structure, abstract data type/ data object (ADT).

Unit- 3

Primitive data types: integers, real, character, Boolean and their representation.

Unit- 4

Arrays – one dimensional and multidimensional arrays storage representation.

MODULE – 2: LINEAR DATA STRUCTURE

Unit- 5

Stacks, Introduction, Stack as ADT, Realization of stacks.

Unit- 6

Applications of Stack, Evaluation of Expressions, Conversion of expressions.

Unit- 7

Recursion – Introduction, examples, Tower of Hanoi problem.

Unit- 8

Queue as ADT, queue applications, dequeue, priority queues.

MODULE – 3: LINEAR DATA STRUCTURE WITH LINKED ALLOCATION

Unit- 9

Linked list, some general linked list operations.

Unit- 10

Singly linked list and its operations.

Unit- 11

Circular and doubly linked list.

Unit- 12

Applications: Polynomial operations, Dictionary Construction; Space matrix multiplication.

MODULE – 4: NON –LINEAR DATA STRUCTURES

Unit- 13

Graphs as a data structure, graph representation based on sequential allocation and linked allocation.

Unit- 14

Binary trees, representation of binary trees based on sequential allocation.

Unit- 15

Representation of binary trees based on linked allocation.

Unit- 16

Traversal of binary tree, operations on binary trees.

MODULE – 5: THREADED BINARY TREES AND FOREST

Unit- 17

Thread binary trees and traversal.

Unit- 18

Representation of forest of trees.

Unit- 19

Traversal of forest.

Unit- 20

Conversion of forest to binary tree.

MODULE – 6: SORTING AND SEARCHING :
Unit- 21

Conventional sort, selection sort, insertion sort.

Unit- 22

Binary search based insertion sort (BSBSI), merge sort, quick sort.

Unit- 23

Heap sort, bucket sort.

Unit- 24

Linear search, binary search, depth first search, breadth first search.

M.Sc. (CS) – SECOND SEMESTER SYLLABUS

MSCS-507: ANALYSIS AND DESIGN OF ALGORITHMS

MODULE -1: INTRODUCTION

Unit- 1

Introduction, what is an algorithm, notation for programs, space complexity, time complexity, asymptotic notation.

Unit- 2

Practical complexities, performance measurement.

Unit- 3

Analyzing control structures, using a barometer, supplementary examples.

Unit- 4

Average case analysis, amortized analysis, solving recurrences.

MODULE -2: THE GREEDY METHOD

Unit- 5

Optimization problems, The Greedy method.

Unit- 6

Applications –Container loading, 0/1 Knapsack problem.

Unit- 7

Topological sorting, Bipartite cover.

Unit- 8

Single source shortest paths, Minimum cost spanning trees.

MODULE – 3: DIVIDE AND CONQUER

Unit- 9

The divide – and conquer method, Applications – Defective chessboard.

Unit- 10

Merge sort, quick sort, selection sort.

Unit-11

Closest pair of points, solving recurrence equations.

Unit- 12

Lower bounds on complexity.

MODULE – 4: DYNAMIC PROGRAMMING

Unit- 13

The dynamic programming method, Applications – 0/1 Knapsack problem.

Unit- 14

Image compression.

Unit- 15

Matrix multiplication chains, all pair shortest paths.

Unit- 16

No crossing subset of nets, component folding.

MODULE – 5: BACKTRACKING

Unit- 17

The backtracking method

Unit- 18

Applications – Container loading, 0/1 Knapsack problem.

Unit- 19

Max clique, traveling salesperson.

Unit- 20
Board permutation.

MODULE – 6: BRANCH AND BOUND

Unit- 21

The branch and bound method.

Unit- 22

Applications – Container loading, 0/1 Knapsack problem.

Unit- 23

Max clique, traveling salesperson.

Unit- 24

Board permutation.

MSCS-508: DATA BASE MANAGEMENT SYSTEMS

MODULE – 1: INTRODUCTION TO DATA BASE SYSTEMS AND ENTITY – RELATIONSHIP MODEL

Unit- 1

Overview; A historical perspective; File Systems Verses a DBMS; advantages of a DBMS; levels of abstraction in a DBMS;

Unit- 2

Data Independences; Structure of a DBMS; People who deal with Databases and architecture.

Unit- 3

Using High-level Conceptual Data models for Database Design; An Example Database Application; Entity types, Entity Sets, Attributes and Keys; Relationships, relationship types, Roles and Structural constraints;

Unit- 4

Weak Entity types; ER Diagrams, Naming conventions and Design issued and Problems on ER modeling.

MODULE -2: RELATIONAL MODEL AND SQL PROGRAMMING

Unit- 5

Relational model Concepts; Relational Constraints and Relational Database Schemes; Update operations and Dealing with Constraints Violations;

Unit- 6

Basic Relational Algebra Operations; Additional Relational Operations; Examples of Queries in Relational Algebra.

Unit- 7

Data Definitions Constraints and Schemes Changes is SQL; Basic Queries in SQL;

Unit- 8

Insert, Delete and Update Statements in SQL; Views in SQL; specifying General constraints as Assertion; Additional Features of SQL.

MODULE -3: DATABASE DESIGN

Unit- 9

Informal Design Guidelines for Relation Schemes; Functional Dependences;

Unit- 10

Axiomatization of functional dependencies and Armstrong axioms.

Unit- 11

Normal Forms; general definitions of Second and Third Normal Forms; Boyee –cold Normal Forms;

Unit- 12

Algorithms for Relational Database Scheme Design.

MODULE -4: CONCEPT OF STORAGE AND IDEXING

Unit- 13

Data on External Storage; File Organization and Indexing;

Unit- 14

Clustered Indexes, primary and Secondary Indexes;

Unit- 15

Index Data Structures; Hash-based indexing.

Unit- 16

Tree-based Indexing, Comparison of File organizations.

MODULE -5: TRANSACTION MANAGEMENT & RECOVERY TECHNIQUES

Unit- 17

The ACID properties: Consistency and Isolocation; Atomicity and Durability Transaction an Schedules;

Unit- 18

Concurrent Execution of Transactions; Motivation for concurrent Execution, Serializibility, Anomalies due to Interleaved Execution, Schedules Involving aborted Transactions.

Unit- 19

Lack based Concurrency Control; Strict Two Phase Locking, Deadlocks; Performance of locking;

Unit- 20

Transaction Support in SQL; Creating and Terminating Transactions, Introduction to Crash recovery; Stealing Frames and Forcing Pages, Recovery-Related Steps during Normal Execution, Overview of ARIES recovery algorithm, Atomicity.

MODULE – 6: CASE STUDIES

Unit- 21

Oracle: Database Design and Querying Tools; SQL Variations and Extensions; Storage and Indexing; Query Processing and Optimization;

Unit- 22

Oracle: Concurrency Control and Recovery; System Architecture, Replication, Distribution and External Data; Database Administration Tools.

Unit- 23

IBM DB2: Universal database; Database Design and Querying Tools; SQL Variations and Extensions Storage and Indexing; Query Processing and Optimization;

Unit- 24

IBM DB2: Concurrency Control and Recovery; System Architecture; Replication, Distribution and External Data; Database Administration Tools.

MSCS-509 – LINUX INTERNALS

MODULE -1

Unit- 1

Main Characteristics, Linux Distributions.

Unit- 2

Compiling the Kernel-where is everything? Compiling, Additional configuration facilities.

Unit- 3

INTRODUCTION TO THE KERNEL: Important data structures, Main algorithms.

Unit-4

Implementation of few system calls.

MODULE -2

Unit- 5

Memory Management: The architecture – independent memory model.

Unit- 6

The virtual address space of a process, Block device caching, Paging under Linux.

Unit- 7

Fundamentals of Interprocess Communication.

Unit- 8

Synchronization in the Kernel, Communication via files, Pipes, Debugging using ptrace.

MODULE -3

Unit- 9

System V IPC. The Linux File System: Basic Principles, The representation of file systems in the kernel.

Unit- 10

The Ext2 file system, The proc file system

Unit- 11

DEVICE DRIVERS UNDER LINUX; Character and block devices, Hardware, polling.

Unit- 12

Interrupts and waiting queues.

MODULE -4

Unit- 13

Implementing a driver, Dynamic and static drivers.

Unit- 14

Network Implementation, Introduction and overview, Important structures, Network devices under Linux.

Unit- 15

Modules and Debugging: what are Modules? Implementation in the Kernel, the meaning of object sections for modules and kernels, Parameter transfer and examples.

Unit – 16

What can be implemented as a module? The Kernel daemon, simple data swapping between modules, an example module, Debugging.

MODULE – 5

Unit – 17

Kernel Related Commands, Free-overview of the system's memory, ps-output of process statistics, top-the CPU charts.

Unit – 18

Init-primus inter pares, shutdown-shutting down the system, trace-monitoring a process.

Unit – 19

Configuring the network interface, trace – route – Ariadne's paths in the internet, configuring a serial interface.

Unit – 20

Configuring a parallel interface, building a directory tree.

MODULE – 6

Unit – 21

The Proc file system: The PROC / directory.

Unit – 22

The Self / directory, the SYS / directory.

Unit – 23

The Booting Process: Carrying out the booting process.

Unit – 24

LILO – the LINUX loader.

MSCS – 510: COMPUTER NETWORKS

MODULE – 1: INTRODUCTION

Unit – 1

Network hardware, Network software.

Unit – 2

Reference Models: OSI and TCP

Unit – 3

Example Networks: Arpanet, X.25, Frame Relay, ATM, Ethernet.

Unit – 4

Network Standardization.

MODULE – 2: THE PHYSICAL LAYERS AND TRANSMISSION

Unit – 5

Analog and Digital Signals: Transmission, impairment.

Unit – 6

Digital to Digital, Analog to Digital, Digital to Analog.

Unit – 7

Guided transmission media – Magnetic media, twisted pair, Co-axial cable, Fiber optics.

Unit – 8

Wireless transmission: The electromagnetic spectrum, Radio transmission, Microwave transmission, Infrared.

MODULE – 3: DATA LINK LAYER

Unit – 9

Design Issues, Framing, Error control, Flow control.

Unit – 10

Error detection and correction; error correcting codes, error detecting codes.

Unit – 11

Elementary data link protocols; simplex protocol, A simplex stop and wait protocol, A simplex protocol for a Noisy channel, Sliding window protocol.

Unit – 12

Example data link protocols: HDLC, point to point protocol.

MODULE – 4: THE MEDIUM ACCESS CONTROL SUB LAYER

Unit – 13

Multiple Access protocols – CSMA, collision free protocols.

Unit – 14

Bluetooth – Architecture, Protocol Stack.

Unit – 15

Bridges, Repeaters.

Unit – 16

Virtual LANS

MODULE – 5: THE NETWORK LAYER

Unit – 17

Network layer design issues.

Unit – 18

Routing Algorithms

Unit – 19

Congestion control Algorithms.

Unit – 20

Internetworking

MODULE – 6

Unit – 21

DNS – Resource records, Name servers.

Unit – 22

e-mail – Architecture and services.

Unit – 23

The www – Architecture, Dynamic web documents, Wireless web.

Unit – 24

Multimedia – Compression, Steaming, VOIP

M.SC (CS) – THIRD SEMESTER SYLLABUS

MSCS – 513: SOFTWARE ENGINEERING

MODULE – 1: INTORDUCTION

Unit – 1

FAQs about software engineering professional and ethical responsibility, computer based system engineering

Unit – 2

Emerging system properties, systems and their environment, system modeling, the system engineering process, system procurement.

Unit – 3

Software process: software process models, process iteration, software specification.

Unit – 4

Software design and implementation, software evolution, software validation, automated process support.

MOUDLE – 2: REQUIREEMNT ENGINEERING

Unit – 5

Software requirements: functional and non-functional requirements, user requirements, System requirements, the Software requirement management.

Unit – 6

Requirement engineering process: feasibility studies, requirements elicitation and analysis, requirements validation, requirement management.

Unit – 7

System models: context models, behavioral models, data models, object models and CASE workbenches.

Unit – 8

Software engineering prototypes: prototyping in software process, rapid prototyping techniques, user interface prototyping.

MODULE – 3: SOFTWARE DESIGN

Unit – 9

Architectural design: system structuring, control models, modular decomposition, domain specific architectures.

Unit – 10

Object oriented design: objects and object classes, an object oriented design process, design evolution.

Unit – 11

User interface design: user interface design principles.

Unit – 12

User interaction, information presentation, user support, interface evolution

MODULE – 4: SOFTWARE TESTING

Unit – 13

Verification and validation: verification and validation planning

Unit – 14

Software inspections, automated static analysis clean room software development

Unit – 15

Software testing: Defect testing, Integration testing.

Unit – 16

Object oriented testing, Testing workbenches.

MODULE – 5: MANAGEMENT

Unit – 17

Project Management: Management activities, project planning.

Unit – 18

Project scheduling, risk management.

Unit – 19

Managing People: Limits of thinking, Group working, Choosing and keeping people.

Unit – 20

The people capability maturity model.

MODULE – 6: COST ESTIMATION AND QUALITY MANAGEMENT

Unit – 21

Software cost estimation: Productivity, estimation techniques.

Unit – 22

Algorithmic cost modeling, project duration and staffing.

Unit – 23

Quality management: Quality assurance and standards, Quality Planning, Quality control, Software measurements and metrics.

Unit – 24

Critical systems: Critical system, Availability and reliability, safety and security.

MSCS-514: VISUAL TECHNOLOGIES

MODULE – 1: THE PHILOSOPHY OF NET

Unit – 1

Understanding the Previous State of Affairs, The NET Solution, The Building Block of the. NET Platform (CLR, CTS, and CLS), The Role of the. NET Base Class Libraries, What C# Brings to the Table, An Overview of. NET Binaries (aka Assemblies), the Role of the Common Intermediate Language.

Unit – 2

The Role of .NET

Type Metadata, The Role of the Assembly Manifast, Compiling CIL to Platform – Specific Instructions, understanding the Common Type System, Intrinsic CTS Data Types, Understanding the Common Languages Specification, Understanding the Common Language Runtime.

Unit – 3

A Tour of the .Net

Namespaces, Increasing Your Namespace Nomenclature, Deploying the .NET Runtime.

Unit – 4

Building C# Applications

The Role of the Command Line. Complier (cs.exe), Building C# Application using csc.exe Working with csc.exe Response Files, Generating Bug Reports, Remaining C# Compiler Options. The command Line Debugger (cordbg.exe) Using the, B Visual Studio .NET IDE, Other Key Aspects of the VS.NET IDE, C# "Preprocessor". Directives, An Interesting Aside : The System. Environment Class.

MODULE – 2

Unit – 5

C# Language Fundamentals

The Anatomy of a Basic C# Class, Creating objects: Constructor Basics, The Composition of a C# Application, Default Assignment and Variable Scope. The C# Member Initialization Syntax, Basic Input and Output with the Console Class.

Unit – 6

Understanding Value Types and Reference Types, The Master Node: System, Object, The System Data Types (and C# Aliases), Converting Between Value Types and Reference Types: Boxing and Unboxing, Defining Program Constants.

Unit – 7

C# Iteration Constructs, C# Controls Flow Constructs, The Complete Set of C# Operators, Defining Custom Class Methods, Understating Static Methods, Methods Parameter Modifies.

Unit – 8

Array Manipulation In C#, String Manipulation in C#, C# Enumerations, Defining Structures in C#, Defining Custom Namespaces.

MODULE – 3

Unit – 9

Object – Oriented Programming with C#

Forms Defining of the C# Class, Definition the "Default Public Interface" of a Type, Recapping the Pillars of OOP, The First Pillars: C#'s Encapsulation Services, Pseudo-Encapsulation: Creating Read – Only Fields.

Unit – 10

The Second Pillar

C#'s Inheritance Supports, keeping Family Secrets: The "Protected" Keyword, Nested Type Definitions, The Third Pillar: C#'s Polymorphic Support, Casting Between.

Unit – 11

Exceptions and object Lifetime

Ode to Errors, Bugs, and Exceptions, The Role of. Net Exception Handing, the System. exception Base Class, Throwing a Generic Exception, Catching Exception, CLR System – Level Exception (system. System Exception), Custom Application – Level Exception (System. System Exception), Handling Multiple Exception.

Unit – 12

The Family Block, The Last Change Exception dynamically Identifying Application – and System Level Exception Debugging System Exception Using US. NET, Understanding Object Lifetime, the CIT of "new", The Basics of Garbage Collection, Finalization a Type, The Finalization Process, Building an Ad Hoc Destruction Method, Garbage Collection Optimizations, The System, GC Type.

MODULE – 4

Unit – 13

Interfaces and Collections
Defining Interfaces Using C# Invoking Interface Members at the object Level, Exercising the Shapes Hierarchy.

Unit – 14

Understanding Explicit Interface Implementation, Interfaces As Polymorphic Agents.

Unit – 15

Building Interface Hierarchies, Implementing Implementation, Interfaces Using Vs .NET, understanding the I convertible Interface, Building a Custom Enumerator (IE numerable and Enumerator), Building Cloneable objects (ICloneable), Building Comparable Objects (I Comparable), Exploring the system. Collections Namespace, Building a Custom Container (Retrofitting the Cars Type).

Unit – 16

Callback Interfaces, Delegates, and Events, Advanced Techniques.

Understanding Callback interfaces, Understanding the .Net Delegate Type, Members of System. Multicast Delegate.

MODULE – 5

Unit – 17

The Simplest Possible Delegate Example, Building More a Elaborate Delegate Example, Understanding Asychronous Delegates. Understanding (and Using) Events. The Advances Keywords of C# A Catalog of C# Keywords Building a Custom Indexer.

Unit – 18

A Variation of the Cars Indexer Internal Representation of Type Indexer. Using C# Indexer from VB .NET.

Unit – 19

Overloading operators, The Internal Representation of Overloading Operators, interacting with Overload Operator from overloaded – Operator – Challenged Languages, Creating Custom Conversion Routines.

Unit – 20

Defining Implicit Conversion Routines, The internal Representations of Customs Conversion Routines.

MODULE – 6: UNDERSTANDING NET ASSEMBLES

Unit – 21

Problems with Classic COM Binaries, An Overview of .Net Assembly, Building a Simple File Test Assembly, A C# Client Application.

Unit – 22

A Visual Basic .Net Client Application, Cross Language Inheritance, Exploring the CarLibrary's, Manifest, Exploring the CarLibrary's Types. Building the Multifile Assembly, Using Assembly.

Unit – 23

Understanding Private Assembles, Probing for Private Assemblies (The Basics), Private A Assemblies XML Configuration Files, Probing for Private Assemblies (The Details).

Unit – 24

Understanding Shared Assembly, Understanding Shared Names, Building a Shared Assembly, Understanding Delay Signing, Installing / Removing Shared Assembly, Using a Shared Assembly.

MSCS-515: COMPUTER GRAPHICS AND VISUALIZATION

MODULE – 1: INTRODUCTION

Unit – 1

Applications of computer graphics; A graphics system; Images: Physical and synthetic; Imaging systems; The synthetic camera model;

Unit – 2

The programmer's interface; Graphics architectures;

Unit – 3

Programmable pipelines; Performance characteristics.

Unit – 4

Graphics Programming: The Sierpinski gasket; Programming two-dimensional applications.

MODULE – 2: OPENGL

Unit – 5

THE OPENGL: the OpenGL API; Primitives and attributes; Color; Viewing;

Unit – 6

Control functions; The Gasket program;

Unit – 7

Polygons and recursion;

Unit – 8

The three-dimensional gasket; plotting implicit functions.

MODULE – 3: INPUT AND INTERACTON

Unit – 9

Interaction; Input devices; Clients and servers; Display lists; Display lists and modeling;

Unit – 10

Programming event-driven input; Menus; Picking;

Unit – 11

A simple CAD program; Building interacting models; Animating interactive programs;

Unit – 12

Design of interactive programs; Logic operations.

MODULE – 4: GEOMETRIC OBEJCTS AND TRANSFORMATIONS

Unit – 13

Scalars, points, and vectors; Three-dimensional primitives; Coordinate systems and frames; Modeling a colored cube;

Unit – 14

Affine transformations; Rotation, translation and scaling.

Unit – 15

Transformations in homogeneous coordinates; Concatenation of transformations;

Unit – 16

OpenGL transformation matrices; Interfaces to three-dimensional applications; Quaternions.

MODULE – 5: VIEWING

Unit – 17

Classical and computer viewing; Viewing with a computer; Positioning of the camera; Simple projections;

Unit – 18

Projections in OpenGL; Hidden-surface removal; Interactive mesh displays; Parallel-projection matrices; Perspective-projection matrices; Projections and shadows.

Unit – 19

LIGHTING AND SHADING: Light and matter; Light sources; The Phong lighting model; computation of vectors; Polygonal shading; Approximation of a sphere by recursive subdivisions;

Unit – 20

Light sources in OpenGL; Specification of materials in OpenGL; Shading of the sphere model; Global illumination.

MODULE – 6: IMPLEMENTATION

Unit – 21

Basic implementation strategies; The major tasks;

Unit – 22

Clipping; Line-segment clipping; Polygon clipping; Clipping of other primitives;

Unit – 23

Clipping in three dimensions; Rasterization; Bresenham's algorithm;

Unit – 24

Polygon rasterization; Hidden-surface removal; Antialiasing; Display considerations.

MSCS-516: ELECTIVE-1

The candidate can chose any of the courses listed under ELECTIVE-1 clause.

MASC-517: MINI PROJECT

M.SC (CS)-FOURTH SEMESTER SYLLABUS

MSCS-518: MANGEMENT INFORMATION SYSTEMS AND ERP

MODULE – 1

Unit – 1

Introduction to Management Information Systems:
Management Information System: Concept and Definition, Role of Management Information System, Impact of Management Information system, Management Information System and Computer, Academic, User.

Unit – 2

Role and Importance of management

Introduction to Management; Approaches to Management; Functions of the Manager; Managers and the Environment; Management as a control System; Management by Exception; MIS: A support to the Management.

Unit – 3

Process of Management

Management Effectiveness; Planning, Organizing, Staffing; Coordination and Directing, Controlling; MIS: A Tool for Management Process.

Unit – 4

Organization Structure and Theory

Basic Model or Organization Structure; Modifications to the Basic Model of Organization Structure; Organizational Behavior; Organization as a system; MIS Organization.

MODULE – 2

Unit – 5

Strategic Management of Business

The concept of Corporate Planning; Essentiality of Strategic Planning.
Development of the Business Strategic; Type of Strategies.
Short range Planning; Tools of Planning; MIS: Business Planning.

Unit – 6

Decision making
Decision Making concepts
Decision Methods, Tools and Procedures
Behavioral Concepts in Decision Making
Organizational Decision Making
MIS and Decision Making Concepts.

Unit – 7

Information
Information Concepts
Information: A Quality Product
Classification of the Information
Methods of Data and Information Collection
Value of the Information

Unit – 8

General Model of a Human as an Information Processor
Summary of Information Concepts and their Implications
Organization and Information
MIS and the Information Concepts

MODULE – 3

Unit – 9

Systems
System Concepts
Systems Control
Types of System
Handling System Complexity

Unit – 10

Post Implementation Problems in a System
System Stress and system Change
MIS and System Concepts

Unit – 11

Development of MIS
Development of Long Range Plans of the MIS
Ascertaining the class of Information
Determining the Information Requirement
Development and Implementation of the MIS

Unit – 12

Management:
Management of Quality in the MIS
Organization for Development of the MIS
MIS: The factors of Success and Failure

MODULE – 4

Unit – 13

Choice of Information Technology
Nature of IT Decision
Strategic Decision
Configuration Design

Unit – 14

Evaluation
Information Technology Implementation Plan
Choice of the 'Information Technology' and the 'MIS'

Unit – 15

Decision Support System
Decision Support System: Concept and Philosophy
DSS: Deterministic Systems

Unit – 16

AI and KBES
Artificial Intelligence System
Knowledge Based Expert System
MIS and the Role of DSS

MODULE – 5

Unit – 17

Introduction
Introduction to ERP, The Enterprise, Benefits of ERP

Unit – 18

Technologies:
ERP and Related Technologies, BPR

Unit – 19

Data Mining
Data Warehousing, Data Mining, OLAP

Unit – 20

Overview of Supply Chain Management.

MODULE – 6

Unit – 21

ERP implementation lifecycle, Implementation Methodology.

Unit – 22

Package selection, ERP implementation – The Hidden Costs, Organizing the Implementation.

Unit – 23

Vendors, consultants and Users, Contracts with Vendors, Consultants and Employees.

Unit – 24

Project Management and Monitoring, After ERP Implementation.

MSCS-519: ELECTIVE-2

The candidate can chose any of the courses listed under ELECTIVE-2 Clause.

MSCS-520: MAJOR PROJECT

Methodology

Model of the dissertation will be available in the website: www.soumysore.edu.in. Minimum pages in the thesis should not be less than 60 pages. The prototype (Working Model) developed as a project should be demonstrated during the project viva-voce examination.

ELECTIVE-1

MSCS-516A: DATA MINING

MODULE-1: INTRODUCTION TO DATA WAREHOUSING

Unit - 1

What is data warehouse? A multidimensional data model.

Unit - 2

Data warehouse architecture

Unit - 3

Data warehouse implementation

Unit - 4

Data cube technology

MODULE-2: INTRODUCTION TO DATA MINING

Unit - 5

From data warehousing to data mining

Unit - 6

Data mining functionalities, data cleaning

Unit - 7

Data integration and transformation

Unit - 8

Data reduction

MODULE-3: DATA MINING PRIMITIVES, LANGUAGES AND SYSTEM ARCHITECTURES

Unit - 9

Data mining primitives

Unit - 10

Presentation and visualization and discovered patterns.

Unit - 11 & 12

A data mining query language.

MODULE-4: MINING ASSOCIATION RULES IN LARGE DATA BASES TRANSLATION

Unit - 13

Association rule mining

Unit - 14

Single-dimensional Boolean association rules from transactional data bases.

Unit - 15 & 16

Mining multilevel association rules from transactional databases.

MODULE-5: CLASSIFICATION AND PREDICTION

Unit - 17

What is cluster analysis? Types of cluster analysis.

Unit - 18

A categorization of major clustering methods, partitioning methods, hierarchical methods.

Units - 19

Density based methods, model-based clustering methods: statistical approach.

Unit - 20

Neural network approach, outliner analysis.

MODULE-6: APPLICATION AND TRENDS IN DATA MINING

Unit - 21

Data mining application, data mining system products and research prototypes.

Unit - 22

Additional themes on data mining.

Unit - 23

Data mining and intelligent query answering.

Unit - 24

Trends in data mining.

MSCS-516B: SIMULATION AND MODELING

MODULE-1: INTRODUCTION TO SIMULATION

Unit - 1

When simulation is the appropriate tool; when simulation is not appropriate; advantages and disadvantages of simulation; areas of application.

Unit - 2

Systems and system environment; components of a system; discrete and continuous systems.

Unit - 3

Model of a system; types of models; discrete-event system simulation; steps in a simulation; steps in a simulation study.

Unit - 4

Simulation examples; characteristics of queuing systems; queuing notation; simulation of queuing system; simulation of inventory systems.

MODULE-2: GENERAL PRINCIPLES

Unit - 5

Concepts in discrete-event simulation.

Unit - 6

The event-scheduling/time-advance algorithm.

Unit - 7

World views.

Unit - 8

Manual simulation using event scheduling.

MODULE-3: RANDOM-NUMBER GENERATION

Unit - 9

Properties of random numbers, generation of pseudo-random numbers.

Unit - 10

Techniques for generating random numbers, tests for random numbers.

Unit - 11

Random variate generation; inverse transform technique; exponential distribution, uniform distribution.

Unit - 12

Discrete distribution; acceptance-rejection technique; Poisson distribution.

MODULE-4: INPUT MODELING

Unit-13

Data collection; identifying the distribution with data; parameter estimation.

Unit - 14

Goodness of fit tests.

Unit - 15

Selecting input models without data.

Unit - 16

Multivariate and time-series input models.

MODULE-5: OUTPUT ANALYSIS FOR A SINGLE MODEL

Unit - 17

Type of simulations with respect to output analysis.

Unit - 18

Stochastic nature of output data; measures of performance and their estimation.

Unit - 19

Output analysis for terminating simulations.

Unit - 20

Output analysis for steady-state simulation.

MODULE-6: VERIFICATION AND VALIDATION OF SIMULATION MODELS

Unit - 21

Model building, verification and validation; verification of simulation Models; calibration and validation of models.

Unit - 22

Simulation of computer systems: Introduction; Simulation tools; model input; high-level computer system simulation.

Unit - 23

CPU simulation.

Unit - 24

Memory simulation.

MSCS-516C: THEORY OF COMPUTATION

MODULE-1: INTODUCTION TO FINITE AUTOMATA

Unit - 1

Introduction to Finite Automata, the central concepts of Automata theory, deterministic finite automata.

Unit - 2

Non-deterministic finite automata, and application.

Unit - 3

Finite automata with Epsilon transitions and convertion from NFA to DFA.

Unit - 4

Various problems on NFA/DFA design.

MODULE-2: REGULAR LANGUAGES

Unit - 5

Regular Expression, Finite Automate and Regular Expressions.

Unit - 6

Applications of Regular Expressions, Proving languages not to be regular.

Unit - 7

Closure Properties of Regular Languages, Decision Properties of Regular Languages.

Unit - 8

Construction of NFA/DFA for a regular expression and Equivalence and minimization of automata.

MODULE-3: CONTEXT-FREE GRAMMARS AND PUSHDOWN AUTOMATA

Unit - 9

Context-free grammars, Parse trees, Applications.

Unit - 10

Ambiguity in grammars and languages and method resolving ambiguity.

Unit - 11

Definition of the Pushdown automata, The languages of a PDA.

Unit - 12

Equivalence of PDA's and CFG's. Deterministic Pushdown Automata.

MODULE-4: PROPERTIES OF CONTEXT FREE LANGUAGES

Unit - 13

Elimination of none productions and unit productions.

Unit - 14

Elimination of useless symbols and Normal forms for CFGs.

Unit - 15

The pumping lemma for CFGs, proving a language not to be context free.

Unit - 16

Closure properties of CFLs and associated theories.

MODULE-5: INTRODUCTION TO TURING MACHINES

Unit - 17

Problems that computers cannot solve, introduction to the Turing Machine.

Unit - 18

Programming techniques for Turing machines, extension to the basic Turing machine.

Unit - 19

Restricted Turing Machine, Turing Machine and Computers;

Unit - 20

Introduction to un-decidability and its significance.

MODULE-6: INTRODUCTION TO COMPILERS

Unit - 21

Different stages of Compilation and typical architecture of a compiler.

Unit - 22

Design of Lexical analyzers, Patterns, tokens and lexemes.

Unit - 23

Syntactic analysis and semantic analysis.

Unit - 24

Intermediate Code generation and Code Optimization.

ELECTIVE-2

MSCS-519A: IMAGE PROCESSING

MODULE-1: INTRODUCTION

Unit - 1

Motivation and perspective, Applications, A simple Image formation Model.

Unit - 2

Fundamental steps in digital image processing system, components of an image processing system.

Unit - 3

Elements of visual perception, Image sensing and acquisition, Image sampling and quantization.

Unit - 4

Basic relationship between pixels-Neighbors of a pixel, Adjacency, Connectivity, Regions and Boundaries, Distance Measures, Image Operations on a Pixel Basis.

MODULE-2: IMAGE ENHANCEMENT

Unit - 5

Introduction, Basic gray level transformations, Histogram processing, Arithmetic/Logical operations.

Unit - 6

Smoothing spatial filters, sharpening spatial filters.

Unit - 7

Fourier Transform and the Frequency Domain, Filtering in the Frequency Domain, Smoothing Frequency domain Filters, Sharpening Frequency Domain Filers.

Unit - 8

Homomorphic Filtering, The Convolution and Correlation Theorems.

MODULE-3: RESTORATION

Unit - 9

Image degradation/restoration process, noise models.

Unit - 10

Restoration in the Presence of Noise only Spatial Filtering, Estimating the Degradation Function.

Unit - 11

Inverse filtering, minimum mean square error filtering, geometric mean filter.

Unit - 12

Geometric transformations.

MODULE-4: COLOR IMAGE PROCESSING

Unit - 13

Color Fundamentals, Color Models.

Unit - 14

Pseudocolor Image Processing, Basics of full Color Image Processing.

Unit - 15

Color Transformations.

Unit - 16

Smoothing and Sharpening, Color Segmentation.

MODULE-5: MORPHOLOGICAL IMAGE PROCESSING AND IMAGE SEGMENTATION

Unit - 17

Dilation and erosion, opening and closing.

Unit - 18

Hit-or-Miss transformations, basic morphological algorithms.

Unit - 19

Detection of discontinues.

Unit - 20

Edge linking and boundary detection, thresh holding, region-based segmentation.

MODULE-6: IMAGE ANALYSIS AND COMPUTER VISION

Unit - 21

Spatial feature extraction, transform features

Unit - 22

Edge detection, boundary extraction, boundary and region representation

Unit - 23

Shape features, textures, classification techniques

Unit - 24

Image understanding

MSCS-519B: INTERNET TECHNOLOGIES

MODULE-1: PERL, CGI PROGRAMMING

Unit - 1

Origins and uses of Perl; Scalars and their operations; Assignment statements and simple input and output; Control statements;

Unit - 2

Fundamental of arrays; Hashes; References; Functions; Pattern matching;

Unit - 3

File input and output; Examples.

Unit - 4

The common gate way Interface;

MODULE-2

Unit - 5

CGI linkage; Query string format;

Unit - 6

CGI.pm module;

Unit - 7

A survey examples;

Unit - 8

Cookies.

MODULE-3: SERVLETS AND JAVA SERVER PAGES

Unit - 9

Overview of Servlets; Servlet details;

Unit - 10

A survey example;

Unit - 11

Storing information on Clients;

Unit - 12

Java Server Pages.

MODULE-4: PHP

Unit - 13

Origins and uses of PHP; Overview of PHP;

Unit - 14

General Syntactic characteristics; Primitives, operations and expressions; output; Control statements;

Unit - 15

Arrays; Functions; Pattern matching; Form Handling; Files;

Unit - 16

Cookies; Session tracking.

MODULE-5: DATABASE ACCESS THROUGH THE WEB

Unit - 17

Relational Databases: An introduction to SQL; Architectures for Database access;

Unit - 18

Data system; Database access with PERL and My SQL.

Unit - 19

Database access with PHP and MySQL.

Unit - 20

Database Unt 4 access with JDBC and MySQL.

MODULE-6: INTRODUCTION TO RUBY, RAILS

Unit - 21

Origins and uses of Ruby; Scalar types and their. Operations;

Unit - 22

Simple input and output statements; Fundamentals of arrays; Hashes;

Unit - 23

Methods; Classes; Code blocks and iterators; Pattern matching. Overview of Rails;

Unit - 24

Document rquests; Processing forms; Rails applications with Databases; Layouts.

MSCS-519C: ARTIFICIAL INTELLIGENCE

MODULE-1: INTRODUCTION

Unit - 1

What is Artificial Intelligence; The AI Problems and Techniques, Problems.

Unit - 2

Problem Spaces and Search: Defining the problem, as a state space search.

Unit - 3

Production systems, problem characteristics, Production system characteristics.

Unit - 4

Issues in the design of search programs.

MODULE-2: HEURISTIC SEARCH TECHNIQUES AND KNOWLEDGE REPRESENTATION

Unit - 5

Generate-and-Test, Hill Climbing, Best-First Search.

Unit - 6

Problem Reduction, Constraint Satisfaction Means-Ends Analysis;

Unit - 7

Approaches to knowledge representation.

Unit - 8

Issues in knowledge representation.

MODULE-3: USING PREDICATE LOGIC AND RULES

Unit - 9

Representing Simple Facts in Logic, Representing Instance and ISA Relationships.

Unit - 10

Computable, Functions and Predicates.

Unit - 11

Resolution, Natural deduction.

Unit - 12

Representing Knowledge Using Rules: Procedural versus Declarative Knowledge, Forward versus Backward Reasoning, matching.

MODULE-4: ATATISTICAL REASONING

Unit - 13

Probability and Bayes Theorem.

Unit - 14

Certainty Factors and Rule-Based Systems.

Unit - 15

Bayesian Networks.

Unit - 16

Dempster-Shafer Theory, Fuzzy Logic

MODULE-5: WEAK SLOT-AND FILLER STRUCTURES

Unit - 17

Semantic Nets

Unit - 18

Frames

Unit - 19

Strong Slot-and-Filler Structures

Unit - 20

Conceptual Dependency Scripts.

MODULE-6: GAME PLAYING AND PLANNING

Unit - 21

Overview, The Minmax Search Procedure, Adding Alfa-Beta Cutoffs, Additional Refinements.

Unit - 22

Iterative Deepening, Planning: Overview, and Example Domain.

Unit - 23

The Blocks World, Components of a Planning System, Goal Stack Planning.

Unit - 24

Nonlinear Planning using Constraint Posting, Hierarchical Planning.