

MNPE-09425068494

In 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	
MCS-101	Discrete Mathematics	04	75	30	25	10	100
MCS-102	Introduction to Java and Object Oriented Programming	04	75	30	25	10	100
MCS-103	Computer Architecture	04	75	30	25	10	100
MCS-104	Data Structure	04	75	30	25	10	100
MCS-105	Practical – 1: OOP Using Java	02	75	30	25	10	100
MCS-106	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	
MCS-201	Analysis & Design of Algorithms	04	75	30	25	10	100
MCS-202	DBMS	04	75	30	25	10	100
MCS-203	Linux Internals	04	75	30	25	10	100
MCS-204	Computer Networks	04	75	30	25	10	100
MCS-205	Practical – 1: ADA and DBMS Laboratory	02	75	30	25	10	100
MCS-206	Practical – 2: 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	
MCS-301	Software Engineering	04	75	30	25	10	100
MCS-302	Visual Technologies	04	75	30	25	10	100
MCS-303	Computer Graphics and Visualization	04	75	30	25	10	100
MCS-304	Elective – 1	04	75	30	25	10	100
MCS-305	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	
MCS-401	Management Information System and ERP	04	75	30	25	10	100
MCS-402	Elective – 2	04	75	30	25	10	100
MCS-403	Major Project	12	200	80	100	40	300
	Total	20	350		150		500

M.Sc (CS) - FIRST SEMESTER SYLLABUS

MCS-101: 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.

MCS-102: OBJECT ORIENTED PROGRAMMING WITH JAVA

MODULE – 1: MATHEMATICAL LOGIC AND SET THEORY

MODULE-I

Unit – 1

FUNDAMENTALS OF OBJECT-ORIENTED PROGRAMMING :- Introduction; Object-Oriented Paradigm; Basic Concepts of Object-Oriented Programming, Objects and Classes, Data abstraction and encapsulation, Inheritance, Polymorphism etc.;

Unit-2 JAVA EVOLUTION :- Java History; Java Features (Compiled and interpreted, Platform-independent and portable, Object-oriented, Robust and secure, Distributed, Simple, small and familiar, Multithreaded and interactive, High performance, Dynamic and extensible); How Java Differs from C and C++ (Java and C, Java and C++); Java and Internet, Java and World Wide Web, Web Browsers (Hot Java, Netscape Navigator, Internet Explorer); Hardware and Software Requirements; Java Support Systems, Java Environment (Java development kit, Java standard library).

Unit-3 JAVA CLASSES : Types of Classes, Scope rules, Access modifiers, Instantiating Objects of a class, Calling methods, Packages & Interfaces, The String class, Java control statements, Operators, Arrays & Vectors.

MODULE-II

Unit-1 PROGRAMMING IN JAVA : Java Applications, Applets & Servlets

Unit-2 JAVA APPLETS : Life Cycle of Applet, Creating Applets, Adding Applet to HTML File; Running the Applet, Passing Parameters to an Applet, Drawing Images on the applet.

Unit-3 JAVA SWING : Introduction to Swing, Swing features, Swing Components, Working with Swing, Swing basic Containers, Buttons, User Interface Components (Buttons, TextFields, TextAreas, CheckBoxes, RadioButtons, JApplet etc.), Layouts & Layout Managers, Using Dialogs, JOptionPane class, Input Dialog Boxes, Timers & sliders, Progress Bars, Tables.

Unit-4 EVENT HANDLING : Event delegation Approach, ActionListener, AdjustmentListener, MouseListener and MouseMotionListener, WindowListener, KeyListener, Change Listener, CaretListener.

Unit-5 MANAGING ERRORS AND EXCEPTIONS :- Introduction; Types of Errors (Compile-time error, Run-time error); Exceptions; Syntax of Exception Handling Code; Multiple Catch Statements; Using finally Statement; Creating User defined Exceptions

Unit-6 JAVA I/O HANDLING : I/O File Handling(InputStream & OutputStreams, FileInputStream & FileOutputStream, Data I/P and O/P Streams, Buffered I/P and O/P Streams, File Class, Reader and Writer Streams, RandomAccessFile).

MODULE-III

Unit -1 MULTITHREADING : Overview of Multithreading, The Thread control methods, Thread life cycle, Newly created threads, Main thread, Creating a Thread (Implementing Runnable Interface, Extending the Thread Class), Thread Synchronization, Writing Applets with Threads.

Unit-2 SOCKET PROGRAMMING : Introduction, TCP/IP Protocol, UDP Protocol, Ports, Using TCP/IP Sockets, Using UDP Sockets.

Unit-3 JAVA DATABASE CONNECTIVITY (JDBC) : JDBC/ODBC bridge, DriverManager Class, Java.SQL Package (Connection Interface, Statement Interface, Prepared Statement Interface, ResultSet Interface, ResultSetMetaData Interface), SQL Exception class.

Unit-4 JAVA SERVLETS : Introduction to Server Side Technologies, Servlet Life cycle, HttpServlets, GenericServlets, init(),service(), doGet(), doPost(), destroy() , Servlets & JDBC.

MCS-103: 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: ARITHMETIC 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.

MCS-104: 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

MCS-201: 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.

MCS-202: 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 in 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; Boyce –Codd Normal Forms;

Unit- 12

Algorithms for Relational Database Scheme Design.

MODULE -4: CONCEPT OF STORAGE AND INDEXING

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 Isolation; Atomicity and Durability
Transaction Schedules;

Unit- 18

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

Unit- 19

Lock 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 Pages 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.

MCS-203 – 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.

MCS – 204: 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, Streaming, VOIP

M.SC (CS) – THIRD SEMESTER SYLLABUS

MCS – 301: SOFTWARE ENGINEERING

MODULE – 1: INTRODUCTION

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.

MODULE – 2: REQUIREMENT 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.

MCS-302: 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 Manifest, 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 – 21

Building C# Applications

The Role of the Command Line. Compiler (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 Handling, 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.

Unit – 11

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 Asynchronous 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

Unit – 12

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

MCS-303: 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

Unit – 13

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 OBJECTS 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

Unit – 14

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.

MCS-304: ELECTIVE-1

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

MCS-305: MINI PROJECT**M.SC (CS)-FOURTH SEMESTER SYLLABUS****MCS-401: MANAGEMENT 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

Unit – 15

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 – 16

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

Unit – 17

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 – 18

Unit – 24

Project Management and Monitoring, After ERP Implementation.

MCS-402: ELECTIVE-2

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

MCS-403: MAJOR PROJECT

Methodology

Model of the dissertation will be available in the website: www.ksoumysore.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

MCS-304A: 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

Unit – 19

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

Unit - 20

Neural network approach, outlier 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.

MCS-304B: 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

Unit – 21

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.

Unit – 22

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.

MCS-304C: THEORY OF COMPUTATION

MODULE-1: INTRODUCTION 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 – 23

Unit - 3

Finite automata with Epsilon transitions and conversion 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 – 24

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.

Unit – 25

ELECTIVE-2

MCS-402A: 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 Filters.

Unit - 8

Homomorphic Filtering, The Convolution and Correlation Theorems.

MODULE-3: RESTORATION

Unit - 9

Image degradation/restoration process, noise models.

Unit - 10

Unit – 26

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.

Unit – 27
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

MCS-402B: 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

Unit – 28

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 – 29

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.

MCS-402C: 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.

Unit – 30

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: STATISTICAL REASONING

Unit - 13

Probability and Bayes Theorem.

Unit - 14

Certainty Factors and Rule-Based Systems.

Unit – 31

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.