# M.Sc Information Technology

## Program Structure

### Semester I

<table>
<thead>
<tr>
<th>Sub.Code</th>
<th>Subjects</th>
<th>Credits</th>
<th>Term/Examination Marks</th>
<th>IA Marks</th>
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<tbody>
<tr>
<td>MSIT-101</td>
<td>Essential Mathematics</td>
<td>4</td>
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<td>Programming Concepts and C</td>
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Semester IV

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Elective- 1 Courses

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<td>MSIT-116A</td>
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<tr>
<td>MSIT-116B</td>
<td>E-Commerce</td>
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<td>MSIT-116C</td>
<td>Data Warehousing / Data Mining</td>
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<td>MSIT-116D</td>
<td>Distributed Systems</td>
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Elective- 2 Courses

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<td>MSIT-121A</td>
<td>Software Testing and Practices</td>
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<td>MSIT-121B</td>
<td>dotNet Technology</td>
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<td>MSIT-121C</td>
<td>Cryptography and Network Security</td>
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<td>MSIT-121D</td>
<td>Multimedia and Animation</td>
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M.Sc (IT) - FIRST SEMESTER SYLLABUS

MSIT-101: Essential Mathematics

Objectives:

The objective of this course is to provide students with the mathematical foundations for the study of Information Technology. It is to make them understand the essential mathematical structures and relations which are required for the design and implementation of computer algorithms in appropriate computing environments.

Module 1: Mathematical logic and Set Theory

Unit 1- Mathematical logic I: Introduction, Notation, Connectives, WFF, Tautologies, Logical implication

Unit 2- Mathematical logic II: Logical equivalence, Duality, Normal forms, Rules of inference

Unit 3- Set theory I: Basics, Inclusion, Exclusion, Induction, Simple problems

Unit 4- Set theory II: Counting principles, Permutation, Combination, Pigeon hole principle, Problems

Module 2: Relations, Recurrence relations, Functions

Unit 1- Relations: Properties, Relation matrix, Digraphs, Partition and covering, Equivalence relations, Compatible relations, Composition of binary relations, Warshall’s algorithm

Unit 2- Recurrence relation I: Introduction, Linear recurrence relation (LLR), Homogenous solutions, Particular solutions

Unit 3- Recurrence relation II: Manipulation of numeric and generating functions, Solution of LLR using generating functions, Problems

Unit 4- Functions: Introduction, Types of functions, Composition of functions, Inverse functions, Characteristic function of sets, Permutation functions, Hashing functions, Recursive functions

Module 3: Graph theory
Unit 1- Basics, Representation, Applications of graph theory, Types of graphs, Matrix representations

Unit 2- Isomorphism, Connectedness, Paths, Circuits, Walks, Eulerian graphs, Hamiltonian circuits, Traveling salesman problem

Unit 3- Planar graphs and graph coloring

Unit 4- Graph Algorithms: Minimum Spanning tree algorithms, graphs, Breadth first and depth first searching algorithms.

Module 4: Algebraic structures

Unit 1- Semi groups, Monoids, Groups, Properties, Examples

Unit 2- Subgroups, Cosets, Lagrange’s theorem, Normal subgroups

Unit 3- Homomorphism, Isomorphism, Algebraic system with two binary operations

Unit 4- Group codes, Error detecting codes, Error correcting codes

References:

1. Tremblay and manohar, Discrete Mathematical structures with Applications to Computer Science, Tata Mc GrawHill
3. Kolman, Busby, Ross, Discrete Mathematics for Computer Science, PHI

MSIT-102: Programming concepts and C

Objectives:

The student will learn the effective use of syntax of the C programming language to develop programs, and provide I/O control for special applications. The student will use both the integrated environment development system and command line compilation.

Module 1: Introduction to Problem Solving

Unit 1
Introduction to C language, C language standards features of C, Program Concept, Characteristics of Programming, Structure of C program.

Unit 2
Introduction to C compilers, Creating and compiling C Programs, IDE features of Turbo C compiler, Command line options to compile C program in TC.

Unit 3
Keywords, Identifiers, Variables, constants, Scope and life of variables - local and global variable. Data types and sizes, C tokens, keywords and identifiers, Constants, Variables, Data types, Declaration of variables, Assigning values to variables, Defining symbolic constants.

Unit 4
Basic input/output library functions: Single character input/output i.e. getch(), getchar(), getche(), putchar(). Formatted input/output i.e. printf() and scanf(), Library functions - concepts mathematical and character functions.

Module 2: Operator, Expressions, Control Flow statement

Unit 1
Introduction to Operators, Arithmetic operators, Relational operators, Logical operators, Assignment operators, Increment and decrement operators, Conditional operators, Bitwise operators, Special operators

Unit 2
Arithmetic expressions, Evaluation of expressions. Precedence of arithmetic operators, some computational problems, Type conversions in expressions, Operator precedence and Associativity, Mathematical functions.

Unit 3
Introduction to control flow, Statements and Block, If-Else, Else-If, Nesting of If -Else Statement, Else If Ladder, The ?: Operator Switch Statement, Compound Statement, Loop Controls – For, While, Do-While Loops, Break Continue, Exit, Goto Statement and Labels

Unit 4
Scope of variable, Global and Local variables, Automatic, external, register and static variables.

Module 3: Functions, Arrays and Strings

Unit 1

Unit 2
Function Argument, Passing arguments to function, Return Values, Nesting of Function, main(), Command Line Argument, Recursion. Storage Class specifier – Auto, Extern, Static, Register

Unit 3
Module 4: Pointers and Structures

Unit 1
Declarations, The & and * Operators, Passing pointers to a function, Operations on pointers, Pointer Arithmetic, Pointers and arrays.

Unit 2

Unit 3
Functions Structure and Union-Defining Structure, Declaration of Structure Variable, Accessing Structure Members, Nested Structures.

Unit 4
Array of Structures, Structure Assignment, Structure as Function Argument, Function That Return Structure, Pointer to Structures, Typedef, Unions, Bit-fields

TEXT BOOK:

2. V.Rajaraman “Fundamentals of computers”, PHI (EEE)

REFERENCE BOOKS:


MSIT-103: OPERATING SYSTEM

Objectives:
The objective of this course is to provide a knowledge of operating system; To study the techniques and steps in operating system. The students will understand how different components of OS function, May also sharing various CPU scheduling algorithms newly management in addition, this course introduce UNIX and Linux Operating System.

Module 1:

Unit 2: Feature Migration, Computing Environment, System Components, OS services, System Calls, System Program, System Structure, Virtual Machine.
Unit 3: Storage Management – Introduction of Memory Management, Swapping, Contiguous Allocation, Partitions, Paging, Segmentation, Segmentation with Paging, Demand Paging,
Unit 4: Page Replacement Algorithms, Allocation of Frames, Thrashing, Disk Structure, Disk Scheduling, Disk Management, Swap Space Management.

Module 2:

Unit 2: Threads - Overview, Multithreading Models, Threading Issues, pthreads, Java Threads, CPU Scheduling - Basic Concepts, Scheduling Criteria, Scheduling Algorithms, Multiple Processor Scheduling, Real Time Scheduling.
Unit 3: Process Synchronization and Deadlocks- Critical Section Problem, Synchronization Hardware, Semaphores, Classical problems of Synchronization, Critical Regions, Monitors,

Unit 4:
Deadlocks - System Model, Deadlock Characterization, Methods for handling Deadlocks - Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from deadlock.
Module 3:

Unit 1: File System Interface – File concept, Access Methods, Directory Structure,

Module 4:

Unit 1: UNIX - History, Design Principles, General Purpose Utilities, Navigating the file system, Handling ordinary files, Editors,
Unit 3: Linux Operating System – Design Principles, Kernel Module, Process Management,
Unit 4: Scheduling, Memory Management, File System, Input and Output, Interprocess Communication.

Text Books:-


Reference Books:-

3. The Design of the UNIX Operating System by Maurice J. Bach, Prentice Hall of India.

**MSIT-104: Data Structure and algorithms**

**Objectives:**

This course introduces the concept of data structures and algorithms and their importance in problem solving. The students will learn about how to design an algorithm. They also practice on analyzing algorithms. They study various data structures of type linear and non linear. Further the sequential and linked allocation based representations will also be discussed in this course.

**Module-1:**

**Unit 1**

Introduction to algorithm, Properties of algorithm, Notation for Programs, Some simple examples.

**Unit 2**

Space complexity, Time Complexity, Asymptotic Notation, Practical Complexities, Performance Measurement of simple algorithms,

**Unit 3**

Analyzing Control Structures, Using a barometer, Supplementary examples, Average Case Analysis, Amortized Analysis, Solving recurrences.

**Unit 4**

Searching algorithms, linear search, Conventional sort, selection sort, insertion sort, binary search based insertion sort and their complexities.
Module-2:

Unit 1

Concept of Data structure and its importance: Relationship with algorithm, Classification of data structure, abstract data type / data object (ADT).

Unit 2

Stack, stack as ADT, recursion, expression evaluation, Queue, queue as ADT, queue applications, realization of stack and queues based on sequential allocation, associated algorithms and their time analysis.

Unit 3

Linked list, some general linked list operations: Singly linear, circular and doubly linked list, associated algorithms and their time analysis

Unit 4

Applications of linked lists: Polynomial operations, Dictionary Construction; Sparse matrix multiplication, associated algorithms and their time analysis

Module-3:

Unit 1

Concept of divide and conquer, general structure, Applications finding minimum and maximum and solving Recurrence Equations,

Unit 2

Merge Sort, Quick Sort, binary search and their complexities
Unit 3

Concept of Greedy Method and Optimization problems,

Unit 4

Applications of greedy method Container Loading, 0/1 Knapsack Problem, Minimum Cost Spanning Tree algorithms

Module-4:

Unit 1

Graphs as a data structure, graph representation based on sequential allocation and linked allocation, and associated algorithms with time complexity.

Unit 2

Binary trees, representation of binary trees based on sequential allocation and linked allocation, and associated algorithms with time complexity.

Unit 3

Traversal of binary tree, operations on binary trees, and associated algorithms with time complexity.

Unit 4

Thread binary trees and traversal, representation of forest of trees, traversal of forest, conversion of forest to binary tree and associated algorithms with time complexity.

Text Book:

1. Introduction to data structure and its applications- Trembly and Sorenson.
2. Data structures, Algorithms and Applications in C++ by Sartaj Sahni,
3. Fundamentals of Algorithmics by Gilles Brassard and Paul Bratley, PHI.

Reference Books:

4. Principle of data structure and algorithm – JD Ullman
5. Fundamental of data structure- Sahani.
7. DS+ Algorithm= program – N wirth.
8. Introduction to Algorithms by Cormen, Leiserson, Rivest and Stein.

MSIT-105: Practical 1: C Programming and Data Structures

There shall be at least ten assignments to practice the concepts of data structure and algorithms. The assignments should cover operations on linear data structures such as stack, queue, operations on linked lists, and operations on trees and traversals techniques. For these the students are supposed to do both a priori and a posteriori analysis.

There shall be at least ten assignments to practice the concepts of C programming. The assignments should cover the concepts of recursion, array and sorting techniques

**Programming C Lab cycle**

1) Program to calculate compound interest.
2) Program to calculate roots of a quadratic equation.
3) Program to average of ‘n’ numbers.
4) Program to find whether the given number is
   (i) Prime number or not (ii) Perfect number or not
   (ii) Armstrong number or not (iv) Palindrome or not
5) Program to demonstrate function calling multiple times.
6) Program to read two integers and print the quotient and remainder of the first number divided by the second number.
7) To find sum of first n natural number using ‘GOTO’ statement
8) To find the sum of all Fibonacci numbers in between 1 to n using ‘for’ loop.
9) To find G.C.D and L.C.M of two numbers using ‘WHILE’ loop.
10) Program for following using Recursion
    • Factorial of a number
    • Fibonacci series
11) Array
    (i) To write a program to accept 10 numbers, store them in a single dimensional array and to make the average of the numbers.
    (ii) To make an array of n elements and sort them and to write a program to check whether an input number is palindrome or not.
    (iii) To write a program to accept a string and to count the no of vowels present in this string.
    (iv) To write programs on matrix operation (addition, subtraction & multiplication). Sort given elements using Selection Sort.
    (v) Sort given elements using Insertion Sort.
    (vi) Sort given elements using Merge Sort.
    (vii) Sort given elements using Quick Sort.
    (viii) Implement the following operations on single linked list.
12) To write a program to find the sum of the digits of a given number using function.
13) To find out the factorial of a given number using recursive function.

**Data Structure Lab cycle**

1) To create a two dimensional array of numbers and calculate & display the row & column sum and the grand total.
2) To write a program to insert (Push) an element into the sack and delete (Pop) an element from the stack using pointer.
3) To write a program to convert an infix expression to a postfix expression.
4) Write a program to evaluate a postfix expression.
5) To write a program to insert an element in the queue and delete an element from the queue.
6) To create a circular queue and add an element and delete an element from a circular queue.
7) To create a single linked list and — (a) insert a node in the list (before header node, in between two nodes, end of the list); (b) delete a node from the list (1st node, last node, in between two nodes); (c) Concatenate two lists.
8) To write a program to sort a list of numbers using
   (i) Heap Sort,
   (b) Quick Sort,
   (c) Bubble Sort.
   (d) Merge Sort

9) write a program to search a key element from a list of elements using
   (i) Linear Search
   (ii) Binary Search

M.Sc (IT) - SECOND SEMESTER SYLLABUS

MSIT-107: Computer Organization

Objectives:

- To understand the basic structure of a computer comprising various components, their interconnection and interactions.
- To understand the basic concepts of memory, memory operations, instruction formats, instruction execution, addressing modes and encoding of information.
- To study the fundamental concepts of registers, register transfers, data transfers and various arithmetic and logical operations supported by a machine.
- To study the various ways of organizing control unit, their performance issues and limitations.
- To study the various ways of accessing I/O devices, mechanisms for interfacing I/O devices and popular standard I/O interfaces.
To understand the various ways of addressing memory, CPU-memory interaction, internal organization of memory chips, concept of virtual and cache memories and their performance considerations.

**Module-1: Introduction**

**Unit-1:** Organization and architecture, structure and function, computer components.

**Unit-2:** Computer function, interconnection structures, bus interconnection, memory locations, addressing and encoding of information.

**Unit-3:** Main memory operations, instructions and instruction sequencing, instruction execution and straight-line sequencing, condition codes.

**Unit-4:** Addressing modes, assembly language, stacks and queues, number representation and operations.

**Module-2: Basic Processing Unit**

**Unit-1:** Some fundamental concepts: Register gating and timing of data transfers, Register Transfers, Performing arithmetic or logic operation, Fetching word from memory. Storing a word in memory, Execution of a complete instruction, Branch instruction.

**Unit-2:** Performance Considerations: Multiple bus organization, Overlapping fetch and execution operations, usage of cache memory.

**Unit-3:** Hardwired Control: Organization of the hardwired control unit, separation of the decoding and encoding functions and generating control signals for the processor.
Unit-4: Microprogrammed Control: Organization of the Microprogrammed control unit, Control word, Microinstruction, Microroutine, Control store, Microinstruction formats, Microprogram sequencing, Branch address modification, Bit-ORing, Wide Branch addressing, Microinstruction with next-address field.

Module-3: Input-Output Organization

Unit-1: Introduction, Accessing I/O devices: Memory mapped I/O and I/O mapped I/O. I/O interface for an input device, mechanisms for interfacing I/O devices.

Unit-2: Interrupts: Interrupt I/O, enabling and disabling interrupts, handling multiple devices, vectored interrupts, interrupts nesting and priority structures, Controlling device requests.

Unit-3: Exceptions, Direct Memory Access, DMA operation, Registers in a DMA interface, use of DMA controllers in a computer system.

Unit-4: I/O hardware, details of I/O interface, functions of I/O interface, standard I/O interfaces.

Module-4: System Memory

Unit-1: Basic concepts: Memory addressing, CPU-Main memory connection, memory access type, memory access cycle, Random Access Memory, cache memory, memory interleaving, virtual memory.

Unit-2: Internal organization of semiconductor memory chips, semiconductor RAMs, static memories, dynamic memories, read only memories, memory hierarchy.
**Unit-3:** Cache memory concept, cache memory design parameters, mapping functions, replacement algorithms, performance considerations.

**Unit-4:** Virtual memory concept, memory management by paging, memory management by segmentation, virtual memory address translation.

**Reference Books:**


**MSIT-108: Management Information System**

**Objectives:**
To provide an exposure to various concepts in building Management Information systems. To bring an awareness in choosing of information Technology.

**Module 1:**
**Unit 1:** Introduction to MIS: Concept, Definition, Role of MIS, Impact of MIS, MIS and the User, management as a control system, MIS support to the Management

**Unit 2:** Management effectiveness and MIS, Organization as system. System Engineering: concepts.

**Unit 3:** Types and Systems, Handling System Complexity, Classes of System, General Model of MIS, Need for System Analysis, System Analysis for existing System and New Requirement, System development models, MIS and System Analysis.

**Unit 4:** Information Concepts, Classification of Information, Methods of data and Information Collections, Value of Information, Information: A Quality Product, General model of a human as Information processor, Knowledge Development of Long Range plans of the MIS.
Module 2:
Unit 1: Ascertaining the class of Information, Determining the information requirement, development and implementation of the MIS, Management quality in the MIS, Organization for development of MIS, MIS development process model.


Unit 3: Decision Making Concepts: Decision Making Process, Decision Making by Analytical Modelling, Behavioural Concepts in decision making, Organizational Decision Making, Decision making and DSS

Unit 4: Decision structures, DSS Components, Management Reporting Alternatives.

Module 3:


Module 4

Unit 3: Marketing Systems, Sales Force Automation, CIM, HRM, Online Accounting System

Unit 4: Customer Relationship Management, ERP, Supply Chain Management.

Text Books


Reference Books


MSIT-109: Information Organization and Retrieval

Objectives:

This course is to learn and practice various ways of representing information of different types in a database. The course also introduces students to the associate retrieval algorithms. General architecture of hypothetical information system and its characteristics shall be studied.

Module 1:

Unit 1

Information retrieval using the Boolean model: information retrieval problem, building an inverted index, processing Boolean queries, Beyond Boolean Queries.

Unit 2
The dictionary and postings lists: Determining dictionary terms, Document delineation and character sequence Decoding, Tokenization, Dropping common terms: stop words, Normalization (equivalence classing of terms), Stemming and lemmatization, Postings lists, revisited.

Unit 3

Unit 4

Module 2:

Unit 1
Information Retrieval System Capabilities, Search Capabilities, Browse Capabilities, Miscellaneous Capabilities.

Unit 2

Unit 3

Unit 4

Module 3:

Unit 1
Document and Term Clustering, Introduction to Clustering, Thesaurus Generation, Manual Clustering, Automatic Term Clustering, Item Clustering, Hierarchy of Clusters.
Unit 2

Unit 3
   Multimedia Information Retrieval, Spoken Language Audio Retrieval, Non-Speech Audio Retrieval.

Unit 4
   Hypothetical systems of Graph Retrieval, Imagery Retrieval, Text Retrieval, and Video Retrieval.

Module 4:

   Unit 1
   User Search Techniques, Search Statements and Binding, Similarity Measures and Ranking.

   Unit 2
   Relevance Feedback, Selective Dissemination of Information Search, Weighted Searches of Boolean Systems, Searching the INTERNET and Hypertext.

   Unit 3
   Introduction to Information Visualization, Cognition and Perception, Information Visualization Technologies.

   Unit 4
   Introduction to Information System Evaluation, Measures Used in System Evaluations.

Text Books:


**MSIT-110: Database Management Systems**

**Objectives:**

To understand the basic principles and necessity of DBMS; To understand various transactions and associated programming on databases; To practice best design for an enterprise

**Module 1: Introduction to Database Systems, Entity Relationship, and Data Models**

**Unit – 1: Introduction**

Purpose of Database system, Characteristics of database approach, Advantages of using DBMS, Data Abstraction, Data Models, Instances and schema, Data independence, Database Languages, Database Manager, Database Administrator, Database Users

**Unit – 2: Data Modeling**

Entity sets, attributes and keys, Relationships, Database modeling using entity, Type role and structural constraints, Weak and Strong entity types, Entity-Relationship Diagram, Design of an E-R Database schema, Object modeling, Specialization and generalization, Enhanced entity-relationship (EER).

**Unit – 3: Data Models**
Classification of data models, Hierarchical models - basic concepts, Network model - basic concepts, DBTG CODASYL model, Relational model. Comparison of different models

Unit – 4: Relational Model

Relational model - basic concepts, Enforcing Data Integrity Constraints, Relational-Algebra Operations, Extended Relational Algebra Operations, Relational Calculus, Assertion and Triggers, views.

Module 2: Commercial Query Languages, Database Design, File Organization, Transaction Processing

Unit – 1: Commercial Query Languages

Introduction to SQL, Basic queries in SQL, Advanced queries in SQL, Functions in SQL

Aggregation, Updates in SQLs, Views in SQL, Embedded SQL and 4GLs, Procedural extension to SQL, Introduction to Query-by-example(QBE).

Unit – 2: Database Design

Database design process, Relational database design, Anomalies in a database, Functional dependencies, minimal covers, Normal forms, First Normal Form, Second Normal Form, Third Normal Form, Boyce-Codd Normal Form, Reduction of an E-R schema to Tables.

Unit – 3: File Organization, Indexing and Hashing

Overview of file organization techniques, Secondary storage devices, Operations in files, Heap files and sorted files, Indexing and Hashing- Basic
concepts, Static Hashing, Dynamic Hashing and Extendible hashing, Single level ordered indexes, Multi-level indexes, Other types of indexes: B-Tree index files, B'-Tree index files, Bitmap index,

Hash Index. Buffer management

**Unit – 4: Transaction Processing**

Desirable properties of transactions, Implementation of atomicity and durability, Concurrent executions, Schedules and recoverability, Serializability of schedules, concurrency control, Serializability algorithms, Testing for Serializability.

**Module 3: Concurrency Control, Recovery, Query Processing and Optimization, Advanced Database Applications**

**Unit – 1: Concurrency Control**

Overview of Concurrency Control, Locking techniques, Lock based protocols, Time stamp based protocols, Commit protocols, Optimistic technique, Time stamp ordering multi version concurrency control, Deadlock handling.

**Unit – 2: Database Backup and Recovery**

Recovery mechanisms, Crash recovery, Recovery from transaction failure, Recovery in a Centralized DBMS, Database recovery techniques based on immediate and deferred updates, ARIES recovery algorithm, Shadow paging, Buffer management.

**Unit – 3: Query Processing and Optimization**
Overview, Query interpretation, Equivalence of expressions, Algorithm for executing query operations, Heuristics of Query Optimization, Catalog information for cost estimation of queries, Basic query optimization strategies, Algebraic manipulation

Unit – 4: Advanced Database Applications

Evolution of an Information system, Decision making and MIS, MIS as a technique for making programmed decisions, Navigation Database System Architecture Overview, Data Mining, Data warehouse, Types of transaction processing system.

Module 4: Distributed Databases, Object Oriented Database Design, Implementing Security in Databases, Case Study

Unit – 1: Distributed Databases

Introduction to Distributed Databases, Distributed Data Storage, Distributed Query Processing, Distributed Transactions, Commit Protocols, Distributed Concurrency Control.

Unit – 2: Object Oriented Database Design

Introduction, Approaches to OODs, Object oriented data model, Object identity, Complex Objects, Persistence, Type and class hierarchies, Inheritance Modeling and designing of OODs, Object oriented queries, Versioning in OODs, Object Relational DBMS-Overview.

Unit – 3: Implementing Security in Databases

Unit – 4: Case Study on Popular Database Package Oracle

MSIT-111: Practical 3: Information Organization and Retrieval

There shall be at least 10 assignments on designing information systems. Assignments should cover creation of text database, multimedia database. The students are expected to design and practice retrieval system. They must implement various indexing data structures.

MSIT-112: Practical 4: Data Base Management System

It is to practice creating databases, creating tables, inserting/deleting/updating records of a database. Performing various query operations using any RDBMS (ORACLE/DB2). There shall be at least 16 program assignments.

The list should cover the followings:

- Data Definition, Table Creation, Constraints
- Select, Insert, Update and Delete Commands
- Relational and Logical operators
- Aggregate Functions
- Queries for extracting data from more than one table
M.Sc (IT) – THIRD SEMESTER SYLLABUS

MSIT-113: COMPUTER NETWORKS

Objectives:

The main objective of the course is to understand the resource sharing and connectivity of networked applications. Also to acquire knowledge on working principles of networked applications. The student is expected to learn different forms, signaling, multiplexing, error detecting & error correction techniques.

Module 1:

Unit 1: Introduction: to computer network, topology, applications of networks, LAN, MAN, WAN, OSI model,

Unit 2: Physical layer and its standards

Unit 3: Data link layer, error detection, Hamming code, CRC, checksum

Unit 4: Network layer introduction: The OSI Model-Layered Architecture; TCP/IP Model; Logical Addressing: Ipv4 Addresses – Address Space, Notations, Classful and Classless addressing, NAT; IPv6 Addresses – Structure, Address space.

Module 2:

Unit 1: Internet protocol: Internetworking; IPv4 – Datagram, Fragmentation, Checksum,
Unit 2: Options; IPv6 – Advantages, Packet formats, Extension headers; Transition form IPv4 to IPv6.

Unit 3: ICMP, IGMP, FORWARDING, ROUTING: Address Mapping; ICMP – Types, Message Format, Error reporting, Query;

Unit 4: IGMP – Group Management, IGMP Messages, Format, IGMP Operation, Encapsulation; Forwarding; Unicast Routing Protocols; Multicast Routing Protocols.

Module 3:

Unit 1: Transport layer introduction: Process to Process Delivery; UDP – Ports for UDP, User Datagram, Checksum,

Unit 2: UDP operation, Use of UDP; TCP – Services, Features, Segment, Connection, Flow, Error,

Unit 3: Congestion Control; SCTP – Services, Features, Format.

Unit 4: Congestion control and qos: Data Traffic; Congestion; Congestion Control – Open Loop, Closed Loop; Two Examples; Quality of Service(QOS); Techniques to improve QOS – Scheduling, Traffic shaping, Resource Reservation, Admission Control.

Module 4:

Unit 1: APPLICATION LAYER: Domain Name System – Namespace, DNS, Distribution of Namespace, DNS in the Internet, Resolution;

Unit 2: Remote Logging; Electronic Mail; File Transfer; WWW and HTTP;

Unit 3: Network management System; SNMP – Concept, SNMP,

Unit 4: Multimedia – Streaming stored Audio/Video; Streaming Live Audio/Video; RTP; VOIP

TEXT BOOK:

**REFERENCE BOOKS:**


**MSIT-114: OOPS with Java**

**Objectives:-**

To understand the concepts of object oriented programming and to meet the Challenges in building up Object based applications; To know, how Java technology is useful in building OO based applications; To learn the importance of object oriented paradigm; to practice the concepts of OOP in programming.

**Module-1:**

**Unit 1-Introduction and Overview of Java:** Creation of Java, Why Java, Byte Code, Java Buzzwords, Object-oriented programming, Simple Java program.

**Unit 2-Data types Variables and Arrays:** Primitive Types-Integers, Floating Point, Characters, Booleans; Literals, Variables, Type conversion and casting, Automatic Type Promotion in
Expressions, Arrays.

**Unit 3-Operators:** Arithmetic, Bitwise, Relational, Boolean logical, Assignment, ? Operators, Operator Precedence, Using parenthesis.

**Unit 4-Control Statements:** Selection, Iteration, Jump Statements.

**Module-2:**

**Unit 1-Introducing Classes:** Class Fundamentals, Declaring Objects, Assigning Object Reference variables, Introducing Methods, Constructors, this keyword, Garbage collection, finalize() method, Stack class.

**Unit 2-Closer Look at Methods and Classes:** Overloading Methods, Using Objects as parameters, Argument passing, Returning objects, Recursion, Access control, static, final, Nested and Inner classes, Using Command line arguments.

**Unit 3-Inheritance:** Inheritance basics, Using super, Multilevel Hierarchy, When constructors are called, Method overriding, Dynamic method dispatch, Abstract classes, final with inheritance, Object class.

**Packages and Interfaces:** Packages, Access protection, Importing Packages, Interfaces.

**Unit 4-Exception Handling:** Exception handling fundamentals, Types, Uncaught exceptions, try and catch, Multiple catch clauses, Nested try statements, Built-in exception, Creating own exception subclasses, Chained exceptions, Using Exceptions.

**Module-3:**
Unit 1-Multithreaded Programming: Thread model, Main thread, Creating a thread, Multiple thread, `isAlive()` and `join()`, Priorities, Synchronization, Interthread communication, Suspending-Resuming-Stopping threads, Multithreading.

Unit 2-The Applet class: Applet Basics, Architecture, Applet skeleton, Simple Applet display methods, Requesting repainting, Using the Status Window; The HTML APPLET tag, Passing parameters to Applets, `getDocumentbase()` and `getCodebase()`, AppletContext and `showDocument()`, AudioClip Interface, AppletStub Interface, Output to the Console.

Unit 3-Event Handling: Two event handling mechanisms, Delegation event model, Event classes, Sources of events, Event listener interfaces, Using the delegation event model, Adapter classes, Inner classes.

Unit 4-A Tour of Swing: JApplet, JFrame and JComponent, Icons and Labels, Handling threading issues, Text fields, Buttons, Combo boxes, Tabbed panes, Scroll panes, Trees, Exploring Swing.

Module-4:

Unit 1-The Web Explained: How It Works


Unit 2-Perl: Introduction, Perl Documentation, Perl Syntax Rules.

MySQL: Introduction, Tutorial, Database Independent Interface, Table Joins, Loading and Dumping a Database.
Unit 3-The Common Gateway Interface: Introduction, Apache Configuration, A First CGI Program, What Can Go Wrong?, CGI.pm Introduced, CGI.pm HTML Shortcuts, Information Received by the CGI Program, Form Widget Methods, CGI Security Considerations, A Note About die(), Project-CGI/ MySQL /DBI.

Unit 4-Server Side Includes: Introduction, Security Considerations.

PHP: Introduction, Embedding PHP Into HTML, Configuration, Quick Examples, Language Syntax, Built-In PHP Functions, PHP and MySQL, Project

Text Books:

   Herbert Schildt

2. Open Source Web Development with LAMP
   James Lee, Brent Ware

Reference Books:

   Patrick Naughton

   Balaguruswamy
**MSIT-115: Software Engineering**

**Objectives:**

- To understand the discipline of software engineering, various phases involved in developing a software product and the challenges in software development task.
- To understand the importance of software process, their characteristics and various software process models normally followed while developing a software product.
- To understand the importance of information gathering, requirements analysis, and the systems models.
- To learn the methods for estimating software project parameters, planning, scheduling, handling risks and controlling changes during the development task.
- To know about the software design concepts, design approaches, design metrics and characteristics of good design.
- To understand the process of coding, coding standards, guidelines, various levels and methods of testing and debugging.
- To learn the software reliability and quality, associated metrics, software maintenance and CSAE tool support in software development.

**Module-1: Introduction**

**Unit-1:** The role of software engineering in system design, software products, emergence of software engineering, notable changes in software development practices, the changing nature of software, the software engineering challenges,

**Unit-2:** Software processes, desired characteristics of software process, the software life cycle, software development process models, comparison of process models.

**Unit-3:** Requirement analysis and specification, need for SRS, characteristics of SRS, organization of SRS document. Techniques for representing complex logic, functional specification with Use Cases, formal system development techniques.
Unit-4: System models: Data-flow models, semantic data models, object models, data dictionaries.

Module-2: Software Project Management

Unit-1: Main objectives of SPM, responsibility of software project managers, project planning, structure of software project management document.

Unit-2: Project size estimation metrics, project estimation techniques (empirical, heuristic, analytical), Halstead’s software science.

Unit-3: Project scheduling and staffing, work break down structure, Gantt charts, PERT charts, organization and team structures, attributes of a good software engineer.

Unit-4: Risk management plan and configuration management plan.

Module-3: Software Design Concepts

Unit-1: Introduction, cohesion and coupling, software design approaches, design principles, module level concepts.

Unit-2: Function-oriented software design: Overview of the structured analysis and structured design methodology, data flow diagrams, extending DFD to real time systems, structure design.

Unit-3: Object-oriented software design concepts: Overview, UML, object-oriented design methodology, OOD metrics and goodness criteria.

Unit-4: User-interface design: Characteristics, basic concepts, command language based interface, menu-based interface, direct manipulation interfaces, windowing systems, types of widgets, overview of X window.

Module-4: Coding and Testing, Software Reliability and Quality, Maintenance and CASE tools
**Unit-1:** Coding standards, guidelines, code walkthroughs, code inspections, software documentation, unit testing, black box testing, white box testing.

**Unit-2:** Debugging, approaches and guidelines, program analysis tools, integration testing, system testing, general issues associated with testing.

**Unit-3:** Software reliability metrics, software reliability specification, reliability growth modeling, software quality factors, quality metrics, software quality management system.

**Unit-4:** The maintenance process, software reverse engineering, software maintenance process models, estimation of maintenance costs, maintainability measurement. CASE and its scope, CASE support in software life cycle, characteristics of CASE tools, architecture of CASE environment.

**Text Books:**


Rajib Mall – Fundamentals of Software Engineering, PHI.


Ghezzi, Jazayeri, Mandrioli – Fundamentals of Software Engineering, PHI.

**MSIT-116A: Advanced Management Information systems**

**Objectives:**
To provide an exposure to various concepts in Advanced Management Information Systems It is necessary to bring awareness in choosing of type of information Technology. This is to improve the effectiveness and deficiency of academic and administrative process; To enhance the knowledge in the area of advanced Management Information System.
Module 1
Unit 1: Introduction, The changing face of the Business Environment, types of information system, Information system vs. Information Technology, Emerging trends in information technology, Hardware, Software, Network resources.

Unit 2: Date Resources, Impact of Internal Revolution Business, Managing E-Transformation, Case Study, Introduction to Telecommunications and Computer Network for Business.

Unit 3: Competitive edge of computer Network’s, Networking for people, Evolution of computer Network, Technological foundation of a computer network, types of architecture, network media, network protocols.

Unit 4: quality of service internet telephony and voice over internet protocols, network planning design and management, case study, Introduction to Database Management.

Module 2
Unit 1: Application of DBMS in management, DBMS Concepts, Steps in Designing DB, Objects, Normalization, DBMS, Date Model, Object Oriented date Model, Types of 1 Composite Information Systems.

Unit 2: Data Integration and Strategies Data Planning Date Warehousing, Case Study, Introduction to Enterprise Information System.

Unit 3: Evolution of enterprise Information system, Emergence of ERP, ERP systems, ERP-Enterprise Solutions, ERP-Market, E-CRM Systems, Customer Service and Support Automation
Unit 4: Enterprise marketing automation (EMA), Comparative Analysis of E-CRM Software Vendor and Products, Evaluating an E-CRM Product.

Module 3:
Unit 1: Introduction, Business intelligence, Business intelligence architecture, Business intelligence Tools, Business intelligence user groups, Data mining, Data mining methods, Data mining frame work.

Unit 2: OLAP and multidimensional database modeling decision trees, Some BI Application: SCM and procurement, Business intelligence in the field of HR, Finance.

Unit 3: Introduction, The profile of a chief information office, The role of a CIO, The CIO’s in Innovation Challenge of CIO.

Module 4:


Unit 2: System Implementation, Successful Implementation through Change Management and its advantages.


Text Books


Reference Books


MSIT-116C: Data Warehousing and Data Mining

Objectives:

This course introduces the learners with concepts of data warehousing and data mining. It will explain how a typical system would be. The learner will practice OLAP technology. Various
tasks involved in data mining activity shall be discussed. Spatial data mining and multimedia data mining is also covered.

Module 1:

Unit 1
Introduction, Operational Data Stores (ODS), Extraction Transformation Loading (ETL), Data Warehouses. Design Issues, Guidelines for Data Warehouse Implementation, Data Warehouse Metadata.

Unit 2
DataWarehouse and OLAP Technology: An Overview, A Multidimensional Data Model, DataWarehouse Architecture, DataWarehouse Implementation, DataWarehousing to Data Mining.

Unit 3
Data Cube Implementations, Data Cube operations, Implementation of OLAP and overview on OLAP Softwares.

Unit 4
Introduction to datamining, Challenges, Data Mining Tasks, Types of Data, Data Preprocessing, Measures of Similarity and Dissimilarity, Data Mining Applications.

Module 2:

Unit 1
Basic Concepts and Algorithms of mining Frequent Patterns, Associations, and Correlations, Frequent Item set Generation, Rule Generation, Compact Representation of Frequent Itemsets.

Unit 2
Alternative methods for generating Frequent Itemsets, FP Growth Algorithm, Evaluation of Association Patterns.

Unit 3
Basics of Classification, General approach to solve classification problem, Prediction, Issues Regarding Classification and Prediction.

Unit 4
Classification by Decision Tree Induction, Bayesian Classification, Rule-Based Classification.
Module 3:

Unit 1
Classification by Back propagation, Support Vector Machines, Associative Classification, Decision Trees, Lazy Learners (K-NN).

Unit 2
Genetic Algorithms, Rough Set Approach, Fuzzy Set Approaches.

Unit 3

Unit 4
Overview of cluster analysis, Types of Data and Computing Distance, Different algorithms for data clustering, Partitional Methods, Hierarchical Methods.

Module 4:

Unit 1
Density Based Methods, Grid-Based Methods, Model-Based Clustering Methods, Clustering High-Dimensional Data. Constraint-Based Cluster Analysis, Outlier Analysis, Cluster Validation Techniques.

Unit 2
Mining Spatial Data, Spatial Data Cube Construction and Spatial OLAP, Mining Spatial Association and Co-location Patterns, Spatial Clustering Methods, Spatial Classification and Spatial Trend Analysis, Mining Raster Databases.

Unit 3
Mining Text Data: Text Data Analysis and Information Retrieval, Dimensionality Reduction for Text, Text Mining Approaches.

Unit 4
Mining Multimedia Data, Similarity Search in Multimedia Data, Multidimensional Analysis of Multimedia Data, Mining Associations in Multimedia Data.

Text Books:
MSIT-116D: Distributed Systems

OBJECTIVES:

The goal is to explain the importance of a course about theory of distributed systems; in this sense, the course will cover the design and implementation of effective distributed systems, issues related to computation and communication, significant advances in distributed architecture infrastructure.

Module 1: Introduction

Unit 1: Introduction, Examples of distributed systems, resource sharing and challenges
Unit 2: System Models, Architecture Models, Fundamental models
Unit 3: Architecture of distributed systems, Data access architecture, Execution architecture-vertical sluice-two-tiered client/server, stored procedure, three tiered architecture
Unit 4: networking and Internetworking, types of network, Internet protocols

Module 2: Synchronization and communication

Unit 1: Interprocess communication, The API for the internet protocols
Unit 2: external data representation and marshalling, client server communication, group communication
Unit 3: distributed objects and remote invocation, communication between distributed objects
Unit 4: remote procedure call, events and notifications

Module 3: Operating system support and Security
Unit 1: Operating system layer, Protection, process and threads
Unit 2: Communication and invocation, operating system architecture
Unit 3: Overview of security techniques, cryptographic algorithms
Unit 4: Digital signatures, cryptography pragmatics

Module 4: Distributed File Systems and Name services

Unit 1: File service architecture case study, Enhancement and further development
Unit 2: Domain name system, directory services, global name services
Unit 3: Peer-to-Peer systems, routing overlays, application and case study
Unit 4: Time and global states, clocks, events and process states, synchronizing physical clocks.

REFERENCE BOOKS:


**MSIT-116B: E-Commerce**

Objectives:-

To provide an exposure to various concepts in E-commerce; To improve effectiveness and efficiency of academic and administrative process, enhance and implement an e-commerce system that meets all documented functional requirements to complete transactions.

Module-1:

Unit 1-Introduction part 1; Introduction of E-commerce, Advantages and Limitation of E-commerce,
Unit 2-The Role of Strategy in E-commerce, Value Chains in E-commerce.

Unit 3-Value Chains in E-commerce, Integrating E-commerce.
Unit 4- Integrating E-commerce. Launching a Business on the Internet.

Module-2:

Unit 1- Designing web sites, The Life Cycle of Site Building-From Page to Stage.

Unit 2- Building a Web Site, Web-Based Business-to-Business, E-Commerce.


Unit 4- Requirements for Internet-Based Payments.

Module-3:

Unit 1- Electronic Payment Media, Credit cards, Debit cards, Smart cards, Digital Signature.

Unit 2- Security in cyberspace, designing for security

Unit 3- How Much Risk Can You Afford, The Virus: Computer enemy Number one,
Unit 4- security Protection and Recovery. Marketing on the Internet. Cyber frauds, Financial frauds e-mail frauds.

Module-4:
Unit 1- Online Shopping, Internet Marketing Techniques

Unit 2- Legal and ethical issues, Legal infrastructure for e-commerce in India.

Unit 3- International cyber law (IT ACT 2000 and the latest cyber law)
Unit 4- The E-cycle of internet marketing case study.

REFERENCE:
1. Electronic commerce- Elias Malady
2. Frontiers of Electronic commerce-Kalakos Whinstone.
3. E-Commerce- Mamta Bhusry
4. Electronic Commerce-Gary P.Schneider

**MSIT-117 Practical 5: Computer Networks**

It is to understand the resource sharing and connectivity of networked applications. Also to acquire knowledge on working principles of networked applications. The student is expected to learn different forms, signaling, multiplexing, error detecting & error correction techniques.

**MSIT-118 Practical 6: OOPS with JAVA**

It is to practice various Object oriented paradigms using JAVA technology. The candidates are expected to design and implement programs for various applications involving Java features such as encapsulation, inheritance, polymorphism (function and operator overloading), multi-threading, exception handling, file management and applets. There shall be at least 10 program assignments.

**M.Sc(IT)-FOURTH SEMeSTER SYLLABUS**
MSIT-119: Web Technologies

Objectives:

To understand the principles of designing and developing GUI based applications; To acquire and practice software development phases using web tools; To integrate and synchronize various components to realize new applications.

Module 1:

Unit 1: Fundamentals of Web, Internet, WWW, Web Browsers, and Web Servers; URLs;

Unit 2: MIME; HTTP; Security; The Web Programmers Toolbox.

Unit 3: XHTML, Origins and evolution of HTML and XHTML; Basic syntax; Standard XHTML document structure;

Unit 4: Basic text markup. Images; Hypertext Links; Lists; Tables; Forms; Frames; Syntactic differences between HTML and XHTML.

Module 2:

Unit 1: Introduction; Levels of style sheets; Style specification formats; Selector forms; Property value forms;

Unit 2: Font properties; List properties; Color; Alignment of text; The Box model; Background images;

Unit 3: The <span> and <div> tags; examples

Unit 4: Conflict resolution examples

Module 3:
Unit 1: Javascript Overview of Javascript; Object orientation and Javascript; General syntactic characteristics; Primitives, operations, and expressions;

Unit 2: Screen output and keyboard input; Control statements; Object creation and modification; Arrays;

Unit 3: Functions; Constructor; Pattern matching using regular expressions; Errors in scripts; Examples.

Unit 4: XML Introduction; Syntax; Document structure; Document Type definitions; Namespaces; XML schemas; Displaying raw XML documents; Displaying XML documents with CSS;

Module 4:

Unit 1: Perl, CGI Programming Origins and uses of Perl; Scalars and their operations; Assignment statements and simple input and output;

Unit 2: Control statements; Fundamentals of arrays; Hashes; References; Functions;

Unit 3: Pattern matching; File input and output; Examples. The Common Gateway Interface; CGI linkage; Query string format; CGI.pm module; A survey example; Cookies.

Unit 4: Servlets and Java Server Pages, Overview of Servlets; Servlet details; A survey example; Storing information on Clients; Java Server Pages.

Text Books:

Reference Books:
MSIT-120: DOTNET TECHNOLOGY

Objectives:
It is to practice various .Net concepts using C# programming; The candidates are expected to design and implement programs for various applications.

Module - 1:


Unit 2: The Role of the Common Intermediate Language, 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

Unit 3: Common Languages Specification, Understanding the Common Language Runtime A tour of the .NET Namespaces, Increasing Your Namespace Nomenclature, Deploying the .NET Runtime


Module - 2:

Unit 1: 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 3: Understating Static Methods, Methods Parameter Modifies, Array Manipulation in C
#, String Manipulation in C#, C# Enumerations, Defining Structures in C#, Defining Custom Namespaces.

Unit 4: 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, 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.

Module 3:

Unit 1: 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 2: The Family Block, the Last Chance Exception Dynamically Identifying Application – and System Level Exception Debugging System Exception Using VS. 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.

Unit 3: INTERFACES AND COLLECTIONS: Defining Interfaces Using C# Invoking Interface Members at the object Level, Exercising the Shapes Hierarchy, Understanding Explicit Interface Implementation, Interfaces As Polymorphic Agents, Building Interface Hierarchies, Implementing,
Unit 4:Implementation, Interfaces Using VS .NET, understanding the IConvertible Interface, Building a Custom Enumerator (IEnumerable and Enumerator), Building Cloneable objects (ICloneable), Building Comparable Objects (IComparable), Exploring the system. Collections Namespace, Building a Custom Container (Retrofitting the Cars Type).

Module 4:

Unit 1: CALLBACK INTERFACES, DELEGATES, AND EVENTS, ADVANCED TECHNIQUES: Understanding Callback Interfaces, Understanding the .NET Delegate Type, Members of System. Multicast Delegate, The Simplest Possible Delegate Example, , Building More a Elaborate Delegate Example, Understanding Asynchronous Delegates, Understanding (and Using)Events.
Unit 2: The Advances Keywords of C#, A Catalog of C# Keywords Building a Custom Indexer, A Variation of the Cars Indexer Internal Representation of 64 Type Indexer. Using
C# Indexer from VB .NET. Overloading operators, The Internal Representation of Overloading Operators, interacting with Overload Operator from Overloaded- Operator-Challenged Languages, Creating Custom Conversion Routines, Defining Implicit Conversion Routines, The Internal Representations of Customs Conversion Routines

**Unit 3: UNDERSTANDING .NET ASSEMBLES:** Problems with Classic COM Binaries, An Overview of .NET Assembly, Building a Simple File Test Assembly, A C#. Client Application, 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 4:** Understanding Private Assemblies, Probing for Private Assemblies (The Basics), Private A Assemblies XML Configurations Files, Probing for Private Assemblies (The Details), Understanding Shared Assembly, Understanding Shared Names, Building a Shared Assembly, Understanding Delay Signing, Installing/Removing Shared Assembly, Using a Shared Assembly.

**TEXT BOOKS:**

**REFERENCE BOOKS:**

**MSIT-121A: Software Testing and practices**

**Objectives:**

The major objectives of this course are to introduce the concepts, metrics, and models in software quality assurance. The course covers components of software quality assurance systems before, during, and after software development. It presents a framework for software quality assurance and discuss individual components in the framework such as planning, reviews, testing, configuration management, and so on. It also discusses metrics and models for software quality as a product, in process, and in maintenance. After having
studied this course, students will develop an understanding of software quality and approaches to assure software quality.

Module-1: Introduction

Unit-1: The software quality challenge: The uniqueness of software quality assurance, the environments for SQA is developed, the main characteristics of SQA environment.

Unit-2: Software quality: Software, errors, faults and failure, classification of the causes of software errors, software quality-definition, SQA-definitions and objectives, software quality control, SQA activities.

Unit-3: Software quality factors: Comprehensive software quality requirements, classifications of software requirements into software quality factors, software quality factors for product operation, revision and transition, alternative models of software quality factors, software compliance with quality factors.

Unit-4: The components of software quality assurance system: SQA architecture, pre-project components, software project life cycle components, infrastructure components for error prevention and improvement, management SQA components, SQA standards, system certification, and assessment components, human components, construction of an organization’s SQA system.

Module-2: SQA Components in the Project Life Cycle

Unit-1: Integrating quality activities in the project life cycle: Classical and other software development methodologies, factors affecting intensity of quality assurance activities in the development process, verification, validation and qualification, a model for SQA defect removal effectiveness and cost.

Unit-2: Reviews: Review objectives, formal design reviews, peer reviews, a comparison of the
team review methods, expert opinions.

Unit-3: Assuring the quality of software maintenance components: Introduction, foundations of high quality, pre-maintenance software quality components, maintenance software quality assurance tools, assuring the quality of external participants’ contributions.

Unit-4: Case tools and their effect on software quality: Case tools, contribution of CASE tools to software quality product, contribution of CASE tools to software maintenance quality, contribution of CASE tools to improved project management.

Module-3: Software Quality Infrastructure Components

Unit-1: Procedures, work instructions and quality devices: The need for procedures and work instructions, procedures and procedures manual, work instructions and manuals, procedures and work instructions -preparation, implementation and updating, templates and checklists.

Unit-2: Staff training and certification: Introduction, objectives, the training and certification process, determining professional knowledge requirements, determining training and updating needs, planning training and updating programs, defining positions requiring certification, planning the certification process, delivery of training and certification programs, follow-up subsequent to training and certification, corrective and preventive actions.

Unit-3: Software configuration management: Software configuration, its items and its management, SCM tasks and organization, software change control, release of SC versions, provision of SCM information services, SCM audits, tools for managing software configuration.

Unit-4: Documentation control: Introduction, controlled documents and quality records, the
controlled document list, controlled document preparation, issues of controlled
document approval, storage and retrieval.

Module-4: Management Components of Software Quality

Unit-1: Software quality metrics: Objectives of quality measurement, classification of
software quality metrics, process and product metrics, implementation of software
quality metrics, limitations of software metrics.

Unit-2: Quality management standards: Scope, ISO 9000 and ISO 9000-3, certification
according to ISO 9000-3, CMM and CMMI assessment methodology, the Bootstrap
methodology, ISO/IEC15504 software process assessment standard.

Unit-3: Organizing for quality assurance: Top management’s quality assurance activities,
department management responsibilities for quality assurance, project management
responsibilities for quality assurance, tasks and method of operation of SQA unit, SQA
trustees, committees and forums.

Unit-4: Costs of software quality: Objectives of costs of software quality metrics, the classical
and extended model of cost of software quality, application of a cost of software
quality system, problems in the application of a cost of software quality metrics, the
future of SQA- challenges and capabilities.

Text Books:

- Daniel Galin, Software Quality Assurance: From Theory to Implementation, Addison


Watts S. Humphrey, Managing the software process, Addison-Wesley.

**MSIT-121B: SOFTWARE PROJECT MANAGEMENT AND PLANNING**

**Objectives:**

The main objective of the course is to understand the software project management and their applications; Also to acquire knowledge on working principles of project related applications.

**Module 1:**

**Unit 1: Introduction to project management**

Importance of software project management: What is a project?, Problems with Software Projects, What is Project Management?; Stages of Project: The Feasibility Study- The Cost-benefit Analysis, Planning, Project Execution, Project and Product Life Cycles; The Stakeholder of Project: All parties of project, The Role of Project Manager; Project Management Framework; Software Tools for Project Management

**Unit 2: project planning**

Integration Management: What is Integration Management, Project Plan Development, Plan Execution

**Unit 3: Scope management**

Scope Management: What is Scope Management?, Methods for Selecting Projects, Project Charter, Scope Statement, Work Breakdown Structure; Stepwise Project Planning: Overview, Main Steps in Project Planning; Use of Software (Microsoft Project) to Assist in Project Planning Activities; Case study.
Unit 4: project scheduling

Time Management: Importance of Project Schedules, Schedules and Activities, Sequencing and Scheduling Activity; Project Network Diagrams: Network Planning Models, Duration Estimating and Schedule Development, Critical Path Analysis, Program Evaluation and Review Technique (PERT); Use of Software (Microsoft Project) to Assist in Project Scheduling; Case study.

Module 2:

Unit 1: cost estimation principles and importance


Unit 2: cost estimation models

Estimating by Analogy; COCOMO Model; Cost Budgeting; Cost Control; Use of Software (Microsoft Project) to assist in Cost Management, Case study.

Unit 3: Quality management characteristics and importance

Quality of Information Technology Projects; Stages of Software Quality Management: Quality Planning, Quality Assurance,

Unit 4: Quality management tools and case study

Quality Control; Quality Standards; Tools and Techniques For Quality Control; Case study.
Module 3:

Unit 1: Human resources management

What is Project Human Resources Management? ; Keys to Managing People ;
Organizational Planning ;

Unit 2: Case study and issues involved

Issues in Project Staff Acquisition and Team Development ; Using Software to Assist
in Human Resource Management ; Case study.

Unit 3: Planning and reporting

Communications Planning; Information Distribution ; Performance Reporting ;
Administrative Closure ;

Unit 4: Case study description

Suggestions for Improving Project Communications ; Using
Software to Assist in Project Communications ; Case study.

Module 4:

Unit 1: Risk management and case study

The Importance of Project Risk Management ; Common Sources of
Risk in IT projects ;
Risk Identification ; Risk Quantification ; Risk Response
Development and Control ;
Using Software to Assist in Project Risk Management ; Case study.

Unit 2: Procurement procedures

Importance of Project Procurement Management ; Procurement
Planning ; Solicitation.
Unit 3: Case study description

Source Selection ; Contract Administration ; Contract Close-out ; Case study.

Unit 4: Planning, execution and closing

Introduction to Project Management Process Groups ; Project
Initiation ; Project
Planning; Project Executing ; Project Controlling and Configuration
Management ; Project Closing.

Text Books


References:


Software requirements
**Software**
- Microsoft Project 2003

**MSIT-121C: Cryptography and Network Security**

**Objectives:**

To know the encryption techniques and standards in Cryptography; To learn the skills required to develop Network Security and System security’

**Module 1: Introduction and Classical encryption techniques**

**Unit 1-** Introduction Part 1: Security trends, OSI architecture, Security attacks

**Unit 2-** Introduction Part 2: Security services, security mechanisms, A model for security

**Unit 3-** Classical encryption techniques Part 1: Symmetric ciphers, Substitution models

**Unit 4-** Classical encryption techniques Part 2: Transposition techniques, Rotor machines, Steganography.

**Module 2: Block Ciphers and Encryption standards**

**Unit 1-** Block cipher principles, DES, Example

**Unit 2-** Strength of DES, Differential and linear cryptanalysis, Block cipher design principles

**Unit 3-** Multiple DES, Modes of Operation

**Unit 4-** Stream Ciphers, Example

**Module 3: Public Key encryption**

**Unit 1-** Background Mathematics- Prime numbers, Fermat’s and Euler’s theorems, Testing for primality, Chinese remainder theorem, Discrete logarithms

**Unit 2-** Principles of public key systems

**Unit 3-** RSA with proof, example, security issues.
Unit 4 - Diffie - Hellman key exchange, Authentication, Digital signatures

Module 4: Network Security and System security

Unit 1 - Internet primer, Authentication service, E-mail security

Unit 2 - IP security, Web security

Unit 3 - Intruders, Detection, Password management

Unit 4 - Malicious software, Firewalls

References:

2. Charlie Kauffman, Radia Perlman, Mike Speciner, Network Security-Private Communication in a public World, Pearson Education Asia
3. Atul KAhan, Cryptography and Network Security, Tata MCGravHill

MSIT-121D: Multimedia and Animation

Objectives:

To understand the principles and applications of Multimedia and Animation; To acquire skills to use Multimedia and Animation applications; To integrate and synchronize the Multimedia and Animation techniques for new application problems.

Module-1:

Unit-1:


Unit 2:

Unit 3:

Airborne Imaging, Graphics Interchange Format, Joint Photographic Experts Group, Pixel Phone, Pixel Art, Graphics Chipset Multimedia and Graphics – Types of graphics, advantages and disadvantages of graphics,

Unit 4:

Vector graphics-bitmap graphics and its features, Different Types of Digital Media Technology -JPEG, GIF, Multimedia and Hardware Requirement: Input- out devices, Video display devices,

Module-2:

Unit 1:

Multimedia Graphics File Formats - Bitmap Formats,, Vector Formats , Metafile Formats, Scene Formats, Animation Formats, Multimedia Formats, Hybrid Formats, Hypertext and Hypermedia Formats.

Unit 2:

3D Formats, Virtual Reality Modeling Language (VRML) Formats, Audio Formats, Font Formats, Page Description Language (PDL) Formats. Different types of multimedia tool for editing: Video editing: Relationship between MPEG, JPEG, and MJPEG, editing methods,
Unit 3:

Two-Dimensional Geometric Transformation-Basic transformations, translation, rotation, scaling, matrix representations, and homogeneous, coordinates, composite transformations, translations, rotations, scaling,

UNIT 4:

The viewing pipeline, viewing coordinate reference frame, window-to-viewport coordinate transformation, two-dimensional viewing functions clipping operations, point clipping, line clipping, Cohen - Sutherland line clipping,

Module-3:

Unit 1:

Introduction to Animation, definition of animation, The History of Animation, line art and animation,

Unit 2:

Difference between film and animation, principles of animation, of approaches animation, basic animation techniques,

Unit 3:

Advanced animation techniques-bitmapped and shape elements, recording animation,

Unit 4:

Classification of Animation, difference between conventional method of animation and digital animation, types of animation.

Module-4:
Unit 1:

Animation and file formats, Hardware and software requirements, Difference between 2D and 3D animation - film, cartoon movie, animation and broadcasting,

Unit 2:

Animation types - authoring tool, presentations, applications, interaction, 2D and 3D animations- projects simple animations,

Unit 3:

video content, complex presentations, applications. Anatomy of human being, 3D animation, media-rich 2D, 3D applications - pictures, sound, video, and special effects,

Unit 4:

Animation files and internet, Movie types and its uses in supportability for the web.

Text Books

3. Designing Interfaces by Jenifer Tidwell
4. Digital Multimedia by Nigel Chapman
5. Information Architecture for the World Wide Web: Designing Large-Scale Web Sites by Peter Morville, Louis Rosenfeld
6. Information Visualization, Second Edition: Perception for Design by Colin Ware
7. Letting Go of the Words: Writing Web Content that Works by Janice Redish
8. Multimedia Applications (X.media.publishing) by Ralf Steinmetz
10. *Visual Thinking: for Design* by Colin Ware

11. *Writing for New Media, Third Edition: Content Development for Bloggers and Professionals* by Timothy Paul Garrand

Publisher: Springer 1997