

**Scheme & Syllabus of  
Master of Science (IT)  
(M Sc IT)  
Batch 2015**



By  
Department of Academics

**Punjab Technical University**

**Scheme and Syllabus  
Master in Science[ IT]  
Batch-January 2015 Onwards**

**First Semester**

Course Code	Course Title	Load Allocations			Marks Distribution		Total Marks	Credits
		L	T	P	Internal	External		
MSIT101/ MCA 101	Information Management	4	1	-	40	60	100	5
MSIT102/ MCA102	Object Oriented Programming in C++	4	1	-	40	60	100	5
MSIT103/ MCA103	Computer Organization and Assembly Language	4	1	-	40	60	100	5
MSIT104	Operating system	4	1	-	40	60	100	5
MSIT105/ MCA105	Technical Communication	3	1	-	40	60	100	4
MSIT106/ MCA 106	Software Lab – I (Information Management)	-	-	4	60	40	100	2
MSIT107/ MCA 107	Software Lab – II (Object Oriented Programming in C++)	-	-	4	60	40	100	2

**Second Semester**

Course Code	Course Title	Load Allocations			Marks Distribution		Total Marks	Credits
		L	T	P	Internal	External		
MSIT201/ MCA 204	Data Communication and Networks	4	1	-	40	60	100	5
MSIT202/ MCA 202	Relational Database Management System	4	1	-	40	60	100	5
MSIT203/ MCA 203	Data Structures	4	1	-	40	60	100	5
MSIT204	Web Technologies	4	1	-	40	60	100	5
MSIT205/ MCA206	Software Lab – III (Relational Database Management System)	-	-	4	60	40	100	2
MSIT206/ MCA 207	Software Lab – IV (Data Structures)	-	-	4	60	40	100	2
MSIT207	Software Lab – V (Web Technologies)	-	-	4	60	40	100	2

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**Third Semester**

Course Code	Course Title	Load Allocations			Marks Distribution		Total Marks	Credits
		L	T	P	Internal	External		
MSIT301	Computer Graphics	4	1	-	40	60	100	5
MSIT302/ MCA 303	Software Engineering	4	1	-	40	60	100	5
MSIT303/ MCA 304	Java Programming	4	1	-	40	60	100	5
MSIT304/ MCA 104	Accounting and Financial Management	4	1	-	40	60	100	5
MSIT305	Software Lab – VI (Computer Graphics)	-	-	4	60	40	100	2
MSIT306/ MCA 307	Software Lab – VII (Java Programming)	-	-	4	60	40	100	2
MSIT307	Minor Project	-	-	8	60	40	100	4

**Fourth Semester**

Course Code	Course Title	Load Allocations			Marks Distribution		Total Marks	Credits
		L	T	P	Internal	External		
MSIT401	Advanced Java Programming	4	1	-	40	60	100	5
MSIT402	Information Security	4	1	-	40	60	100	5
MSIT403/ MCA 305B	Theory of computation	4	1	-	40	60	100	5
MSIT404/ MCA 401	Data Warehousing & Mining	4	1	-	40	60	100	5
MSIT405	Software Lab – VIII (Advanced Java Programming)	-	-	4	60	40	100	2
MSIT406	Major Project	-	-	8	120	80	200	4

# *First Semester*

## MSIT101/ MCA101 Information Management

### Unit –I

**Introduction to Information Technology** - Definition, Applications in various sectors, Different types of software, Generations of Computers, Input and output Devices, Various storage devices like HDD, Optical Disks, Flash Drives. Different Types of data file formats: Types and Applications.

### Unit –II

**IT Infrastructure in India** – Telecommunication, Internet research and Broadband

### Unit –III

Data Collection and Data Management, Data Models, Information vs. Knowledge, Various techniques to derive information, Information Management.

### Unit –IV

**Management Information System** – Definition, Strategic Management of Information, Decision Making, Development Process of MIS, Strategic Design of MIS, Business Process Reengineering.

### Unit –V

Understanding Knowledge Management, Designing a Knowledge Management System, Nature and Scope of Business Intelligence, Information Security- Meaning and Importance, Organizational Security Policy and Planning, Access Control and Operations Security.

### Unit –VI

Office Automation (Word processing, Spreadsheet, Presentation, E-Mail Clients), Content Management System and Architecture.

### Suggested Readings / Books:

1. **Introduction to Information Technology, Second Edition**, Turban, Rainer, Potter, WSE, Wiley India.

2. **Data Warehousing Fundamentals: A Comprehensive Study For IT Professionals**, Paulraj Ponnian BWSTN, Wiley India.

3. **Information Assurance For The Enterprise: A Roadmap To Information Security-** Corey Schou, Daniel Shoemaker, Mc-Graw Hill Publications.

4. **Management Information System: Text And Cases**, Waman Jawadekar, Mc-Graw Hill Publications.

## **MSIT102/ MCA102 Object Oriented Programming in C++**

### **Section-A**

Evolution of OOP, OOP Paradigm, advantages of OOP, Comparison between functional programming and OOP Approach, Characteristics of object oriented language- objects, classes, inheritance, reusability, user defined data types, polymorphism, overloading. Introduction to C++, Identifier and keywords, constants, C++ operators, type conversion, Variable declaration, statements, expressions, features of iostream.h and iomanip.h input and output, conditional expression loop statements, breaking control statements.

### **Section- B**

Defining function, types of functions, storage class specifiers, recursion, preprocessor, header files and standard functions, Arrays, pointer arithmetic's, structures, pointers and structures, unions, bit fields typed, enumerations, Passing array as an argument to function.

### **Section- C**

Classes, member functions, objects, arrays of class objects, pointers and classes, nested classes, constructors, destructors, inline member functions, static class member, friend functions, dynamic memory allocation. Inheritance, single inheritance, types of base classes, types of derivations, multiple inheritance, container classes, member access control

### **Section-D**

Function overloading, operator overloading, polymorphism, early binding, polymorphism with pointers, virtual functions, virtual destructors, late binding, pure virtual functions, opening and closing of files, stream state member functions, binary file operations, structures and file operations, classes and file operations, random access file processing. Exception Handling.

### **Suggested Readings / Books:**

- 1. Object Oriented Programming in Turbo C++**, *Robert Lafore*, Galgotia Publications, 1994.
- 2. The C++ Programming Language**, *Bjarne Wesley* Publications, 1994.
- 3. Object Oriented Programming with C++**, *E.Balagurusamy*, Tata McGraw Hill
- 4. Object Oriented Software Engineering**, *S.Halladay and M. Wiebel*, BPB Publications, 1995.

## **MSIT103/ MCA103 Computer Organization and Assembly Language**

**Objectives:** The objective of the course is to provide students with a solid foundation in computer design. Examine the operation of the major building blocks of a computer system. To introduce students to the design and organization of modern digital computers & basic assembly language.

### **Section- A**

**Computer Organization:** Basic Computer Organization, Bus & Memory Transfer, Stored Program Organization, Computer Registers, Computer Instructions, Timing and Control, Hardwired based design of Control Unit, Instruction Cycle, Formats of Various types of Instructions- Memory Reference Instructions, Register Reference Instructions & I/O Instructions, General Register Organization-Control word, Design of Adder & Logic Unit, Stack Organization-Register Stack, Memory Stack, Reverse Polish Notation Addressing Modes, RISC vs CISC Architectures, Interrupts & types.

### **Section B**

**Pipeline & Vector Processing:** Parallel Processing, Pipelining-Arithmetic & Instruction Pipeline, Vector Processing-Vector operations, Memory Interleaving, Array Processors.

**Input – Output Organization:** Input-Output Interface- I/O vs Memory Bus, Isolated vs Memory mapped I/O, Synchronous Data Transfer , Asynchronous Data Transfer-Strobe Control, Handshaking, Asynchronous Communication Interface, Modes of Transfer- Programmed I/O, Interrupt Initiated I/O, Interrupt Cycle, Priority Interrupt Controller, DMA Controller & DMA Transfer.

### **Section C**

**Memory Organization:** Main Memory-Memory Address Map, Memory connection to CPU, Associative Memory-Hardware organization, Match Logic, Cache Memory-Levels of Cache, Associative Mapping, Direct Mapping, Set-Associative Mapping, writing into Cache, Cache coherence, Virtual Memory-Address space & Memory space, Address mapping using pages, Associative memory page table, Page replacement, Memory Management Hardware – Segmented page mapping, Multiport memory, Memory protection.

### **Section D**

**Multiprocessors:** Characteristics of Multiprocessors, Interconnection structures-Time Shared Common Bus, Crossbar switch, Multistage Switching Network, Hypercube interconnection, Interprocessor communication & synchronization.

**Assembly Language Programming:** Example of a typical 8 bit processor (8085 microprocessor)—Registers, Addressing modes, Instruction Set-Data transfer Instructions, Arithmetic Instructions, Logical Instructions, Program Control Instructions, Machine Control Instructions, Use of an Assembly Language for specific programmes: Simple numeric manipulations, Sorting of a list and use of I/O instructions.

**Suggested Readings / Books:**

- 1. Computer Organization-** *Car Hamacher, Zvonks Vranesic, Safwat Zaky*, V Edition, McGraw Hill.
- 2. Computer System Architecture,** *Mano, M.M.*, 1986: Prentice Hall of India.
- 3. Computer Architecture and Organization,** *John Paul Hayes*: McGraw-Hill International Edition
- 4. Structured Computer Organization,** *Tanenbaum, A.S.*: Prentice Hall of India.



## MSIT104 Operating System

### Section A

#### Basics of Operating Systems:

Basics of Operating Systems: Definition, Types of Operating Systems: Mainframe, Desktop, Multiprocessor, Distributed, Clustered, Real time, Embedded and Time sharing. Simple, Layered, Monolithic and Microkernel Operating Systems. Virtual systems.

#### Operating System Components:

Process Management, Memory Management component, I/O Management, File Management, Protection System and Network management.

#### Operating System Services:

Process Execution, I/O operations, File manipulations, Communications, Error detection and recovery, Resource allocation, Accounting, System, Protection, System Calls and System Call Execution; API.

### Section B

**Process:** Definition, Process Relationships, Process states, Process State transitions, Process Control Block, Context switching. Threads - Concept, Types and advantages of Multithreads.

**Process Scheduling:** Definition, Scheduling objectives, Types of Schedulers, Scheduling criteria, CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time, Scheduling algorithms - Pre-emptive and Non pre-emptive, FCFS, SJF and RR. Multiprocessor schedulers. Performance evaluation of schedulers.

**Inter-process Communication and Synchronization:** Definition, Shared Memory System, Message passing, Critical section, Mutual Exclusion, Semaphores.

**Deadlocks:** Definition, Deadlock characteristics, Deadlock Prevention, Deadlock Avoidance, Deadlock detection and Recovery.

### Section C

**Basic Memory Management:** Definition, Logical and Physical address map, Memory allocation, Contiguous, Fixed and variable partition. Internal and External fragmentation and Compaction; Paging - Principle of operation, Page allocation, Hardware support, Protection and sharing; Segmentation, Segmentation with Paging.

**Virtual Memory Management:** Basics of Virtual Memory, Hardware and control structures, Locality of reference, Page fault, Working Set, Dirty page/Dirty bit; Demand paging, Page replacement policies - Optimal (OPT), First in First Out (FIFO), Second Chance (SC), Not recently used (NRU) and Least Recently used (LRU).

#### **Section D**

**Device Management:** Hardware I/O organization, I/O control, Port and memory mapped I/O, DMA. Buffering and Caching. Device Drivers.

**Disk Management:** Disk Structure, Disk Formatting, Disk Scheduling and its algorithms, RAID.

**Security:** Authentication; Types of Threats, Detection, Prevention and correction of Threats.

#### **File Management:**

File concept, File attributes - Name, Identifier, Type, Location, Size, Time, Date, user identification, File Operations, Directory Structure - Single level, Two level, Tree Structure. Disk space allocation methods - Contiguous, Linked, Indexed. Access Methods - Sequential, Indexed, Random access, File system structure, Byte sequence, Record sequence and Tree-based. Disk formatting

**Security and Protection:** Security threats, Security Policies and Mechanisms, Authentications

#### **Suggested Readings:**

1. William Stalling, "OperatingSystem Internals and Design Principle", edition6th, PearsonEducation India, 2009.
2. Peterbears Galvin, "Operating System Principle", Edition7th, WileyIndia, 2009.
3. J.Harris, "Operating System SCHAUM'S OUTLINE", Special Indian Edition TataMc Graw Hill2008.
4. Pramod Chandra, " An Introduction to Operating System", Edition3rd, PH, 2010.

## MSIT105/ MCA105 Technical Communication

### Unit –I

**Basics of Technical Communication-** Functions of Communication-Internal & External Functions, Models-Shannon & Weaver's model of communication, Flow, Networks and importance, Barriers to Communication, Essential of effective communication (7 C's and other principles), Non-verbal Communication

### Unit –II

**Basic Technical Writing:** Paragraph writing (descriptive, Imaginative etc.), Precise writing, reading and comprehension, Letters – Format & various types.

### Unit –III

**Advanced Technical Writing:** Memos, Reports, E-Mails & Net etiquettes, Circulars, Press Release, Newsletters, Notices. Resume Writing, Technical Proposals, Research Papers, Dissertation and Thesis, Technical Reports, Instruction Manuals and Technical Descriptions, Creating Indexes, List of References and Bibliography.

### Unit –IV

**Verbal Communication-** Presentation Techniques, Interviews, Group Discussions, Extempore, Meetings and Conferences.

### Unit –V

**Technical Communication-** MS-Word, Adobe Frame maker and ROBO Help

### Suggested Readings/ Books

1. Vandana R Singh, The Written Word, Oxford University Press, New Delhi.
2. KK Ramchandran, et al Business Communication, Macmillan, New Delhi
3. Swati Samantaray, Business Communication and Communicative English, Sultan Chand, New Delhi.
4. S.P. Dhanavel English and Communication Skills for Students of Science and Engineering (with audio CD)

## **MSIT106/ MCA106 Software Lab-I (Information Management)**

This laboratory course will mainly comprise of exercises on Section D of the Course MSIT-101 [**Information Management**]

## **MSIT107/ MCA107 Software Lab-II (Object Oriented Programming in C++)**

This laboratory course will mainly comprise of exercises on what is learnt under paper: MSIT 102 [Object Oriented Programming in C++ ]

**Note: Program should be fully documented with simple I/O data. Flow charts should be developed wherever necessary.**

### **Write program in 'C++' language**

Using input and output statements

Using control statements.

Using functions.

Using array

Using Classes and implementation of Constructor and Destructor.

Using files.

Using OOP's Concepts (Inheritance, Polymorphism, Encapsulation, Friend and Static Functions)

# *Second Semester*

## MSIT201/ MCA204 DATA COMMUNICATION AND NETWORKS

**Objectives:** As part of this course, students will be introduced to Computer Networks and Data Communication paradigms, about Network models and standards, Network protocols and their use, wireless technologies.

### SECTION-A

**Introduction to Data Communication:** Components of Data Communication, Data Representation, Transmission Impairments, Switching, Modulation, Multiplexing.

**Review of Network Hardware:** LAN, MAN, WAN, Wireless networks, Internetworks.

**Review of Network Software:** Layer, Protocols, Interfaces and Services.

**Review of Reference Models:** OSI, TCP/IP and their comparison.

#### Physical Layer

**Transmission Media:** Twisted pair, Coaxial cable, Fiber optics, Wireless transmission (Radio, Microwave, Infrared). Introduction to ATM, ISDN, Cellular Radio and Communication Satellites.

### SECTION-B

#### Data Link Layer

Services provided by DLL: FRAMING, ERROR CONTROL, FLOW CONTROL, MEDIUM ACCESS

#### Medium Access Sub layer

Channel Allocation, MAC protocols – ALOHA, CSMA protocols, Collision free protocols, Limited Contention Protocols, Wireless LAN protocols, IEEE 802.3, 802.4, 802.5 standards and their comparison.

### SECTION-C

#### Network Layer

Design Issues, Routing Algorithms (Shortest Path, Flooding, Distance Vector, Hierarchical, Broadcast, Multicast). Congestion Control Algorithms (Leaky bucket, Token bucket, Load shedding), Internetworking, IP Protocol, ARP, RARP.

#### Network Trouble Shooting

Using Ping, Traceroute, IPconfig, Netstat, nslookup

## SECTION-D

### Transport Layer

Addressing, Establishing and Releasing Connection, Flow Control, Buffering, Internet Transport Protocol (TCP and UDP).

### Application Layer

Domain name system, E-mail, File transfer protocol, HTTP, HTTPS, World Wide Web.

### Suggested Books: -

1. Tanenbaum, Andrew S.,2009: Computer Networks(4thEdition),PHI.
2. Forouzan, B. A., 2009: Data Communications and Networking, Fourth Edition, Tata McGrawHill.
3. DouglasE.Comer,2004: Internetworking with TCP/IP (Vol.1,4thEdition),CPE.
4. Stallings,William 2008: Data and Computer Communications(8thEdition),PHI.
- 5.Nance,Bary,1997: Introduction to Networking,PHI,4thEdition.



## **MSIT202/ MCA202 Relational Database Management Systems**

### **Section – A**

#### **Review of DBMS:**

Basic DBMS terminology; Architecture of a DBMS: Data Independence - Physical and Logical Independence, Degree of Data Abstraction, Initial Study of the Database, Database Design, Implementation and Loading, Testing and Evaluation, Operation, Maintenance and Evaluation.

#### **Conceptual Model:**

Entity Relationship Model, Importance of ERD, Symbols (Entity: Types of Entities, weak Entity, Composite Entity, Strong Entity, Attribute: Types of Attribute, Relationship: Type of relationship, Connectivity, Cardinality).

### **Section – B**

#### **Database Models and Normalization:**

Comparison of Network, Hierarchical and Relational Models, Object Oriented Database, Object Relational Database, Comparison of OOD & ORD; Normalization and its various forms, De- Normalization, Functional Dependencies, Multi-valued Dependencies, Database Integrity: Domain, Entity, Referential Integrity Constraints.

#### **Transaction Management and Concurrency Control:**

Client/ Server Architecture and implementation issues, Transaction: Properties, Transaction Management with SQL, Concurrency; Concurrency Control: Locking Methods: (Lock Granularity, Lock Types, Two Phase Locking, Deadlocks), Time Stamping Method, Optimistic Method, Database Recovery Management.

### **Section – C**

#### **Distributed Databases:**

Centralized Verses Decentralized Design; Distributed Database Management Systems (DDBMS): Advantage and Disadvantages; Characteristics, Distributed Database Structure, Components, Distributed Database Design, Homogeneous and Heterogeneous DBMS.

**Levels of Data and Process Distribution:**

SPSD (Single–Site Processing, Single-Site Data), MPSD (Multiple-Site Processing, Single Site Data), MPMD (Multiple –Site Processing, Multiple-Site Data), Distributed Database Transaction Features, Transaction Transparency, Client/ Server Vs DDBMS.

**Section – D**

**Business Intelligence and Decision Support System:**

The need for Data Analysis, Business Intelligence, Operational Data vs. Decision Support Data, DSS Database properties and importance, DSS Database Requirements.

**OLAP and Database Administration:**

Introduction to Online Analytical Processing (OLAP), OLAP Architecture Relational, Star Schemas, Database Security, Database administration tools, Developing a Data Administration Strategy.

**References:**

1. “Data Base Systems”, Peter Rob Carlos Coronel, Cengage Learning, 8th ed.
2. “Database System Concepts”, Henry F. korth, Abraham, McGraw-Hill, 4th ed.
3. “An Introduction To Database Systems”, C.J.Date, Pearson Education, 8th ed.
4. ”Principles of Database Systems”, Ullman, Galgotia Publication, 3rd ed.
5. “An Introduction To Database Systems”, Bipin C. Desai, Galgotia Publication

## MSIT203/ MCA203 DATA STRUCTURES

### Section A

Introduction to Data Structure: Concept of data, problem analysis, data structures and data structure operations, notations, mathematical notation and functions, algorithmic complexity, Big-O Notation and time space trade off.

Overview of Arrays, Recursion, Pointers, Pointer Arithmetic, Array of pointers, Arrays in terms of pointers, Static and Dynamic Memory Management, Garbage Collection.

Understanding and Implementation of various Data Structures with applications

Stack: operations like push, pop and various applications like conversion from infix to postfix and prefix expressions, evaluation of postfix expression using stacks

Queues: operations like enqueue, dequeue on simple, circular and priority queues.  
Linked Lists: operations like creations, insertion, deletion, retrieval and traversal on single, circular and doubly linked list.

### Section B

Trees definitions and concepts: Root, Node, Leaf Node, Level, Degree, Height and Tree representation using Linked List and Array

Types of Trees: Binary trees, Binary search tree, Height balanced (AVL) tree, B- trees, B+ Tree

Tree operations: creation, insertion, deletion and traversals (Preorder, In-order, Post-ordered) and searching on various types of trees

Heap: Definition, Structure, Algorithms and applications

### Section C

Graph definitions and concepts: Edge, Vertices, and Graph representation using Adjacency matrix, Adjacency lists

Types of graphs: Weighted, Unweighted, Directed, Undirected Graphs

Graph operations: creation, insertion, deletion, traversals and searching (depth-first, breadth-first) of various types of graphs and Dijkstra's algorithm for shortest distance calculation.

## Section D

Searching: Concept and efficiency of linear and binary search algorithms.

Sorting: Concepts, Order, Stability, Efficiency of various algorithms (Selection Sort, Bubble Sort, Insertion Sort, Merge Sort, Quick Sort, Heap Sort, Radix Sort)

Hashing: Definition, Implementation and applications

### Note:

Programs are to be implemented in C++

### Books:

Data Structures – A Pseudo code Approach with C++ - Gilberg and Forouzan by Cengage

Schaum's Outline of Data Structures with C++ - Hubbard John. R by Tata McGraw- Hill

Data Structures Using C and C++ - Langsam, Augenstein, Tanenbaum by Pearson Education

## MSIT204 WEB TECHNOLOGIES

### Section- A

Internet and World Wide Web: Introduction, Internet Addressing, ISP, types of Internet Connections, Introduction to WWW, WEB Browsers, WEB Servers, URLs, HTTP, WEB Applications, Tools for web site creation.

HTML5: Introduction to HTML5, Lists, adding graphics to HTML5 page, creating tables, linking documents, forms, frames, Cascading Style sheets.

### Section- B

Java Script: Introduction, programming constructs: variables, operators and expressions, conditional checking, functions and dialog boxes, JavaScript DOM, creating forms, introduction to Cookies, JQuery.

### Section- C

AJAX: Introduction, HTTP Request, XMLHttpRequest, AJAX Server Script.

### Section- D

PHP: Introduction, syntax, statements, operators, PHP and MySQL, PHP and AJAX.

### Suggested Readings/Books

1. Deitel, Deitel, Nieto, Lin and Sadhu, XML How to Program, Pearson Education.
2. Ivan Bayross, Web Enabled Commercial Application Development using HTML, DHTML, JavaScript, Perl CGI, BPB.
3. Steven M. Schafer, HTML, CSS, JavaScript, Perl, Python and PHP, Wiley India Textbooks.
4. Paul S. Wang, G. Keller, S. Katila, An Introduction to Web Design + Programming, Cengage Learning.
5. JefferyC. Jackson, Web Technologies: A Computer Science Perspective, Pearson Education.
6. Robin Nixon, Learning PHP, MySQL, and JavaScript, Shroff/O'Reilly.

## **MSIT205/ MCA206 Software Lab –III (RDBMS)**

### **Learning Objectives:**

1. Comparative study of various Database Management Systems
2. Data Definition Language (DDL), Data Manipulation Language (DML), and Data Control Language (DCL)
3. How to apply Constraints at various levels.
4. View data in the required form using Operators, Functions and Joins.
5. Creating different types of Views for tailored presentation of data
6. How to apply Conditional Controls in PL/SQL
7. Error Handling using Internal Exceptions and External Exceptions
8. Using various types of Cursors
9. How to run Stored Procedures and Functions
10. Creating Packages and applying Triggers
11. Creating Arrays and Nested Tables.

## **MSIT206/ MCA207 Software Lab – IV (Data Structures)**

### **Learning Objectives:**

1. Selecting suitable Data Structures for specific tasks.
2. Understanding various traversing techniques on various data structures.
3. Inserting and deleting elements in required data structures.
4. Searching data stored within various data structure using various search techniques.
5. Understanding memory-space trade off.
6. Sorting various data structures using different techniques.

### **MSIT207 Software Lab –V (WEB TECHNOLOGIES)**

1. Creation of Web pages using HTML5.
2. Creation of Web pages using JavaScript.
3. Creation of Web pages using AJAX.
4. Creating web pages using PHP.



# *Third Semester*

## MSIT301 Computer Graphics

### SECTION- A

Introduction to Active and Passive Graphics, Applications of Computer Graphics. Input devices: light pens, Graphic tablets, Joysticks, Trackball, Data Glove, Digitizers, Image scanner, Graphs and Types of Graphs. Video Display Devices-- Refresh Cathode Ray Tube, Raster Scan displays, Random Scan displays, Architecture of Raster and Random Scan Monitors, Color CRT-monitors and Color generating techniques (Shadow Mask, Beam Penetration) , Direct View Storage Tube, Flat-Panel Displays; 3-D Viewing Devices, Raster Scan Systems, Random Scan Systems, Graphics monitors and workstations, Color Models (RGB and CMY), Lookup Table.

### SECTION-B

Process and need of Scan Conversion, Scan conversion algorithms for Line, Circle and Ellipse, effect of scan conversion, Bresenham's algorithms for line and circle along with their derivations, Midpoint Circle Algorithm, Area filling techniques, flood fill techniques, character generation.

### SECTION-C

2-Dimensional Graphics: Cartesian and need of Homogeneous co-ordinate system, Geometric transformations (Translation, Scaling, Rotation, Reflection, Shearing), Two-dimensional viewing transformation and clipping (line, polygon and text), Cohen Sutherland, Sutherland Hodgeman and Liang Barsky algorithm for clipping.

Introduction to 3-dimensional Graphics: Geometric Transformations (Translation, Scaling, Rotation, Reflection, Shearing), Mathematics of Projections (parallel & perspective). Introduction to 3-D viewing transformations and clipping.

### SECTION-D

Hidden line and surface elimination algorithms: Z-buffer, Painters algorithm, scan-line, subdivision, Shading and Reflection: Diffuse reflection, Specular reflection, refracted light, Halftoning, Dithering techniques. Surface Rendering Methods: Constant Intensity method, Gouraud Shading, Phong Shading (Mash Band effect). Morphing of objects.

**Note: Graphics Programming using C/C++ with introduction to Open GL.**

### References:

1. D. Hearn and M.P. Baker, —Computer GraphicsII, PHI New Delhi; Third Edition.

2. J.D. Foley, A.V. Dam, S.K. Feiner, J.F. Hughes,. R.L Phillips, ||Computer Graphics Principles & Practices, Second Edition||, Pearson Education, 2007.
3. R.A. Plastock and G. Kalley, —Computer Graphics||, McGraw Hill, 1986.
4. F.S. Hill: Computer Graphics using Open GL- Second Edition, Pearson Education-2003

## MSIT302/ MCA303 Software Engineering & Project Management

### Section-A

**Software Engineering:** The software problem, Evolution of Software Engineering, Principles of software engineering, Software Development vs. Software Engineering.

**Software Process:** Software Process, Selection of appropriate process model, Software Process Models Waterfall, Spiral, Prototyping, Agile Methodology- Scrum and XP.

### Section- B

**Advanced Requirement Analysis & Design:** Analysis Principles, SRS, Requirement Elicitation Techniques- FAST and QFD, Design Principles, Design Concepts, Data Design, Architectural Design- Architectural Styles, Procedural Design.

### Section- C

**Software Project Management:** The Management Spectrum, Software Project Planning and its characteristics, Types of metrics, Effort Estimation- FP, LOC, FP vs. LOC, Schedule & Cost Estimation Models- Activity Networks- PERT/CPM, COCOMO-I, COCOMO-II, Risk Assessment-Probability Matrix, Risk Management.

**Software Testing:** Testing Fundamentals-Error/Fault/Failure, Testing Principles, Test Cases, Testing Techniques-White Box & Black Box, Unit Testing, Integration Testing, System Testing, Verification and Validation Testing, Acceptance Testing.

### Section-D

**Software Quality Management:** S/W Quality, Importance of S/W Quality, Quality Metrics, Quality Standards-ISO 9126, Change Control, Change Control Process.

### Advanced S/W Engineering:

CASE Tools, Reverse Engineering, Re-engineering, WebEngineering.

### References:

1. R.S. Pressman, Software Engineering: A Practitioner's Approach (6th ed.), McGraw-Hill, 2006
2. P. Jalote, An Integrated Approach to Software Engineering(3rd ed.), Narosa Publishing House, 2005
3. K.K. Aggarwal and Y. Singh, Software Engineering(revised 2nd ed.), New Age International Publishers, 2006.
4. Sommerville, Ian, Software Engineering, Addison-Wesley Publishing Company, 2006) 8th ed.
5. Bob Hughes and Mike Cotterell, Software Project Management, Tata McGraw Hill Publishing Company Ltd., New Delhi (2006) 3rd ed.

## MSIT303/ MCA304 JAVA PROGRAMMING

**Objective of the course:** The objective of this course is to get insight of the subject and after completion of this course, students will be able to:

- Use the advanced features of Java Technology
- Develop good program to handle exceptions and errors in program.
- Work with collection API and develop fast programs.
- Use the java.io package in detail.
- Use the serialization concepts of java technology.
- Develop good multithreaded programs
- Work the latest JDBC technology
- Learn Java Generics and the development of Projects

### **Section A**

Introduction: Object Oriented Concept overview, features and applications of Java, Differences between Java and C++, structure of Java Program, understanding class path. Building Blocks: Literals, Tokens, Keywords, constants, variables & Data types, scope of variables, Operators, Expressions, Flow Control statements.

Arrays, Vectors, Type Conversion, Command Line Arguments, Review of classes and methods, Access specifiers, constructors, Inheritance, static Classes, Abstract Classes, Final Classes, Wrapper Classes: Autoboxing and Unboxing, Garbage Collection & Finalize method, Enumerated types and annotations, Handling String and String Buffer classes, Method Overloading and Overriding, Nesting of methods and methods with varargs.

### **Section B**

Interfaces & Packages: Interfaces and implementing multiple inheritance through interfaces, Packages, Multithreaded Programming, Synchronization.

Exception Handling: Introduction, Handling System defined Exceptions, Creating and handling user defined exception.

Managing I/O: Introduction to streams, Handling and using various Stream Classes, Random, String Tokenizer, Scanner classes .

### **Section C**

Applet and Graphic Programming: Introduction to applets, Types of applets, Using Applet Applications, Passing Parameters to applets,

Introduction to Graphic Programming: Applying 2-D transformations on Objects, Event Handling ,Layouts, Frames, Panels, Menu's, Pop up Menus, Swings, JDBC.

### **Section D**

Advanced Programming: Servlet Programming( Servlet Life Cycle, Generic Servlet, HttpServlet, HttpServletRequest, HttpServletResponse, service method, doGet method, doPost method, Servlet Exception), Introduction to JSP, Syntax, Semantics, Declaration and Expressions Socket Programming: Overview, Difference between TCP and UDP

Sockets, Various methods associated with TCP and UDP.

## REFERENCES

1. Introduction to Java Programming, Comprehensive Version, Y. Daniel Liang, Pearson, 9/E
2. Java 2 The Complete Reference by Petric Noughton And Herbet Schildt, McGraw Hill Professional, 1999
3. Head First java by Kethy Seirra and Bert Bates, Oxford Publications.
4. Head First Sevlets and JSP, 2nd Edition by Bryan Basham, Kathy Sierra, Bert Bates, O’Rielly Media.

## **MSIT304/ MCA104 Accounting and Financial Management**

### **Section-A**

Accounting: Principles, concepts and conventions, double entry system of accounting, introduction to basic books of accounts of sole proprietary concern, partnership, organization & company, closing of books of accounts and preparation of trial balance. Final Accounts : Trading, Profit and Loss accounts and Balance sheet ( without adjustment)

### **Section-B**

Financial Management: Meaning, scope and role, a brief study of functional areas of financial management. Introduction to various FM tools: Ratio Analysis, Fund Flow statement and cash flow statement (without adjustments)

### **Section-C**

Costing: Nature, importance and basic principles, Marginal costing: Nature scope and importance, Break even analysis ,its uses and limitations, construction of break even chart, Standard costing: Nature, scope and variances, Budgetary Control (only introduction)

### **Section-D**

Computerized Accounting: Advantages, Computer Programs for accounting, , Computer based Auditing.

### **Suggested Readings/ Books:**

1. Principles:A Book-Keeping by J.C.Katyal
2. Principles of Accounting by Jain and Narang
3. Financial Management by I.M. Pandey,Vikas Publications.
4. Management Accounting, by Sharma, Gupta & Bhall
5. Cost Accounting by Jain and Narang
6. Cost Accounting by Katyal
7. Basic Accounting,Second Edition by Rajni Sofat, Preeti Hiro,PHI

## **MSIT305 Software Lab- VI (Computer Graphics)**

**Implement all the algorithms for MSIT301 [Computer Graphics] using C++.**



## **MSIT306/ MCA307 S/W Lab- VII [ JAVA Programming ]**

### **Learning Objectives:**

- 1.To understand Basic Programming Constructs and the concepts of Object Oriented Programming and its Applications Practically.
2. Dealing with Array and String Programming.
3. Exception Handling.
4. Multithreading.
5. Interfaces and Package handling.
6. File Handling.
7. Applet and Swings Programming.
8. Event Handling and Graphics Programming.
9. Database Connectivity.
10. Java Server Pages.
11. Servlet and Socket(TCP & UDP) Programming

# *Fourth Semester*

## **MSIT401 Advanced Java Programming**

### **Unit I: Introduction to Multithreading and Concurrency in Java**

Creating and managing threads in Java, Priority management, Thread synchronization, Inter thread communication, Thread groups and Daemon threads.

Concepts of concurrency, task scheduling, Callable and Futures, Synchronizes, Semaphores, Concurrent collections, Atomic variables and Locks

### **Unit II: Understanding Input Output Streams**

Basic concepts of Stream data, Input Stream hierarchy, Output Stream hierarchy, Understanding of various API's and methods used or streaming of data. Serialization and security in Serialization.

### **Unit III: Introduction to Java Data Base Connectivity**

Basic concept on Database Connectivity Drivers. Database interaction using Statement Interface, Result set Interface. Prepared Statements and Callable statements. Transaction management.

### **Unit IV: Java Beans and Generics**

Reflection API, Introduction to Java Bean, Java Beans in User Interface, Naming Convention, Importance of Bean Serialization. Introduction to generics, Importance of generics, Implementation of various types in Generics and Concept of Erasure.

### **Unit V: Annotations**

Introduction to Annotations, Built in Annotations, Annotation Inheritance, Creation of user defined Annotations and Advantages of Annotations

### **Suggested Readings/Books**

1. Thinking in Java, Pearson Education, "Bruce Eckel".
2. Head First Java, O'Reilly Media, "Kathy Sierra".

## MSIT402 Information Security

**Objectives:** Upon completion of this course, students will have gained knowledge of information security concepts and understanding of Information Security principles and approaches.

**Module1:** Symmetric Ciphers - Overview: Services, Mechanisms and Attacks, The OSI Security Architecture, A Model of Network Security. Classical Encryption Techniques: Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Rotor Machines, Steganography. Block Cipher and the Data Encryption Standard: Simplified DES, Block Cipher Principles, The DES, The Strength of DES, Differential and Linear Cryptanalysis. Symmetric Ciphers: Triple DES, Blowfish. Confidentiality using Conventional Encryption: Placement of Encryption Function, Traffic Confidentiality, Key Distribution, Random Number Generation.

**Module2:** Public Key Encryption, Digital Signatures - Number Theory, Prime Numbers Formats and Eulers Theorems, Testing for Primality. Public Key Cryptography and RSA: Principles of Public Key Cryptosystems, The RSA Algorithms, Key Management, Diffie Hellman Key Exchange.

**Module3:** Authentication Protocols - Message Authentication: Authentication Requirements, Authentication Functions, Message Authentication Codes, MD5 Message Digest Algorithms, Digital Signatures and Authentication Protocols: Digital Signatures, Authentication Protocols, Digital Signature Standards.

**Module4:** Network Security - Authentication Applications: Kerberos, X.509 Directory Authentication Service. Electronic Mail Security: Pretty Good Privacy. IP Security: Overview, IP Security Architecture, Authentication Header, Encapsulation Security Payload. Web Security: Web Security Requirements, Secure Sockets Layer and Transport Layer Security, Secure Electronic Transaction.

**Module5:** System Security- Intruders, Malicious Software, Viruses and Related Threats, Counter Measures, Firewalls and its Design Principles.

### Suggested / Readings & Books

1. William Stallings, Network Security Essentials, Applications and Standards Pearson Education.
2. William Stallings, Cryptography and Network Security Principles and Practice. 2/e, Pearson Education.
3. Bishop, Matt, Introduction to Computer Security. Addison-Wesley, Pearson Education, Inc. ISBN: 0321-24744-2. (2005)

4. Michael.E.Whitman andHerbertJ.Mattord PrinciplesofInformationSecurity,  
CengageLearning

5. Atul Kahate Cryptography & Network Security, TMH, 2nd Edition 6. Charlie Kaufman,  
Radia Perlman, Mike Speciner, Network Security: Private Communication in Public  
World, 2nd Edition, 2011, Pearson Education.

## MSIT403/ MCA 305B Theory of Computation Elective

### Objectives:

- Understanding and development of theoretical models of computations and their analysis.
- The models of computations include (i) Finite Automata (and Regular Languages), (ii) Push Down Automata (and Context-free Languages), (iii) Turing Machine (and their Languages).
- The aim of analysis is to identify and prove the capabilities and limitations of particular models of Computations.

### Section-A

1. Introduction, Sets , Logic , Functions , Relations , Languages , Proofs Mathematical Induction , Strong Principle of Mathematical Induction , Recursive Definitions , Structural Induction
2. Regular Languages & Regular Expressions, Finite Automata (FA), Distinguishing Strings w.r.t. Language , Union, Intersection, & Compliment of Languages

### Section-B

3. Non-deterministic Finite Automata (NFA), NFA with Null-Transitions, Kleene's Theorem
4. A Criterion for Regularity, Minimal Finite Automata, Pumping Lemma for Regular Languages.
5. Introduction to Context-Free Grammar (CFG) , Regular Grammars , Derivation (Parse) Trees & Ambiguities , An Unambiguous CFG for Algebraic Expressions , Simplified Forms & Chomsky Normal Forms

### Section-C

6. Introduction to Push Down Automata (PDA), Deterministic PDA (DPDA), PDA corresponding to a Given CFG , CFG Corresponding to a Given PDA , Parsing
7. The Pumping Lemma for CFG , Intersection & Complement of CFGs , Decision Problems Involving CFGs

### Section-D

8. Turing Machine (TM) Definition & Examples, Computing a Partial Function with a TM.
9. Recursive Enumerable & Recursive Languages, Enumerating a Language, Context-Sensitive Languages & Chomsky Hierarchy.

**Reference Book:**

"Introduction to Languages and the Theory of Computation", John C. Martin, Tata McGraw-Hill, (2003), 3rd Edition, ISBN: 007049939X

**Suggested Additional Reading:**

1. "Elements of the Theory of Computation", Harry Lewis & Christos H. Papadimitriou, IEEE (PHI), 2nd Edition ,ISBN-978-81-203-2233-2.
2. " Theory of Computation", Michael Sipser, ", Cengage Learning(2007), ISBN-13: 978-81-315- 0513-7
3. — Introduction to Automata Theory, Languages, and Computation II, Hopcroft, Motwani & Ullman, Pearson Education, 3rd Edition, (2008), ISBN: 978-81-317-2047-9

## **MSIT404/ MCA401 Data Warehousing and Data Mining**

### **Section A**

Review of Data Warehouse: Need for data warehouse, Big data, Data Pre-Processing, Three tier architecture; MDDM and its schemas, Introduction to Spatial Data warehouse, Architecture of Spatial Systems, Spatial: Objects, data types, reference systems; Topological Relationships, Conceptual Models for Spatial Data, Implementation Models for Spatial Data, Spatial Levels, Hierarchies and Measures Spatial Fact Relationships.

### **Section B**

Introduction to temporal Data warehouse: General Concepts, Temporality Data Types, Synchronization and Relationships, Temporal Extension of the Multi Dimensional Model, Temporal Support for Levels, Temporal Hierarchies, Fact Relationships, Measures, Conceptual Models for Temporal Data Warehouses : Logical Representation and Temporal Granularity

### **Section C**

Introduction to Data Mining functionalities, Mining different kind of data, Pattern/Context based Data Mining, Bayesian Classification: Bayes theorem, Bayesian belief networks Naive Bayesian classification, Introduction to classification by Back propagation and its algorithm, Other classification methods: k-Nearest Neighbor, case based reasoning, Genetic algorithms, rough set approach, Fuzzy set approach

### **Section- D**

Introduction to prediction: linear and multiple regression, Clustering: types of data in cluster analysis: interval scaled variables, Binary variables, Nominal, ordinal, and Ratio-scaled variables; Major Clustering Methods: Partitioning Methods: K-Mean and K-Medoids, Hierarchical methods: Agglomerative, Density based methods: DBSCAN

### **References:**

1. Data Mining: Concepts and Techniques By J.Han and M. Kamber **Publisher** Morgan Kaufmann Publishers
2. Advanced Data warehouse Design (from conventional to spatial and temporal applications) by Elzbieta Malinowski and Esteban Zimányi **Publisher** Springer
3. Modern Data Warehousing , Mining and Visualization By George M Marakas, **Publisher** Pearson



## **MSIT405 Software Lab- VIII (Advanced Java Programming)**

Programs to implement all the concepts of **MSIT401 Advanced Java Programming**.