



# UNIVERSITY OF MYSORE DIRECTORATE OF OUTREACH AND ONLINE PROGRAMS

## MASTER OF COMPUTER APPLICATIONS

### SEMESTER – I

#### **Hardcore Courses**

1. Advanced Data Structures and Indexing
2. Object Oriented Programming with C++
3. Advanced Database Management System

#### **Softcore Courses**

1. Java Programming
2. Linux Programming
3. E-Commerce and E-Governance

## **I Semester**

### **Hardcore courses**

#### **Advanced Data Structures and Indexing (3:0:1)**

##### **Course Outcome:**

- Understand the importance of various types of data structures in solving a problem through programming.
- Able to identify the suitability of a particular data structure to solve a problem.
- Critically evaluate the efficient representation of data structures in the memory.
- Elucidate the various operations performed on a particular data structure.
- Understand the importance of indexing and how it is achieved through a particular data structure.

##### **Course Content**

###### **Unit – I:**

Introduction, concept of data type, classification of data structures, abstract data types, Primitive data structures such as integer, real, character & Boolean, and their representation, Non-primitive data structures such as arrays, their representations, operations and applications, Linked lists, types of linked lists, operations on linked lists and their applications.

###### **Unit-II**

Introduction, representation, various operations and applications of stacks, queues, trees and graph data structures.

###### **Unit-III**

Introduction, representation, operations and applications of Height balanced trees, Weight balanced trees, B-trees, B+ trees, Red-Black trees, Splay trees and Skip lists, Interval trees, Segment trees, KD-trees, Quad trees and related structures with their applications.

## **Unit-IV**

Impact of indices on query performance, basic structure of an index, Types of Indexing and its data structures.

### **Reference Books**

1. Horowitz and Sahni, Fundamentals of Data Structures, W H Freeman & Co (June 1983).
2. Debasis Samantha, Classic Data Structures, PHI Learning Pvt. Ltd. 2<sup>nd</sup> Edition.
3. Aho, Ullman and Hopcroft, Data Structures and Algorithms, Addison Wesley (January 1983).
4. Jean-Paul, Tremblay and Sorenson, An introduction to data structures with applications, McGraw-Hill, 2<sup>nd</sup> Edition.
5. Peter Brass, Advanced Data Structures, Cambridge University Press, New York, 2008.

## **Object Oriented Programming with C++ (3:0:1)**

### **Course Outcome:**

- Justify the philosophy of object-oriented design and the concepts of encapsulation, abstraction, inheritance, and polymorphism.
- Design, implement, test, and debug simple programs in an object-oriented programming language.
- Describe how the class mechanism supports encapsulation and information hiding.
- Compare and contrast the notions of overloading and overriding methods in an object-oriented language.

### **Course Content:**

#### **Unit-I**

Introduction: Procedure-oriented programming, Concepts of Object-oriented programming, benefits of OOP, Applications of OOP, Structure of C++ program.

Tokens, Keywords, Identifiers and constants, Basic Data Types, User-defined data types, derived data Types, Symbolic constants, Type compatibility, Declaration of variables,

Dynamic initialization of variables, Reference variables, Operators in C++, Scope resolution operator, Member dereferencing operators, Memory management operators, Manipulators, Type cast operator, Expressions and their types, Special assignment expressions, Implicit conversions, Operator overloading, Operator precedence, Control structures.

## **Unit –II**

Functions: The main function, Function prototyping, Call by Reference, Return by Reference, Inline functions, Default arguments, const arguments, Function overloading, Friend and Virtual functions.

Classes and Objects: Specifying a Class, Defining member functions, Making an Outside function Inline, Nesting of member functions, Private member functions, Arrays within a Class, Static data members, Static member functions, Arrays of Objects, Objects as function arguments, friendly functions, Returning Objects, const member functions, Pointers to members.

Constructors and Destructors: Constructors, Parameterized constructors, Multiple constructors in a class, Constructors with default arguments, Dynamic initialization of objects, Copy constructor, Dynamic constructor, Constructing Two-dimensional arrays, const Objects, Destructors.

## **Unit –III**

Operator overloading and Type Conversions: Defining operator overloading, Overloading unary operators, Overloading Binary operators, Rules for overloading operators, Type conversions.

Inheritance and Polymorphism: Introduction, defining derived classes, single inheritance, making a private member inheritable, multilevel inheritance, hierarchical inheritance, hybrid inheritance, virtual base classes, abstract classes, constructors in derived classes, polymorphism – introduction, pointers, pointers to objects, this pointers, pointers to derived classes, virtual functions, pure virtual functions.

## **Unit –IV**

Console I/O Operations, Files and Templates: C++ streams, C++ stream classes, Unformatted I/O operations, Formatted I/O operations, managing output with manipulators.

Files: Classes for file stream operations, opening and closing a file, detecting end of file, more about open(): file modes, file pointers and their manipulations, sequential input and output operations.

Templates: Function templates, Class templates Exceptions.

### **Reference Books:**

1. Object Oriented Programming with C++ , M.T. Somashekara, D.S. Guru, H.S. Nagendraswamy, K.S. Manjunatha, PHI Learning, New Delhi, 2012
2. Object Oriented Programming with C++ by E. Balagurusamy
3. Object Oriented Programming in C++ by Robert LaforeTechmedia Publication.
4. The complete reference C – by Herbert shieldt Tata McGraw Hill Publication.

## **Advanced Database Management System (3:0:1)**

### **Course Outcome**

- Understand the significance of databases, types of databases, merits and limitations of different DBMS.
- Explain and apply the concept of normalization for database design.
- Understand and apply concurrency control and transaction processing mechanisms.
- Learn the characteristics implementation of object oriented and distributed database management systems and their architecture.
- Understand the design techniques used in RDBMS, extension techniques in RDBMS, standards for OODBMS, products and applications.

### **Course Content**

#### **Unit-1:**

Introduction: Comparison between different databases: Significance of Databases, Database System Applications, Advantages and Disadvantages of different Database Management systems, Comparison between DBMS, RDBMS, Distributed and Centralized DB.

Normalization: Functional Dependency, Anomalies in a Database, The normalization process: Conversion to first normal form, Conversion to second normal form, Conversion to third normal form, The boyce-code normal form (BCNF), Fourth Normal form and fifth normal form, normalization and database design, Denormalization

#### **Unit-2:**

Concurrency Control Serializability: Enforcing, Serializability by Locks, Locking Systems With Several, Lock Modes, Architecture for a Locking Scheduler Managing Hierarchies of Database Elements, Concurrency Control by Timestamps, Concurrency Control by Validation, Database recovery management

Transaction processing: Introduction of transaction processing, advantages and disadvantages of transaction processing system, online transaction processing system, serializability and recoverability, view serializability, resolving deadlock, distributed locking. Transaction management in multi-database system, long duration transaction, high-performance transaction system.

### **Unit-3:**

Object Oriented DBMS Overview of object: oriented paradigm, OODBMS architectural approaches, Object identity, procedures and encapsulation, Object oriented data model: relationship, identifiers, Basic OODBMS terminology, Inheritance , Basic interface and class structure, Type hierarchies and inheritance, Type extents and persistent programming languages, OODBMS storage issues.

Distributed Database: Introduction of DDB, DDBMS architectures, Homogeneous and Heterogeneous databases, Distributed data storage, Advantages of Data Distribution, Disadvantages of Data Distribution Distributed transactions, Commit protocols, Availability, Concurrency control & recovery in distributed databases, Directory systems, Data Replication, Data Fragmentation. Distributed database transparency features, distribution transparency.

### **Unit-4**

Object Relational and Extended Relational Databases: design techniques used in RDBMS, extension techniques in RDBMS, standards for OODBMS

Products and applications: ODMG-93 standards, ODMG Smalltalk binding, SQL3, Nested relations and collections, Storage and access methods , Implementation issues for extended type , Comparing RDBMS, OODBMS &ORDBMS.

Database application: Active database: starburst, oracle, DB2, chimera, Applications of active database, design principles for active rules, Temporal database, special, text and multimedia database. Video database management: storage management for video, video preprocessing for content representation and indexing, image and semantic-based query processing, real time buffer management.

### **Reference Books**

1. Henry F Korth, Abraham Silberschatz and S. Sudharshan, "Database System Concepts", Sixth Edition, McGraw Hill, 2011.
2. C.J.Date, A.Kannan and S.Swamynathan,"An Introduction to Database Systems", Eighth Edition, Pearson Education, 2006.
3. R. Elmasri, S.B. Navathe, "Fundamentals of Database Systems", Fifth Edition, Pearson Education/Addison Wesley, 2007.

4. Thomas Cannolly and Carolyn Begg, "Database Systems, A Practical Approach to Design, Implementation and Management", Third Edition, Pearson Education, 2007.
5. Subramaniam, "Multimedia Databases", Morgan Kauffman Publishers, 2008.



## **Softcore Courses**

### **Java Programming (3:0:1)**

#### **Course Outcome**

- Use an integrated development environment to write, compile, run, and test simple object-oriented Java programs.
- Read and make elementary modifications to Java programs that solve real-world problems.
- Validate input in a Java program, Identify and fix defects and common security issues in code.
- Document a Java program using Javadoc.
- Use a version control system to track source code in a project.

#### **Course Content**

##### **Unit-I**

Introduction to Java: Origin and features of Java. Java Program Structure, Java Tokens, Java statements, Java Virtual machine, Command Line Parameters, Java Variables and Data Types, Operators, Decision Making, Branching and looping statements.

Classes, Objects and Methods used in Java: Class fundamentals, Methods, Constructors, Overloading, Inheritance, Interfaces, One and two dimensional arrays, Vectors, Strings, Wrapper Classes.

##### **Unit-II**

Java Packages: API packages, system packages, naming conventions, creating and accessing a package, adding a class to a package, hiding classes.

Multi-threads Programming: Java thread Model, Main Thread, creating a Thread, Creating Multiple Threads, Extending the thread class, Stopping and blocking a thread, Life cycle of a thread, Managing Errors and Exceptions.

##### **Unit-III**

Applet Programming: Introduction, how applet differ from application, Applet life cycle, Applet tag, passing parameters to applet. Abstract Windows Toolkit: Components, Container, Panel, Label, Button, Checkbox, CheckboxGroup, Choice, List, TextField, TextArea, Scrollbars.

Graphics Programming: The Graphics class, Lines and Rectangles, Circles and Ellipses, Drawing Arcs, Drawing Polygons, Line Graphs, Using Control Loops in Applets.

## **Unit–IV**

Managing Input/output Files in Java: Stream Classes, Byte Stream Classes, Character Stream Classes, Creation of Files, Reading/Writing characters, Reading/Writing Bytes, Handling Primitive Data Types, Concatenating and Buffering Files, Random Access Files.

Networking: Internet Address, TCP/IP Client Sockets, TCP/IP Server Sockets, URL, URL Connection, JDBC connectivity

## **Reference Books**

1. Programming with Java – A PRIMER by - E.Balagurusamy, Tata McGraw-Hill 3<sup>rd</sup> Edition
2. The Complete Reference - Java-2 by- Patrick Naughton and Herbert Schildt Published by Tata McGraw-Hill India.
3. The Complete Reference – J2EE by - Jim Keogh, published by Tata McGraw-Hill.

## **Linux Programming (3:0:1)**

### **Course Outcome:**

- Identify and use UNIX/Linux utilities to create and manage simple file processing operations, organize directory structures with appropriate security, and develop shell scripts to perform more complex tasks.
- Effectively use the UNIX/Linux system to accomplish typical personal, office, technical, and software development tasks.
- Monitor system performance and network activities.
- Effectively use software development tools including libraries, pre-processors, compilers, linkers, and make files. Comprehend technical documentation, prepare simple readable user documentation and adhere to style guidelines.
- Collaborate in teams on system tasks.

## **Course Content:**

### **Unit-I:**

Introduction, Features of Linux, Linux Utilities-File handling utilities, File permissions, Process utilities, Disk utilities, Networking commands, Filters, Text processing utilities and Backup utilities, sed – scripts, operation, addresses, commands, applications, awk – execution, fields and records, scripts, operation, patterns, actions, functions, using system commands in awk.

### **Unit-II:**

Working with the Bourne shell(bash): Introduction, shell responsibilities, pipes and input Redirection, output redirection, running a shell script, the shell as a programming language control structures, arithmetic in shell, shell script examples, interrupt processing, functions, debugging shell scripts.

### **Unit-III:**

Files: File Concept, File System Structure, Inodes, File Attributes, File types, Library functions,the standard I/O and formatted I/O in C, stream errors, kernel support for files, System calls, File structure related system calls(File APIs), file and record locking, file and directory management – Directory file APIs, Symbolic links & hard links. Process concept.

### **Unit -IV:**

Multithreaded Programming: Differences between threads and processes, Thread structure and uses, Creating Threads, Thread Attributes, Thread Synchronization with semaphores and with Mutexes, Example programs. Sockets: Introduction to Sockets,example-client/server programs.

## **Reference Books:**

1. Unix System Programming using C++, T.Chan, PHI.(UNIT III to UNIT VIII)
2. Unix Concepts and Applications, 4th Edition, Sumitabha Das, TMH.
3. Beginning Linux Programming, 4th Edition, N.Matthew, R.Stones,Wrox, Wiley India Edition.
4. Advanced Programming in the Unix environment, 2nd Edition, W.R.Stevens, Pearson Education.
5. Unix Network Programming, W.R.Stevens, PHI.

## **E-Commerce and E-Governance (2:1:1)**

### **Course Outcome:**

- Understand the fundamentals of E-commerce, types and applications.
- Evaluate the role of the major types of information systems in a business environment and their relationship to each other.
- Assess the impact of internet and internet technology in a business electronic commerce and electronic business.
- Learn strategies for e-commerce, e-governance, wireless application protocol technology and electronic payment system.

### **Course Content**

#### **Unit–I**

Introduction: Electronic commerce environment and opportunities: Background, The electronic commerce environment, Electronic market place technologies. Modes of electronic commerce: Overview, Electronic data interchange (EDI), Migration to open EDI, E-commerce with WWW/Internet, Commerce Net advocacy, Web commerce going forward.

Approaches to safe E-commerce: Overview, Secure Transport Protocols, Secure Transactions, Secure electronic payment protocol (SEPP), Secure electronic Transaction (SET), Certificates for authentication, Security on web commerce & Enterprise network.

Payments and Security: Electronic cash and Electronic payment Schemes: Internet monetary payment and Security requirements, payment and purchase order process, On-line electronic cash. Master card/Visa secured electronic transaction: Introduction, Business Requirements, Concepts, Payment processing.

#### **Unit –II**

Consumer-oriented e-commerce: Introduction, Traditional retailing and e-retailing, benefits of e-retailing, Key success factors, Models of e-retailing, features of e-retailing, developing a consumer-oriented e-commerce system, The PASS model. Business-oriented e-commerce: Features of B2B e-commerce, Business models, Integration. Web advertising and web publishing: Traditional versus internet advertising, Internet techniques and strategies, Business models for advertising and their Revenues streams, pricing models and measurement

of the effectiveness of Advertisements, web publishing- Goals and criteria, web site development Methodologies, logic design of the user interface.

### **Unit–III**

E-Governance – An introduction, scope, Types of E- Governance- Public, Corporate, Urban, Public-Private Partnership. Models & issues for effective E-Governance.E-Democracy, role of E-Governance, E-Republic, E-Business.The stages of E-Government development, E-Govt Privacy, Security & Accessibility. Mobile security issues for E-Govt. ICT & E-Governance – Role of ICT(Information & Communication Technology). ICT infrastructure, Implementation of ICT policy.CRM(Customer Relationship Model)- Defining CRM in the public-service area. Standards in E-Governance, India Portal-Mission mode project, India development Gateway (InDG).

### **Unit–IV**

E-Government in India- Introduction, Core policies, selection criteria, core infrastructure, support infrastructure, HRD/ Training- Technical assistance, awareness & assessment. National E-Governance Strategy, Implementation approach, governance structure. Draft policy Guidelines on website development-infrastructure, Applicability, Aims & Objectives, Content structure, website features, Administration, maintenance/updating, website promotion, technical aspects, security & secrecy of information, infrastructure & Training.

### **Reference Books**

1. Ravi Kalakota, Andrew B. Frontiers of Electronic Commerce, Addison Wesley 1996.
2. Daniel Minoli, Emma Minoli: web commerce Technology Handbook. Tata McGraw Hill 1999.
3. Henry Chan, Raymond Lee, Tharam Dillon, Elizabeth Cheng: E-Commerce Fundamentals and applications, John Wiley & Sons, 2002.
4. E-Governance by - V.M. RAO
5. E-Governance by - PANKAJ SHARMA.