

# MCA 301 Java and Web Programming

## Module I

Introduction to object oriented programming-Features of Java – Data types, variables and arrays – Operators – Control statements – Classes and Methods – Inheritance.

## Module II

Packages and Interfaces –Exception Handling – Multithreaded Programming – Input/Output – Files –Utility Classes– String Handling. Generics, Generic Class, Generic methods.

## Module III

Java applets-Life cycle of an applet – Adding images to an applet – Adding sound to an applet. Passing parameters to an applet. Event Handling. Introducing AWT: Working with Windows Graphics and Text. Using AWT Controls,Layout Managers and Menus.

## Module IV

JDBC Overview – JDBC implementation – Connection class – Statements- Catching Database Results, handling database Queries..Networking– InetAddress class – URL class- TCP sockets- UDP sockets.

## Module V

Web page Designing using HTML, Scripting basics-Client side and server side scripting. Java Script-Object, names, Literals, operators and expressions- statements and features- events-windows-documents- frames- data types- built-in functions- Browser object model-Verifying forms. Servlet – life cycle of a servlet. The Servlet API, Handling HTTP Request and Response, using Cookies, Session Tracking. Introduction to JSP.

## References

- Java The Complete Reference , Herbert Schildt 7th Edition. Tata McGraw-Hill Edition
- Java 6 by Rogers Cadenhead, Laura Lemay, Pearson education
- Java Programming – A Practical Approach – C Xavier, Tata McGraw-Hill Edition
- K. Arnold and J. Gosling, “The JAVA programming language”, Third edition, Pearson Education, 2000
- Javascript A Beginners Guide, 3rd Edition – John Pollock - Tata McGraw-Hill Edition

# MCA 302 SOFTWARE ENGINEERING

## Module 1 The Software Process

Software and Software Engineering, Software Development Process Models – The Waterfall Model, V-Model , Incremental Process Models, Prototyping, the Spiral Model, Concurrent Models. Software Implementation and Management process- inspection, Agile Development, Principles that Guide Practice

## Module II Modeling and Design

Understanding Requirements, Requirements Modeling: Scenarios, Information, and Analysis Classes, Requirements Modeling for WebApps, Design Concepts, Software Architecture : Definition, Importance and Styles, User Interface Design

## **Module III Quality Management**

Quality Concepts, Review Techniques, Software Quality Assurance, Software Configuration Management, Product Metrics

## **Module IV Testing**

Software Testing Strategies, Testing Conventional Applications, Testing Object-Oriented Applications, Testing Web Applications

## **Module V Project Management**

Project Management Concepts, Process and Project Metrics, Estimation for Software Projects, Project Scheduling, Risk Management

## **References**

- Pressman, R.S., Software Engineering: A Practitioner's Approach, MGHISE, 7th Edition, 2010
- Sommerville, I., Software Engineering, Pearson Education, 7th Ed., 2005.
- Software Engineering principles & Practice- Waman S Jawadkar 2nd Edition, Tata McGraw Hill Publishing Co. Ltd.
- Schach, S., Software Engineering, TMH, 7th Ed., 2007
- Kelkar, S.A., Software Engineering: A Concise Study, PHI, 2007
- Humphrey, W.S., Managing the Software Process, Addison Wesley, 1999
- Hughes, B and Cotterel, M., Software Project Management, 3rd Edition, TMH, 2004.
- Brooks, F.P., The Mythical Man-Month, Pearson, 1995

## **MCA 303 System Software**

### **Module I**

**General concepts**-Review of assembly and machine language programming, distinction between system software and application software, Language processors:- Introduction , Language processing activities.

**Assemblers**:- Elements of Assembly language programming, A simple assembly scheme, Pass structure of assemblers, Design of two pass assemblers

### **Module II**

Macros and macro processors:- Macro definition and call, Macro expansion, Nested macro calls, advanced macro facilities, design of macro pre processor

Linker-Relocation and linking concepts-self relocating programs.

Loader-Types of loaders

Editor-Types of editors-Components of editor-Debug monitor

### **Module III**

Introduction to compiling:- Compilers, Analysis of a source program, the phases of a compiler,

Lexical analysis:-The role of the lexical analyzer, Input buffering, specification of tokens

Recognition of tokens, Finite automata, Conversion of an NFA to DFA, From a regular expression to an NFA

### **Module IV**

Syntax analysis:- the role of the parser, Context free grammars, writing a grammar, Top down parsing Bottom up parsing, syntax directed translation-syntax directed definition, , Construction of Syntax Tree, L R parsers-LR parsing algorithm, Constructing SLR parsing tables, SLR parsing table

## **Module V**

Intermediate code generation-postfix notation, syntax tree, three-address code, basic blocks and flow graph,the DAG representation of basic blocks, Backpatching,

Code optimization:- The principal sources of optimization, optimization of basic blocks, loops in flow graphs, Peephole optimization

Code Generations:- Issues in the design of a code generator, simple code generator

## **References**

- System Programming and operating Systems- D.M.Dhamdhare Tata McGraw Hill (Modules 1& 2)
- Compilers Principles, Techniques and Tools- Alfred V Aho, Ravi Sethi, Jeffry D Ullman (Modules 3, 4 & 5 )
- Systems programming- John J Donovan
- System Software- Leland L Beck, Addison Wesley Publishing Company

# **MCA 304 DATABASE MANAGEMENT SYSTEMS**

## **MODULE I**

### **Introduction To Database Systems and E-R Model**

Overview, A Historical Perspective, Files System versus DBMS,Advantages of DBMS, Describing and storing data in a DBMS Transaction management, Structure of a DBMS, People who work with Databases, Overview of Database Design. Entities, Attributes and Entity Sets, Relationships and Relationship sets, Additional Features of E-R Model: Key Constraints. Conceptual Design with the E-R Model Overview of Unified Modeling Languages Recommended to use a couple of specific ER-Models (Chen Model, Yourdon Model etc)

## **MODULE II**

### **Relational Model and Query Languages**

Introduction to the Relational Model.Integrity Constraints over Relations : Primary Key, Foreign Key and General Constraints. E-R Model to Relational Model: Entity Sets to Tables, Relationship Sets to Tables, Translating, Relationship Sets with Key Constraints. Translating Relationship Sets with Participation Constraints, Translating Weak Entity Sets, Translating Class Hierarchies. Translating E-R Diagrams with Aggregation, Introduction to Query Languages, Relational Algebra: Selection and Projection Operations. Set Operations, Renaming, Joins, Division

## **MODULE III**

### **Structured Query Language**

Overview of SQL, Basic Queries in SQL, Union, Intersect and Except, Nested Queries, Aggregate Operators, Null Values, Number, String and Date Functions, Using user defined functions inside queries, Complex Integrity Constraints in SQL, Triggers and Views in SQL, Embedded SQL and Cursors

## **MODULE IV**

### **Relational Database Design**

Introduction to Schema Refinement, Functional Dependencies, Properties of Decomposition, Normal Forms: First Normal Form, Second Normal Form,Third Normal Form, Boyce Codd Normal Form, Fourth Normal Form,Fifth Normal Form

## MODULE V

### Transaction Management, Concurrency Control, Distributed System and Database Administration

The ACID Properties, Transactions and Schedules, Concurrent Execution of Transactions: Serialisability, Anomalies Due to Interleaved Execution .Schedules Involving Aborted Transactions, Lock-Based Concurrency Control: 2 PL – Basic & Strict, Dead Locks, Introduction to Crash Recovery, Concurrency Control: 2 PL, Serialisability, and Recoverability, Introduction to Locking Management: Dealing with Deadlock .Introduction to ARIES, Introduction to Distributed Databases: Advantages & Disadvantages, Transaction Types – Local & Global Transactions, Distributed DBMS Architectures, Design of Distributed Databases: Replication, Fragmentation  
How to add users, space management of tablespaces and objects

### References

- Database Management Systems – Raghu Ramakrishnan and Johannes Gehrke, Third Edition, McGraw Hill, 2003
- Database Systems: Design , Implementaion and Management, Peter Rob, Thomson Learning, 7Edn.
- Concept of Database Management, Pratt, Thomson Learning, 5Edn.
- Database System Concepts – Silberchatz, Korth and Sudarsan, Fifth Edition, McGraw Hill, 2006
- The Complete Reference SQL – James R Groff and Paul N Weinberg, Second Edition, Tata McGraw Hill, 2003

## MCA 305 Data Communications

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### Module I

**Signals:-**Simplified data communications model. Electric signals - continuous and discrete signals, periodic signals, Fourier Series Representation of Periodic Signals, Frequency, Spectrum and Bandwidth. Analog and Digital data transmission - data and signals, analog and digital transmission, their comparison, Digital data rate and band width. Transmission impairments - Attenuation, Delay distortion, Noise, Channel Capacity.

**Transmission Media :-** Guided Transmission Media -Twisted pair wires, Coaxial, Optical fiber. Wireless Transmission - Terrestrial microwave, satellite microwave, broad cast Radio, Infrared.

### Module II

**Digital Transmission:-**Digital Data, Digital Signal:-Line coding- characteristics of line coding, Line coding schemes- Unipolar encoding:- NRZ, RZ, Manchester, Differential Manchester. Bipolar encoding:- AMI., Block coding Analog Data, Digital Signal:- Sampling, Sampling theorem, Nyquist rate, Pulse Amplitude Modulation (PAM), Pulse Code Modulation (PCM).

### Module III

**Analog Transmission:-**Modulation of Analog signals:- Analog to Analog modulation- Amplitude Modulation, Frequency Modulation, and Phase Modulation.

Modulation of Digital Data – Bit Rate and Baud Rate, ASK, FSK, PSK,QAM. Modems.

**Multiplexing:-** FDM, TDM, statistical TDM, WDM. Channnelization:- FDMA, TDMA,CDMA.

### Module IV

**Transmission mode:-** Parallel transmission, Serial transmission, Asynchronous transmission,

synchronous transmission. Line Configurations, full duplex and half duplex transmission.

**Circuit switching**:- Telephone networks-local loops, trunks.

**Packet switching** :- Datagram, virtual circuit. Effect of packet size on transmission time.

Comparison of circuit switching and packet switching

## Module V

**High-Speed Digital Access**:- DSL Technology-ADSL, xDSL, Spread Spectrum- Concept, Frequency Hopping, Direct Sequence

**Cellular Telephony**:- Basic concepts, Frequency–Reuse Principle, Transmitting, Receiving, Handoff, Roaming. First Generation, Second Generation-GSM, Third Generation.

## References

- William Stallings -Data and Computer communications - Prentice Hall of India VII<sup>th</sup> Edition.
- Behrouz A Forougan, Data Communications and Networking, 4th ed.McGraw Hill
- Andrews S. Tanenbaum -Computer Networks, Prentice Hall of India, 4<sup>th</sup> Edition.

## MCA 306 Java Programming LAB

1. Program to illustrate class, objects and constructors
2. Program to implement overloading, overriding, polymorphism etc
3. Program to implement the usage of packages
4. Program to create our own exception
5. Program for handling file operation
6. Implement the concept of thread programming
7. Program to implement Generic class and generic methods
8. Applet program for passing parameters
9. Applet program for running an audio file
10. Program for event-driven paradigm in Java
11. Event driven program for Graphical Drawing Application
12. Program that uses Menu driven Application
13. Program to implement JDBC in GUI and Console Application
14. Web page design using HTML and client side validation using Javascript
15. Programs to implement session Handling and Cookies in Servlets and JSP
16. Socket programming to implement communications
17. Develop a multi-threaded GUI application of your choice.

## MCA 307 DBMS LAB

Installation and configuration of Oracle Database

- 1 Table Design- Using foreign key and Normalization
- 2 Practice SQL Data Definition Language(DDL) commands
  - a) Table creation and alteration(include integrity constraints such as primary key, referential integrity constraints, check, unique and null constraints both column and table level
  - b) Other database objects such as view, index, cluster, sequence, synonym etc.
- 3 Practice SQL Data Manipulation Language (DML) commands
  - a) Row insertion, deletion and updating
  - b) Retrieval of data
    - i) Simple select query
    - ii) Select with where options (include all relational and logical operators)
    - iii) Functions: Numeric, Data, Character, Conversion and Group functions with having clause.
    - iv) Set operators
    - v) Sorting data
    - vi) Sub query (returning single row, multiple rows, more than one column, correlated sub query)
    - vii) Joining tables( single join, self join, outer join)
      - x Data manipulations using date functions
      - xi User defined functions in a query
      - xii How to use hints in queries to optimize performance
      - xiii Manage ODBC/JDBC connections
- 4 Practice Transaction Control Language (TCL) commands ( Grant, revoke, commit and save point options)
- 5 Usage of triggers, functions and procedures using PL/SQL constructs
- 6 Development of sample applications using Oracle as Back End Sample applications may include
  - i) Payroll
  - ii) Student Information
  - iii) Bank
  - iv) Library Information System etc.

Information System Transaction

How to take backup and restore using Oracle

How to conduct query optimization in a database