Course Structure and Syllabi

Master of Information Technology

Academic Programmes

July, 2013
# MSc-IT Syllabus at JECRC

## Semester – I

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
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<td>CA-11011</td>
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**Total** 25
## Semester – II

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| **Total**   |                                  |         |         |         | **25** |
## Semester – III

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## Semester – IV

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</table>
Course Code: CA-11011  
Course Name: Advance JAVA Programming Language  

UNIT I  
Review of Java Basics: Features, environment, class, inheritance, package, interface, applets, AWT, exception handling, multithreading, files.  
Swing: Features, components, swing vs AWT, swing containers, controls, using Dialogs, sliders, progress bars, tables, creating user interface using swing.

UNIT II  
Java Database Connectivity: Connectivity model, Java. SQL package, JDBC Exception classes, Database connectivity, Data manipulation and navigation.  
Java RMI: Distributed object technologies, RMI architecture, creating RMI applications.

UNIT III  
Java Servlets: Servelets vs CGI, Servlet lifecycle, creating and running servlets.  
Networking: Networking basics, Java and the Net, TCP/IP client sockets, TCP/IP server sockets, Inet Address, URL, Datagrams, creating networking applications.

UNIT IV  
Java Beans: Component architecture, what are Beans, Advantages of Beans, Bean Developer kit (BDK), JAR files, introspection, developing Beans, Using Bound properties, The Java Beans API.

REFERENCES:  
2. Schildt, Herbert, 1998: The complete Reference Java 2, TMH  
Course Code: CA-11012
Course Name: Interactive Computer Graphics

Unit I
Display Devices: Line and point plotting systems; Raster, vector, pixel and point plotters, Continual refresh and storage displays, Digital frame buffer, Plasma panel displays, Very high resolution devices, High-speed drawing, Display processors, Character generators, Color-display techniques (shadow mask and penetration CRT, color look-up tables, analog false colors, hard-copy color printers). Display Discription; Screen coordinates, user co-ordinates; Graphical data structures (compressed incremental list, vector list, use of homogeneous coordinates); Display code generation; Graphical functions;

UNIT II
The view algorithm, Two-dimensional transformation, Line-drawing, Circle drawing algorithms.
Interactive Graphics: Pointing and positioning devices (cursor, lightpen, digitizing tablet, the mouse, track balls), Interactive graphical techniques; Positioning, (Elastic or Rubber Band lines, Inking, zooming, panning, clipping, windowing, scissoring),

UNIT III
Mouse Programming, Turbo-C, Graphic Languages: Primitives (Constants, actions, operators, variables), plotting and geometric transformations, display subroutines, Concept of Animation, Saving, Loading and Printing graphics images from/to disk. Animated algorithms for Sorting, Towers of Hanoi etc.

UNIT IV
3-D Graphics: Wire-frame, perspective display, Perspective depth, Projective transformations, Hidden line and surface elimination, Transparent solids, Shading.
Programming Projects: Two dimensional Transformations, 3-dimensional transformations, Interactive Graphical Techniques. GUI. Turbo C/C++ (Graphics Routines) is to be used as the standard teaching tool.

REFERENCES:
Course Code: CA-11013
Course Name: Software Engineering & Management

Unit I
Software Specifications: Software requirements, Definition, Software requirements specifications (SRS), Components of SRS.

UNIT II
Software Project Planning & Scheduling: Objectives, Decomposition techniques, Problem based estimation, Cost estimation models, COCOMO model, Risk in estimation.
System Analysis: Principles of structures Analysis, DFD, E-R-diagram, Data Dictionary

UNIT III
Software Metrics: Role of Metrics and Measurements, Types of Software Metrics.
Software design: Objectives, Principles, Concepts, Design Process, Design Methodologies, Structured design, Modular design, Object oriented design, Userinterface design, Features of a Modern GUI, Windows, icons, error messages etc.

UNIT IV
Hardware and Software Selection: Hardware acquisition, Benchmarking, Vendor selection, Software selection, Performance and acceptance criteria, Site preparation.

REFERENCES:
MSc-IT Syllabus at JECRC

Course Code: CA-11014
Course Name: Algorithm Design and Analysis

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**Unit I**

**Review of Algorithms and Data Structures**: Analysing algorithms; Stacks and Queues, Trees, Heaps and Heap sort; Sets, Find and Disjoint set union, Graphs, Hashing. Example of recursive programs; Converting recursive algorithms into iterative ones; Analysing algorithms; Big Oh and Asymptotic notations.

**Divide and Conquer**: General method, Binary Search, Merge sort, Quick sort, Selection sort, Strassen's matrix multiplication and analysis of these problems.

**UNIT II**

**Greedy Method**: General Method, Knapsack problem, Job sequencing with deadlines, Minimum spanning Trees, Single source Shortest path; analysis of these problems.

**Dynamic Programming**: General method, Optimal Binary Search Trees, 0/1 Knapsack, the travelling Salesperson problem.

**UNIT III**

**Backtracking**: General method, 8 queen's problem, Graph colouring, Hamiltonian cycles.

**Branch-And-Bound**: Method, 0/1 Knapsack and Travelling Salesperson problems, Efficiency considerations.

**UNIT IV**

**Lower-Bound Theory**: Techniques for Algebraic problems, Some Lower Boundson parallel Computation.

**NP-hard and NP-complete problems**: Basic concepts, Statement of Cook's Theorem, Examples of NP-hard graph and NP-scheduling problems, some simplified NP-hard problems.

**REFERENCES:**

Course Code: CA-11015  
Course Name: Lab. JAVA Programming  

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Practical will be based on Paper Advance JAVA Programming Language: Covers UNIT-I, UNIT-II, UNIT-III, UNIT-IV, UNIT-V of Syllabus.
Course Code: CA-11016  
Course Name: Lab. Computer Graphics  

Course Code: CA-11017
Course Name: Lab. Software Engineering

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Practical will be based on Paper Software Engineering & Management: Covers UNIT-I, UNIT-II, UNIT-III UNIT-IV, UNIT-V of Syllabus.
Course Code: CA-11018
Course Name: Lab. Algorithm Design

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Practical will be based on Paper Algorithm Design and Analysis: Covers UNIT-I, UNIT-II, UNIT-III UNIT-IV, UNIT-V of Syllabus.
Course Code: CA-12011  
Course Name: Operating System

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**Unit I**
Introduction to Operating System: OS, types of OS, Functions/Operations of OS, History of OS, Users services/jobs.
Memory Management (I): Address protection, segmentation, virtual memory, paging, page replacement algorithms.

**UNIT II**
Memory Management (II): cache memory, hierarchy of memory types, associative memory.
Support for concurrent process: Mutual exclusion, shared data, critical sections, busy form of waiting, lock and unlock primitives, synchronization.

**UNIT III**
Scheduling: Process states, virtual processors, interrupt mechanism, scheduling algorithms-preemptive and non-preemptive scheduling.

**UNIT IV**
System deadlock: Prevention, detection and avoidance.
Multiprogramming system: Queue management, File and directory systems, disk scheduling.

**REFERENCES:**
5. Richie, C. 2001: Operating System
Course Code: CA-12012
Course Name: Electronic Commerce and Tools

Unit I

**Electronic Commerce Fundamentals:** Introduction to E-commerce and its advantages & disadvantages; Traditional vs E-Commerce; Growth of E-Commerce in India vis-à-vis Other Nations; Prospects and limitations in the growth of E-commerce in Indian context; E-Commerce Framework; The anatomy of E-commerce Applications; E-commerce consumer & organization applications.

**UNIT II**

Internet as a Network infrastructure for E-commerce; Architecture and components of Internet; Internet Services; ISPs at Local/National/Global Level; Domain Name Registration; Internet Administration; Internet Protocol Suite. Architectural Framework for E-Commerce; WWW as the architecture; Hypertext Publishing; Technology behind the web; Security behind the web.

**UNIT III**

Consumer oriented applications; Mercantile Process Model; Mercantile Model from the Consumer’s perspective; Mercantile Model from the Merchant’s perspective. Electronic Data Interchange (EDI) and its applications in business; Legal, Security and Privacy issues in EDI; EDI software implementation; Internal Information Systems; ERP and Supply-Chain Management; The corporate digital library; Advertising and marketing on the internet; On-demand education and Digital copyrights.

**UNIT IV**

**Issues in E-commerce:** The legal and policy environment of E-Commerce; Intellectual Property, advertising and consumer protection; Copyright Law; Patent Law; Network Security and Firewalls; Client-Server Network Security Threats; Data and Message Security; Encrypted Documents and E-mail; Principles of digital cryptography; Symmetric and Asymmetric Cryptosystems; Cryptographic standards e.g. Data Encryption Standard (DES); Digital Signatures; Public Key Certificates;

**REFERENCES:**

Course Code: CA-12013
Course Name: Artificial Intelligence and LISP

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**Unit I**


**UNIT II**


Gameplaying: Minimax Search Procedure, Adding Alpha-Beta Cutoffs

**UNIT III**


Natural Language understanding and Processing: Complexity of the problem, Syntactic processing, Semantic Analysis, Pragmatic processing, Introduction to Perception and Action.

**UNIT IV**

Introduction to LISP: Symbolic expressions, creating, Appending and modifying lists, Defining functions, Predicates, Conditionals, Recursion, Iteration, Lambda Expressions, Use of Advanced functions like MAPCAR, REMOVE-IF, COUNT-IF.

**REFERENCES:**

7. Bharti & Chaitany, 2005: Natural Language Processing, PHI.
MSc-IT Syllabus at JECRC

Course Code: CA-12014
Course Name: Trends in Computing

Unit I
Parallel Computing: Parallel virtual machine (PVM) and message passing interface (MPI) libraries and calls. Advanced architectures. Today’s fastest computers and Supercomputers.
Data compression technology: Introduction, space/storage compression, Lossy versus lossless data compression, Graphics Metafiles, Classes of data encoding techniques, GIF, PNG, JPEG and MPEG compressions

UNIT II
Data Warehousing and data mining: characteristics of data warehousing, data modeling for data warehousing, steps to build a data warehouse, Applications of data mining, Association rules, classification, sequential patterns, clustering etc., commercial data mining tools.

UNIT III
Intelligent Agent Technology: Introduction to agents, Intelligent software systems, applications, Intelligent architectures, components of intelligent agent based distributed systems, agent communication protocols - introduction to knowledge query and manipulation language (KQML). Case Study - Road Traffic Management System.

UNIT IV

REFERENCES:
1. M. Sasikumar, Dinesh Shikhare, P. Ravi Prakash, 2004 : Introduction to Parallel Processing, PHI. (for section A)
Course Code: CA-12015
Course Name: Lab. Operating System

Course Code: CA-12016
Course Name: Lab. Electronic

Course Code: CA-12017
Course Name: Lab. LISP

Practical will be based on Paper Artificial Intelligence and LISP: Covers UNIT-I, UNIT-II, UNIT-III UNIT-IV, UNIT-V of Syllabus.
Course Code: CA-13011
Course Name: Software Testing and Quality Assurance  

Unit I

UNIT II

UNIT III
Quality Assurance: Overview of Software Quality, Software Quality Attributes, Factors Affecting Software Quality, Building Software Quality Assurance Plan, Components of SQAP.

UNIT IV
System Configuration Management (SCM): Basic requirements for SCM system, SCM principles, Planning and organizing for SCM, Benefits of SCM, Change management, Version and release management.

REFERENCES:
1. Doutsch, Wills, Hall, 1988 : Software Quality Engineering: A total Technique and management Approach,
5. William E. Perry, WILEY, 2006 : Effective methods for Software Testing:
Course Code: CA-13012
Course Name: Visual C++ Programming

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Unit I

UNIT II
Win32 architecture and the Windows GUI The Win32 API, Architecture of a Win32 program, Elements of Windows GUI.
Windows Programming with MFC MFC fundamentals: The structure and usage of the MFC, The application framework, MFC support for multithreading, MFC class categories, The document/view architecture, Handling window messages, Managing handlers with ClassWizard, Errors and error handling, MFC diagnostic functions and macros, Exceptions and exception handling.

UNIT III
MFC and user interface programming: MFC classes and user interface elements, Commands and menus, Toolbars, Dialog bars and status bars, Creating dialog boxes, Standard windows controls and MFC classes, Dialog Data Exchange (DDX) and Dialog Data Validation (DDV), Using list boxes, Building an ActiveX control framework, MFC support for Context-sensitive help.
Viewing and Storing Data: Form views, Control views, Splitter windows, Handling multiple views.

UNIT IV
Database Creation Programming in Windows Data access with MFC: Introduction to data access, MFC database classes, Recordsets and transactions. Developing database applications: Creating an ODBC application, Structure of a database application, Connecting the recordset to controls, Creating a joined recordset. Querying the database: Customizing a query, Querydefs and parameterized, queries, Seek and Find functions.
Application Deployment The Registry and application setup, Linking, MFC and DLLs.

REFERENCES:
Course Code: CA-13013
Course Name: Linux Administration

Unit I
Introduction to Linux: What is Linux, Linux's History, Minimum System Requirements; Installing Linux: Working with Linux, Floppy-less Installation, Boot and Root Disks, Choosing Text or Graphics Installation, Setting up your Hard Drive, Formatting the Partitions, Setting up the Ethernet, Configuration X, Selecting packages to Install, Using LILO; Partitioning the Hard Disk: Linux Swap Space Partitions, Linux's fdisk, Enabling the Swap Space for Installation, Creating the Linux File-system partition, Using LILO
Using Linux: Starting and Stopping your Linux System, Linux Shutdown Commands, Login, Passwords, Creating a New Login, Logging Out; Trying out your new Login: Linux Error Messages, Search Paths; The who Command, Commands and Programs.
Basic Linux Commands: How Linux Commands Work, Command Options, Other Parameters, Input and Output Redirection, National conventions used to Describe Linux commands, Online help available in Linux, The Linux Man pages, Finding keywords in Man pages, The bash shell help facility; Wildcards: * and ?, Environment Variables, Process and How to Terminate them, The process status Commands: ps, The process termination command: kill, the su command, the grep command.

UNIT II
Using the File System: Files Overview, Common types of files, filenames, Directories overview, Parent directories and sub-directories, The root directory, How directories are named, The home directory; Navigating the Linux file System: pwd command, Absolute and relative filenames; cd command, Creating and Deleting files: Cat, Creating Directories, Moving and Copying files, Moving and Copying with Wildcards, Moving Directories, Removing files and directories, Fear of Compression: The Zipless file, Important directories in the Linux file System: /, /home, /bin, /usr, /usr/bin, /usr/spool, /dev, /usr/bin, /sbin, /etc.

UNIT III
Linux - tcsh: An Introduction to tcsh, Command completion, Wildcards, Command History, Aliases, Input and Output Redirection, Pipelines, Prompts, Job Control; Key Bindings, Correcting Spelling Errors, Pre-commands, Change directory Commands, Monitoring Logins and Logouts, Customizing tcsh, tcsh Command Summary, tcsh variables.
Shell Programming: Creating and Running Shell Programs, Using variables: Assigning a value to a variable, Accessing the value of a variable, Positional Parameters and other Built-In Shell Variables; The Importance of Quotation Marks: The test Command, Thetcsh Equivalent of the test command, Conditional Statements: if Statement, caseStatement; Iteration Statements:
for Statement, while Statement, until Statement, shift Command, select Statement, repeat Statement, Functions.

**Editing and Typesetting:** Text Editors vi, The vi Editor, Starting vi, vi modes, Inserting Text, Quitting vi, Moving the Cursor, Deleting Text, Copying and Moving Text, Searching and Replacing Text, Setting Preferences.

**UNIT IV**

**PERL:** Creating and Executing Perl Programs, Handling Data in Perl: Variables, Numbers, Strings, File Operators: Arrays, Perl Programming Constructs: Statement Blocks, If Statements, unless Statements, for Statements, for each Statements, while Statements, until Statements, Functions: Passing Arguments to Functions, Using Return Values; Perl Operators.

**Linux for System Administrators:** System Administration Basics, The root Account, Starting and Stopping the System, Booting from a Floppy, Using LILO to Boot, Shutting Down Linux; Mounting File Systems: Mounting a Floppy, Creating a New file System, Un-mounting file Systems, Checking file Systems, Using a file as Swap Space; Compressing files with gzip and compress: Using tar, Backups, Setting up your System: Setting the System Name, Using a Maintenance Disk, Forgetting the root Password, Setting the Login Message.

**Networking & Network Services:** What is TCP/IP? Hardware Requirements, Configuring Linux Files, Setting up the Dummy Interface, Configuration Files, Testing and Troubleshooting, The netstat Command, ping, Mail, News, NFS, NIS, www, FTP, DNS.

**REFERENCES:**
Course Code: CA-13014  
Course Name: Systems Approach to Management and Optimization Techniques  

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Unit I  
**Concepts of Computer Based Systems:** Data, Information, Information Systems, Model of computer based information system; Introduction to Management Information System, Decision Support System and Knowledge Based Systems  
**Accounting Information System:** Characteristics, sample system, subsystems for filling customer order, order replenishment stock, performing general ledger processes; features and use of Accounting Information System Package-Tally.  
**Marketing Information System:** Basic concepts, model, subsystems including Marketing Research, Marketing Intelligence, Product, Place, Promotion and Pricing subsystems

UNIT II  
**Manufacturing Information System:** Model and subsystems including Accounting Information, Industrial Engineering, Inventory, Quality and Cost Subsystems  
**Financial Information System:** Model and Subsystems including Forecasting, Funds Management and Control Subsystems.  
**Human Resources Information Systems:** Model and Subsystems including human resources research, human resources intelligence, HRIS Database, HRIS output.

UNIT III  
**Basics of Operations Research (OR):** Origin and Development of OR, Characteristics of OR, Models in OR, OR and Decision Making, Role of Computers in OR, Limitations of OR  
**Linear Programming:** Mathematical Formulation, Graphical and Simplex method, Duality in Linear programming, Dual Simplex Method, The Revised Simplex Method, Sensitivity Analysis.

UNIT IV  
**Special types of Linear Programming problems** – Transportation and Assignment problems.  
**Integer Programming:** Introduction, Branch and Bound Techniques, Binary Linear Programming, Assignment & Traveling salesman problems.  
**Dynamic Programming,** Deterministic & Probabilistic Dynamic Programming

REFERENCES:  
Course Code: CA-13015
Course Name: Lab. Software Testing

Course Code: CA-13016
Course Name: Lab. C++ Programming

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Course Code: CA-13017
Course Name: Lab. Linux Administration

L T P C
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Practical will be based on Paper Linux Administration: Covers UNIT-I, UNIT-II, UNIT-III UNIT-IV, UNIT-V of Syllabus.
Course Code: CA-14011
Course Name: Industrial Training project

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The project period will be of 6 months duration. The project will involve development of application/system software in industrial/commercial/scientific environment.