

**UNIVERSITY OF MADRAS**  
**INSTITUTE OF DISTANCE EDUCATION**  
**MSC (IT) INFORMATION TECHNOLOGY**  
**Under Choice Based Credits System**  
**(With effect from the academic year 2018-2019)**

**SCHEME OF EXAMINATION**

<b>SEMESTER I</b>	<b>SUBJECTS</b>	<b>CREDIT</b>	<b>MAX MARKS</b>		<b>TOTAL</b>
<b>COURSE COMPONENT</b>			<b>INT</b>	<b>EXT</b>	
Core Paper-I	C++ and Data Structures	4	20	80	100
Core Paper-II	Computer Architecture	4	20	80	100
Core Paper-III	Data Base Management Systems	4	20	80	100
Core Paper-IV	Practical – I: Data Structures Lab. Using C ++	2	40	60	100
Core Paper-V	Practical – II: RDBMS Lab.	2	40	60	100
Elective - I	Visual Programming	3	20	80	100

<b>SEMESTER II</b>	<b>SUBJECTS</b>	<b>CREDIT</b>	<b>MAX MARKS</b>		<b>TOTAL</b>
<b>COURSE COMPONENT</b>			<b>INT</b>	<b>EXT</b>	
Core Paper-VI	Operating Systems	4	20	80	100
Core Paper-VII	Programming in Java	4	20	80	100
Core Paper-VIII	Practical – III: Java Programming Lab	2	40	60	100
Elective -II	Data Warehousing and data Mining	3	20	80	100
Elective -III	Dot Net Programming	3	20	80	100
Elective -IV	Practical – IV: Dot Net Programming Lab.	2	40	60	100

<b>SEMESTER III</b>	<b>SUBJECTS</b>	<b>CREDIT</b>	<b>MAX MARKS</b>		<b>TOTAL</b>
<b>COURSE COMPONENT</b>			<b>INT</b>	<b>EXT</b>	
Core Paper-IX	Computer Networks	4	20	80	100
Core Paper-X	Design and Analysis of Algorithms	4	20	80	100
Core Paper-XI	Advanced Java Programming	4	20	80	100
Core Paper-XII	Information Security	4	20	80	100
Core Paper-XIII	Practical – V: Advanced Java Lab.	2	40	60	100
Core Paper -XIV	Practical – VI: Mini Project	2	40	60	100
Elective-V	Mobile Computing	3	20	80	100

<b>SEMESTER IV</b>	<b>SUBJECTS</b>	<b>CREDIT</b>	<b>MAX MARKS</b>		<b>TOTAL</b>
<b>COURSE COMPONENT</b>			<b>INT</b>	<b>EXT</b>	
Core Paper-XV	Project & Viva – voce	16	20	60+20	100

**CREDIT DISTRIBUTION**

		<b>CREDITS</b>
Core Paper	9 X 4	36
Core Practical	5X 2	10
Elective	4 X 3	12
Elective Practical	1 X 2	2
Project	1 X 16	16
<b>TOTAL</b>		<b>76</b>

**UNIVERSITY OF MADRAS**  
**INSTITUTE OF DISTANCE EDUCATION**  
**MSC (IT) INFORMATION TECHNOLOGY**  
**Under Choice Based Credits System**  
**(With effect from the academic year 2018-2019)**  
**SYLLABUS**

**SEMESTER – I**

<b>Core Paper - I : C++ and Data Structures</b>
<b>Objective of the course :</b> This course introduces the basic concepts of programming in C++ and Data Structure.
Unit 1: Introduction to C++; Tokens, Keywords, Identifiers, Variables, Operators, Manipulators, Expressions and Control Structures in C++; Pointers - Functions in C++ - Main Function -Function Prototyping - Parameters Passing in Functions - Values Return by Functions - Inline Functions - Friend and Virtual Functions
Unit-2: Classes and Objects; Constructors and Destructors; and Operator Overloading and Type Conversions - Type of Constructors - Function overloading. Inheritance : Single Inheritance - Multilevel Inheritance - Multiple Inheritance - Hierarchical Inheritance - Hybrid Inheritance. Pointers, Virtual Functions and Polymorphism; Managing Console I/O operations.
Unit 3: Working with Files: Classes for File Stream Operations - Opening and Closing a File - End-of-File Deduction - File Pointers - Updating a File - Error Handling during File Operations - Command-line Arguments. Data Structures: Definition of a Data structure - primitive and composite Data Types, Asymptotic notations, Arrays, Operations on Arrays, Order lists.
Unit-4:Stacks - Applications of Stack - Infix to Postfix Conversion, Recursion, Maze Problems - Queues- Operations on Queues, Queue Applications, Circular Queue. Singly Linked List- Operations, Application - Representation of a Polynomial, Polynomial Addition; Doubly Linked List - Operations, Applications.
Unit-5 : Trees and Graphs: Binary Trees - Conversion of Forest to Binary Tree, Operations - Tree Traversals; Graph - Definition, Types of Graphs, Hashing Tables and Hashing Functions, Traversal - Shortest Path; Dijkstra's Algorithm.

**1. Recommended Texts :**

- i) E.Horowitz, S.Sahni and Mehta, 1999, Fundamentals of Data Structures in C++, Galgotia.
- ii) Herbert Schildt, 1999, C++ - The complete Reference, Third Edition, Tata McGraw –Hill.

**2. Reference Books:**

- i)GregoryL.Heileman, 1996, Data Structures , Algorithms and Object Oriented Programming – Mc-Graw Hill International Editions.
- ii)A.V.Aho, J.D. Ullman, J.E. Hopcraft: Data Structures and Algorithms-Adisson Wesley Pub.

<b>Core Paper - II :Computer Architecture</b>
<b>Objective of the course :</b> This course introduces the concepts of Computer Architecture.
Unit 1: : Data representation - Data types - complements, fixed point and floating point representation other binary codes - micro operations: Register transfer language, Register transfer, Bus and Memory transfer, Arithmetic, logic, and shift micro operations, Arithmetic logic shift unit - micro programmed control -control memory - Address sequencing - micro program example - design of control unit.
Unit-2: : Central processing unit: General register and stack organizations, instruction formats - Addressing modes, Data transfer and manipulation - program control, RISC - Pipelining - Arithmetic and instruction, RISC pipeline - Vector processing and Array processors.
Unit 3: Computer Arithmetic - Addition and subtraction, Multiplication and division, floating point and decimal Arithmetic operations.
Unit-4: Input-output organization - peripheral devices, I/O interface, Asynchronous data transfer, modes of transfer, priority interrupt, direct memory access, I/O processor, serial communications.
Unit-5 : Memory organization - Memory hierarchy - main memory - Auxiliary memory - associative, cache and virtual memory, memory management hardware - multi processors: Interconnection structures, Inter processor arbitration.

### **1. Recommended Texts :**

i)M.M. Mano, 1993, Computer System architecture. PHI (Third Edition).

### **2. Reference Books**

i) V. C. Hamacher, G.Vranesic, S. G.Zaky-Computer Organiation, McGraw Hill.

ii) J. P.Hayes, 1988, Computer architecture, McGraw Hill, ISE.

iii) H. K, Briggs. F.A, 1988, Computer Architecture and Parallel Processing, McGraw-Hill ISE.

iv) William Stallings, 2003, Computer Organization & Architecture, 6th dition,PHI, New Delhi.

<b>Core Paper - III :Database Management Systems</b>
<b>Objective of the course :</b> This course introduces the concepts of database systems design
Unit 1: Introduction to Database Systems – Relational Model – Structure – Relational Algebra – Null Values – SQL – Set Operation – Views – Advanced SQL – Embedded SQL – Recursive Queries – The Tuple Relational Calculus – Domain Relational Calculus.
Unit 2: E-R Model – Constraints – E-R- Diagrams Weak Entity Sets – Reduction to Relational Schemes – Relational Database Design – Features of Relational Design – Automatic Domains and First Normal Form – Decomposition using Functional Dependencies – Multivalued Dependencies – More Normal Forms – Web Interface – Object – Based Databases – Structured Types and inheritance in SQL – Table inheritance – Persistent.
Unit 3: Storage and File Structure – RAID – File Organisation – Indexing and Hashing – B Tree – B Tree Index files - Static and Dynamic Hashing – Query Processing – Sorting & Join Operators – Query Optimization – Choice of Evaluation Plans.
Unit 4: Transaction Management – Implementation of Atomicity and Durability – Serializability – Recoverability – Concurrency Control – Dead Lock Handling – Recovery System – Buffer Management.
Unit 5: Database – System Architecture – Client Server – Architectures – Parallel System – Network Types – Distributed Database – Homogeneous and Heterogeneous Database – Directory System – Case Study – Oracle – MSSQL Server.

### 1. Recommended Texts

i) A. Silberschatz, H.F. Korth and S. Sudharshan, 2006, Database System Concepts, 5th Edition, Tata McGraw Hill, New Delhi.

### 2. Reference Books:

- i) J. D. Ullman, 1988, Principles of Database Systems, Galgotia Publishers, New Delhi
- ii) C.J. Date, 1985, An Introduction to Database Systems, Third Edition, Narosa, New Delhi.
- iii) Elmasri and Navathe, 1999, Fundamentals of Database Systems, Third Edition, Pearson Education, Delhi.
- iv) C. Ritchie, 2004, Relational Database Principals, 2ndEdition,Thomson, Singapore.

### 3. Website, E-learning resources

- (i) <http://www.cse.iitb.ac.in/dbms/Data/Papers-Local/DBConceptsBook/slide-dir/>

**Core Paper - IV :Practical – I : Data Structure Lab. Using C++**

**Objective of the course :**This course train the students to implement the data structure concepts.

For the implementation of the following problems, the students are advised to use all possible object oriented features. The implementation based on structured concepts will not accepted.

1. Implementation of Arrays (Single and Multi-Dimensional)
2. Polynomial Object and necessary overloaded operators.
3. Singly Linked Lists.
4. Circular Linked Lists.
5. Doubly Linked Lists.
6. Implementation of Stack (using Arrays and Pointers)
7. Implementation of Queue (Using Arrays and Pointers)
8. Implementation of Circular Queue (using Arrays and Pointers)
9. Evaluation of Expressions.
10. Binary Tree implementations and Traversals.
11. Binary Search Trees.

**Core Paper - V :Practical – II: RDBMS Lab.**

**Objective of the course :**This course gives training in design and implementation of data bases for the selected problems.

Students are advised to use the concepts like Data Normalization, Link between table by means of foreign keys and other relevant data base concepts for developing databases for the following problems. The implementation of each problem should have necessary input screen Menu-driven query processing and pleasing reports. The choice or RDBMS is left to the students. Necessary validations must be done after developing database.

1. Building Simple Applications.
2. Working with Intrinsic Controls and ActiveX Controls.
3. Application with multiple forms.
4. Application with Dialogs.
5. Application with Menus.
6. Application using Data Controls.
7. Application using Common Dialogs.
8. Drag and Drop Events.
9. Database Management.
10. Creating ActiveX Controls
11. Library Management System
12. Students Marksheet Processing
13. Bank Transactions.
14. Personal information system
15. Question Database and conducting Quiz.

<b>Elective -I :Visual Programming</b>
<b>Objective of the course :</b> This course introduces the basic concepts of Visual Programming.
Unit 1: Customizing a Form - Writing Simple Programs - Toolbox - Creating Controls - Name Property - Command Button - Access Keys - Image Controls - Text Boxes - Labels - Message Boxes - Grid - Editing Tools - Variables - Data Types - String - Numbers.
Unit-2: Displaying Information - Determinate Loops - Indeterminate Loops - Conditionals - Built-in Functions - Functions and Procedures.
Unit 3: Lists - Arrays - Sorting and Searching - Records - Control Arrays - Combo Boxes - Grid Control - Projects with Multiple forms - DoEvents and Sub Main - Error Trapping.
Unit-4: VB Objects - Dialog Boxes - Common Controls - Menus - MDI Forms - Testing, Debugging and Optimization - Working with Graphics.
Unit-5 : Monitoring Mouse activity - File Handling - File System Controls - File System Objects - COM/OLE - automation - DLL Servers - OLE Drag and Drop – Accessing windows API – Visual basic and Databases – Visual basic and the Internet.

### **1. Recommended Texts :**

- i) Gary Cornell, 1999, Visual Basic 6 from the Ground up, Tata McGraw-Hill, New Delhi .
- ii) Noel Jerke, 1999, Visual Basic 6 (The Complete Reference), Tata McGraw-Hill, New Delhi.

### **2. Reference Books:**

- i) B. Siler and J. Spotts, 2001, Special Editor using Visual Basic 6, PHI, New Delhi.

## SEMESTER – II

<b>Core Paper - VI :Operating Systems</b>
Objective of the course :This course introduces the fundamental concepts of operating Systems with case studied on Unix and Windows.
Unit 1: Introduction – Multiprogramming - Time sharing - Distributed system - Real-Time systems - I/O structure - Dual-mode operation - Hardware protection _ General system architecture - Operating system services - System calls - System programs - System design and implementation. Process Management: Process concept - Concurrent process - Scheduling concepts - CPU scheduling -Scheduling algorithms, Multiple processor Scheduling
Unit 2: Process Management: Process Synchronization - Critical section - Synchronization hardware - Semaphores, classical problem of synchronization, Interprocess communication. Deadlocks: Characterization, Prevention, Avoidance, and Detection.
Unit 3: Storage management - Swapping, single and multiple partition allocation - paging - segmentation - paged segmentation, virtual memory - demand paging - page replacement and algorithms, thrashing. Secondary storage management - disk structure - free space management - allocation methods – disk scheduling - performance and reliability improvements - storage hierarchy.
Unit 4: Files and protection - file system organization - file operations - access methods - consistency semantics - directory structure organization - file protection - implementation issues - security – encryption
Unit 5: Case Studies: UNIX and Windows operating systems.

### 1. Recommended Texts :

i) A. Silberschatz P.B. Galvin, Gange, 2002, Operating System Concepts, 6th Edn., Addison-Wesley Publishing Co., Boston.

### 2. Reference Books:

i) H.M. Deitel, 1990, An Introduction to Operating Systems, Addison Wesley Publishing Co., Boston

ii) D.M. Dhamdhare , 2002, Operating System, Tata McGraw-Hill, New Delhi.

iii) A.S. Tanenbaum , Operating Systems: Design and Implementation, Prentice-Hall of India, New Delhi.

iv) Nutt, 2005, Operating Systems, 3 rd Edition, Pearson Education, Delhi.



**Core Paper – VII: Programming in Java**

**Objective of the course :** This course is to develop programming skills in Java.

Unit 1: Introduction to Java - Features of Java - Object Oriented Concepts - Lexical Issues - Data Types - Variables - Arrays - Operators - Control Statements. Classes - Objects - Constructors - Overloading method - Access Control - Static and fixed methods - Inner Classes - String Class - Inheritance - Overriding methods - Using super-Abstract class.

Unit 2: Packages - Access Protection - Importing Packages - Interfaces - Exception Handling - Throw and Throws - Thread - Synchronization - Messaging - Runnable Interface - Inter thread Communication - Deadlock - Suspending, Resuming and stopping threads - Multithreading.

Unit 3: I/O Streams - File Streams - Applets –Events handling - String Objects - String Buffer - Char Array - Java Utilities - Code Documentation.

Unit 4: Networks basics - Socket Programming - Proxy Servers - TCP/IP Sockets - Net Address - URL - Datagrams - Working with windows using AWT Classes - AWT Controls - Layout Managers and Menus, jdbc connectivity.

Unit 5 : Servlets – Environment and Role – Architectural Role for servlets – HTML support – Generation – Server side – Installing Servlets- Servlet APT – servlet life cycle – HTML to servlet communication.

**1. Recommended Texts :**

- i) C. S. Horstmann, Gary Cornell, 1999, Core Java 2 Vol. I Fundamentals, Pearson Education, Delhi.
- ii) D.R. Callaway, 1999, Inside Servlets, Pearson Education, Delhi.

**2. Reference Books**

- i) P. Naughton and H. Schildt, 1999, Java2 (The Complete Reference), Third Edition, Tata McGraw-Hill, New Delhi.
- ii) K. Moss, 1999, Java Servlets, Tata McGraw-Hill, New Delhi.
- iii) H.M. Deital and P.J. Deital, 2005, Java: How to program, 5th Edition, Pearson Education, Delhi.

**Core Paper - VIII :Practical –III: Java Programming Lab.****Objective of the course :**This course gives practical training in programming in Java.**Application:**

1. Determining the order of numbers generated randomly using Random Class.
2. Implementation of Point Class for Image manipulation.
3. Usage of Calendar Class and manipulation.
4. String Manipulation using Char Array.
5. Database Creation for storing e-mail addresses and manipulation.
6. Usage of Vector Classes.
7. Implementing Thread based applications & Exception Handling (Synchronization & asynchronization).

**Applets:**

8. Working with Frames and various controls.
9. Working with Dialogs and Menus.
10. Working with Panel and Layout.
11. Incorporating Graphics (Scaling Only).
12. Applications for Events Handling
13. Application Using jdbc Connectivity
14. HTML to Servlet Applications
15. Servlet to Applet communication

<b>Elective –II: Data Warehousing and Data Mining</b>
Objective of the course :This course introduces the basic concepts of data warehousing and data mining
Unit 1: Introduction: Data Mining tasks – Data Mining versus Knowledge Discovery in Data bases – Relational databases – Data warehouses – Transactional databases – Object oriented databases – Spatial databases – Temporal databases – Text and Multimedia databases – Heterogeneous databases - Mining Issues – Metrics – Social implications of Data mining.
Unit 2: Data Preprocessing: Why Preprocess the data – Data cleaning – Data Integration – Data Transformation – Data Reduction – Data Discretization.
Unit 3: Data Mining Techniques: Association Rule Mining – The Apriori Algorithm – Multilevel Association Rules – Multidimensional Association Rules – Constraint Based Association Mining.
Unit 4: Classification and Prediction: Issues regarding Classification and Prediction – Decision Tree induction – Bayesian Classification – Back Propagation – Classification Methods – Prediction – Classifiers accuracy.
Unit 5 : Clustering Techniques: cluster Analysis – Clustering Methods – Hierarchical Methods – Density Based Methods – Outlier Analysis – Introduction to Advanced Topics: Web Mining , Spatial Mining and Temporal Mining.

### 1. Recommended Texts:

i)J. Han and M. Kamber , 2001, Data Mining: Concepts and Techniques, Morgan Kaufmann, .New Delhi.

### 2. Reference Books:

i)M. H.Dunham, 2003, Data Mining : Introductory and Advanced Topics , Pearson Education, Delhi.

ii)PaulrajPonnaiah, 2001, Data Warehousing Fundamentals, Wiley Publishers.

iii)S.N. Sivananda and S. Sumathi, 2006, Data Mining, Thomsan Learning, Chennai.

### 3. Website, E-learning resources:

<http://www.academicpress.com>

<http://www.mkp.com>

<b>Elective III :Dot Net Programming</b>
<b>Objective of the course :This course introduce the basic concepts of Dot Net Programming</b>
<b>UNIT-I</b> :Exploring Visual Studio IDE – Toolbox Control, user control creation – menus, Toolbars and Dialog boxes. Programming fundamentals - Variables, formulas and .NET Framework- Decision Structures – Loops and Timers.
<b>UNIT-II</b> : Debugging Visual Basic programs – Structured Error Handling – Modules and Procedures – Arrays – Collections and System. Collections Namespace. Exploring Text Files and String Processing. Managing windows forms and controls – Inheriting forms and creating base classes.
<b>UNIT-III</b> : Database – Introduction to ADO.NET – Bound Controls, SQL Statements, LINQ, Filtering data. Data Representation using the DataGridView control
<b>UNIT-IV</b> Web Application Basics – ASP.NET Application Fundamentals – The Page Rendering Model – Custom Rendering Controls – Composite Controls – Control potpourri – Web Parts – Configuration – Data Binding – Web site navigation – personalization.
<b>UNIT-V:</b> Caching and State management – Session State – Application Data Caching – Caching Output – Diagnostics and Debugging –The HTTP Application class and HTTP Modules – Custom Handlers. ASP.NET Web services- windows communication foundation, Ajax, ASP.NET and WPF Content.

**Recommended Text**

- (i) M. Halvorson, 2009, Microsoft Visual Basic 2008 Step by Step, Prentice Hall of India.
- (ii) G. Shepherd, 2009, Microsoft ASP.NET 3.5 step by step, Prentice Hall of India

**Reference Books**

- (i) B.Evjen, S. Hanselman, D. Rader, 2008, Beginning ASP.NET 3.5 in C# and VB, Wrox Publications.
- (ii) M. MacDonald, 2007, Beginning ASP.NET in VB 2008 from Novice to professional, second edition, Aprèss Publications.

**Website and e-Learning Source :**<http://docserve.wordpress.com/2011/04/18/complete-dot-net-notes/>

**Elective IV : Practical – IV :Dot Net Programming Lab****Objective of the course** :This course gives practical training in DOT NET programming

- (1)Write a VB.NET Desktop application and demonstrate the following (a) Link Label control that opens a web browser in your Visual basic applications (b) Dialog box controls, toolbars and menus.
- 2) Write a VB.NET desktop application to demonstrate error handling and debugging options.
- (3) Write a VB.NET desktop application to demonstrate .NET framework classes with mathematical methods.
- (4)Write a suitable VB.NET Desktop application and demonstrate the following: (a) Input Box (b)List Box(c)Masked Textbox
- (5)Write a VB.NET desktop application to demonstrate how to use a Timer control to create a logon program with a password time-out feature
- (6) Write a VB.NET desktop application to demonstrate how to create and manipulate large integer arrays. And Demonstrates the Array. sort and Array. Reverse methods and how to use a Progress Bar control to give the user visual feedback during long sorts.
- (7)Write a VB.NET desktop application to demonstrate a simple note-taking utility that demonstrate the how to manage Open. Copy, save As, Insert Date, Sort Text, and Exit commands in a program.
- (8)Write a VB.NET desktop application to demonstrate how controls are added to a windows form at run time by using program code (not the designer).
- (9)Write a VB.NET desktop application to demonstrate the graphics methods in the system. Drawing namespace, including DrawEclipse, Fill Rectangle, and DrawCurve.
- (10)Write a VB.NET desktop application to demonstrate how to create new classes, properties, and method.
- (11)Write a VB.NET desktop application to demonstrate how ADO.NET is used to establish a connection to aMSAccess database and show how the DataGridView control is used to display multiple tables of data on a form. Also demonstrate how navigation bars, datasets, and table adapters are interconnected and bound to objects on a form.
- (12)Create a web application and demonstrate rendering control tags and server-side controls and user controls.
- (13)Create a web application and demonstrate control validation, the TreeView, and the MultiView/View Controls.
- (14)Create a web applications and demonstrate databinding to several different controls, including the GridView. Also illustrate loading and saving data sets as XML and XML schema.
- (15)Create a web application and demonstrate session state within a web application.

## SEMESTER – III

<b>Core Paper IX :Computer Networks</b>
<b>Objective of the course :This course gives an insight into various network models and the general network design issues and related algorithms.</b>
Unit 1: Introduction – Network Hardware – Software – Reference Models – OSI and TCP/IP models – Example networks: Internet, ATM, Ethernet and Wireless LANs - Physical layer – Theoretical basis for data communication - guided transmission media
Unit 2: Wireless transmission - Communication Satellites – Telephones structure –local loop, trunks and multiplexing, switching. Data link layer: Design issues – error detection and correction.
Unit 3: Elementary data link protocols - sliding window protocols – Data Link Layer in the Internet - Medium Access Layer – Channel Allocation Problem – Multiple Access Protocols.
Unit 4: Network layer - design issues - Routing algorithms - Congestion control algorithms – IP protocol – IP Address – Internet Control Protocol.
Unit 5 : Transport layer - design issues - Connection management - Addressing, Establishing & Releasing a connection – Simple Transport Protocol – Internet Transport Protocol (TCP) - Network Security: Cryptography.

### 1. Recommended Texts:

A. S.Tanenbaum, 2003, Computer Networks, Fourth Edition, - Pearson Education, Inc, (Prentice hall of India Ltd), Delhi.

### 2. Reference Books:

- i) B. Forouzan, 1998, Introduction to Data Communications in Networking, Tata McGraw Hill, New Delhi.
  - ii) F. Halsall, 1995, Data Communications, Computer Networks and Open Systems, Addison Wesley.
  - iii) D. Bertsekas and R. Gallager, 1992, Data Networks, Prentice hall of India, New Delhi.
- Lamarca, 2002, Communication Networks, Tata McGraw Hill, New Delhi.

### 3. Website, E-learning resources

- (i) <http://authors.phptr.com/tanenbaumcn4/>

<b>Core Paper X :Design and Analysis of Algorithms</b>
<b>Objective of the course :This course gives insight into the design and analysis for selected problems.</b>
Unit 1: Introduction - Definition of Algorithm – pseudocode conventions – recursive algorithms – time and space complexity –big-“oh” notation – practical complexities – randomized algorithms – repeated element – primality testing - Divide and Conquer: General Method - Finding maximum and minimum – merge sort.
Unit 2: Divide and conquer contd. – Quicksort, Selection, Strassen's matrix multiplication – Greedy Method: General Method –knapsack problem - Tree vertex splitting - Job sequencing with dead lines – optimal storage on tapes.
Unit 3: Dynamic Programming: General Method - multistage graphs – all pairs shortest paths – single source shortest paths - String Editing – 0/1 knapsack. Search techniques for graphs – DFS-BFS-connected components – biconnected components.
Unit 4: Back Tracking: General Method – 8-queens - Sum of subsets - Graph Coloring – Hamiltonian cycles. Branch and Bound: General Method - Traveling Salesperson problem.
Unit 5 : Lower Bound Theory: Comparison trees - Oracles and advisory arguments - Lower bounds through reduction - Basic Concepts of NP-Hard and NP-Complete problems.

### 1. Recommended Texts :

- i) E. Horowitz, S. Sahni and S. Rajasekaran, 1999, Computer Algorithms, Galgotia, New Delhi.

### 2. Reference Books:

- (i) G. Brassard and P. Bratley, 1997, Fundamentals of Algorithms, PHI, New Delhi.
- ii) A.V. Aho, J.E. Hopcroft, J.D. Ullmann, 1974, The design and analysis of Computer Algorithms, Addison Wesley, Boston.
- iii) S.E.Goodman and S.T.Hedetniemi, 1977, Introduction to the Design and Analysis of algorithms, Tata McGraw Hill Int. Edn, New Delhi.

### 3. Website, E-learning resources

<http://www.cise.ufl.edu/~raj/BOOK.html>

<b>Core Paper - XI :Advanced Java Programming</b>
<b>Objective of the course :This course gives an insight into advanced features of Java</b>
Unit 1: Servlet overview – the Java web server – your first servlet – servlet chaining – server side includes- Session management – security – HTML forms – using JDBC in servlets – applet to servlet communication.
Unit 2: Java Beans :The software component assembly model- The java beans development kit- developing beans – notable beans – using infobus - Glasgow developments - Application Builder tool- JAR files-Introspection-Bound Properties-Persistence-customizers - java beans API.
Unit 3: EJB: EJB architecture- EJB requirements – design and implementation – EJB session beans- EJB entity beans-EJB Clients – deployment tips, tricks and traps for building distributed and other systems – implementation and future directions of EJB-Variable in perl-perl control structures and operators – functions and scope
Unit 4: RMI – Overview – Developing applications with RMI: Declaring& Implementing remote interfaces-stubs & skeletons, Registering remote objects, writing RMI clients – Pushing data from RMI Servlet – RMI over Inter-ORB Protocol
Unit 5: JSP –Introduction JSP-Examining MVC and JSP -JSP scripting elements & directives-Working with variables scopes-Error Pages - using Java Beans in JSP Working with Java Mail-Understanding Protocols in Javamail-Components-Javamail API-Integrating into J2EE-Understanding Java Messaging Services-Transactions.

### 1. Recommended Text:

- i) J. McGovern, R. Adatia, Y. Fain, 2003, J2EE 1.4 Bible, Wiley-dreamtech India Pvt. Ltd, New Delhi
- ii) H. Schildt, 2002, Java 2 Complete Reference, 5th Edition, Tata McGraw Hill, New Delhi.

### 2. Reference books:

- i) K. Moss, 1999, Java Servlets, Second edition, Tata McGraw Hill, New Delhi.
- ii) D. R. Callaway, 1999, Inside Servlets, Addison Wesley, Boston
- iii) Joseph O'Neil, 1998, Java Beans from the Ground Up, Tata McGraw Hill, New Delhi.
- iv) Tom Valesky, Enterprise JavaBeans, Addison Wesley.
- v) Cay S Horstmann & Gary Cornell, Core Java Vol II Advanced Features, Addison Wesley.



<b>Core Paper –XII: Information Security</b>
<b>Objective of the course :This course introduces basics of Information Security.</b>
Unit 1: Introduction: Security- Attacks- Computer criminals- Method of defense Program Security: Secure programs- Non-malicious program errors- Viruses and other malicious code- Targeted malicious code- Controls against program threats.
Unit 2: Operating System Security: Protected objects and methods of protection- Memory address protection- Control of access to general objects- File protection mechanism- Authentication: Authentication basics- Password- Challenge-response- Biometrics.
Unit 3: Database Security: Security requirements- Reliability and integrity- Sensitive data- Interface- Multilevel database- Proposals for multilevel security.
Unit 4: Security in Networks: Threats in networks- Network security control- Firewalls- Intrusion detection systems- Secure e-mail- Networks and cryptography- Example protocols: PEM- SSL- Ipsec.
Unit 5: Administrating Security: Security planning- Risk analysis- Organizational security policies- Physical security - Legal- Privacy- and Ethical Issues in Computer Security - Protecting programs and data- Information and law- Rights of employees and employers- Software failures- Computer crime- Privacy- Ethical issues in computer society- Case studies of ethics.

### 1. Recommended Texts:

- i) C. P. Pfleeger, and S. L. Pfleeger, Security in Computing, Pearson Education, 4th Edition, 2003
- ii) Matt Bishop, Computer Security: Art and Science, Pearson Education, 2003.

### 2. Reference Books:

- i). Stallings, Cryptography And Network Security: Principles and practice, 4th Edition, 2006
- ii). Kaufman, Perlman, Speciner, Network Security, Prentice Hall, 2nd Edition, 2003
- iii). EricMaiwald, Network Security : A Beginner’s Guide, TMH, 1999
- iv). Macro Pistoia, Java Network Security, Pearson Education, 2nd Edition, 1999
- v). Whitman, Mattord, Principles of information security, Thomson, 2nd Edition, 2005

<b>Core Paper - XIII :Practical - V: Advanced Java Lab.</b>
<b>Objective of the course :This course gives practical training in Advanced java programming</b>
<ol style="list-style-type: none"> <li>1. HTML to Servlet Applications</li> <li>2. Applet to Servlet Communication</li> <li>3. Designing online applications with JSP</li> <li>4. Creating JSP program using Java Beans</li> <li>5. Working with Enterprise Java Beans</li> <li>6. Performing Java Database Connectivity.</li> <li>7. Creating Web services with RMI.</li> <li>8. Creating and Sending Email with Java</li> <li>9. Building web applications</li> </ol>

<b>Core Paper - XIV : Practical - VI: Mini Project.</b>
<b>Objective of the course :</b> This course is to train the student to create a complete web based application with database connectivity and preparing the report of work done.
Each student will develop and implement individually application software based on any emerging latest technologies.

<b>Elective - V :Mobile Computing</b>
<b>Objective of the course :</b> This course introduces the basic concepts of mobile computing
Unit 1: Introduction - Mobile and Wireless Devices – Simplified Reference Model – Need for Mobile Computing –Wireless Transmissions –Multiplexing – Spread Spectrum and Cellular Systems- Medium Access Control – Comparisons.
Unit 2: Telecommunication Systems – GSM – Architecture – Sessions –Protocols – Hand Over and Security – UMTS and IMT – 2000 – Satellite Systems.
Unit 3: Wireless LAN - IEEE S02.11 – Hiper LAN – Bluetooth – Security and Link Management.
Unit 4: Mobile network layer - Mobile IP – Goals – Packet Delivery – Strategies – Registration – Tunneling and Reverse Tunneling – Adhoc Networks – Routing Strategies.
Unit 5: Mobile transport layer - Congestion Control – Implication of TCP Improvement – Mobility – Indirect – Snooping – Mobile – Transaction oriented TCP - TCP over wireless – Performance.

### 1. Recommended Texts :

i)J. Schiller, 2003, Mobile Communications,2nd edition, Pearson Education, Delhi.

### 2. Reference Books:

i) Hansmann, Merk, Nicklous, Stober, 2004, Principles of Mobile Computing, 2nd Edition, Springer (India).

ii) Pahlavan, Krishnamurthy, 2003, Principle of wireless Networks: A unified Approach, Pearson Education, Delhi.

iii) Martyn Mallick, 2004, Mobile and Wireless Design Essentials, Wiley Dreamtech India Pvt. Ltd., New Delhi.

iv) W.Stallings, 2004, Wireless Communications and Networks, 2nd Edition, Pearson Education, Delhi.

## SEMESTER – IV

<b>Core Paper - XV :Project &amp; Viva-Voce</b>
---

<b>Objective of the course :</b> This course is to train the student in executing a project and preparing the report of work done.
--

The project work is to be carried out either in a software industry or in an academic institution for the entire semester and the report of work done is to be submitted to the University.
---

\*\*\*\*\*