

### Subject wise Core Elective Papers

M. Sc. Subject	Core elective paper to be opted in sem III (Sem V in case of M. Sc. (Tech) Applied Geology)	Core elective paper to be opted in sem IV (Sem VI in case of M. Sc. (Tech) Applied Geology)
M. Sc. (Information Technology)	Soft Computing	Design and Analysis of Algorithm
	Distributed Databases	Cloud Computing
	Object Oriented Analysis and Design using UML	Mobile Computing

**Foundation Course:** (Candidate can opt for any one foundation course paper as shown below in the semester III and IV (Semester V & VI in case of M. Sc. (Tech) Applied Geology). However, Student shall opt for this paper from any other subject other than his / her main subject for post graduation. If the candidate decides to opt for foundation course papers then he/she shall not be eligible to opt for Core (Subject Centric) papers in their respective subjects). List of foundation courses available:

M. Sc. Subject	Foundation Course I in semester III (Sem V in case of M. Sc. (Tech) Applied Geology)	Foundation Course II in Semester IV (Sem VI in case of M. Sc. (Tech) Applied Geology)
M. Sc. (Information Technology)	Operating system concepts	Advances in information technology
	Principles of Management	Banking Operations And Services
	E-Business	Information Security And Cyber Law

**Core (Discipline Centric):** (Candidate can opt for this paper as shown below in the semester III and IV (Semester V & VI in case of M. Sc. (Tech) Applied Geology) in their main subject of post graduation only. If the candidate decides to opt for Core (Subject Centric) papers in their main subject of post graduation then he/she shall not be eligible to opt for Foundation Course papers neither in their own subject nor in any other subject). List of Core (Discipline Centric) course available in the respective subject:

M. Sc. Subject	Core (Subject Centric) I in semester III (Sem V in case of M. Sc. (Tech) Applied Geology)	Core (Subject Centric) II in Semester IV (Sem VI in case of M. Sc. (Tech) Applied Geology)
M. Sc. (Information Technology)	CORBA	Enterprise Computing
	Digital & Cyber Forensics	Mobile & Cyber Forensics

**Scheme of teaching and examination under semester pattern Choice Based Credit System (CBCS) for M.Sc. Information Technology**

<b>Semester I for M.Sc. Information Technology</b>											
Code	Theory / Practical	Teaching scheme (Hours / Week)			Credits	Duration in hrs.	Examination Scheme				
		Th	Pract	Total			Max. Marks		Total Marks	Minimum Passing Marks	
							External Marks	Internal Ass		Th	Pract
Core 1	Paper 1 <b>Computer Architecture and Organization</b>	4	-	4	4	3	80	20	100	40	
Core 2	Paper 2 <b>Internet Computing With ASP.NET</b>	4	-	4	4	3	80	20	100	40	
Core 3	Paper 3 <b>Distributed Operating System</b>	4	-	4	4	3	80	20	100	40	
Core 4	Paper 4 <b>Advanced DBMS and Administration</b>	4	-	4	4	3	80	20	100	40	
Pract. Core 1 & 2	Practical 1 <b>based on theory paper-1 and 2</b>	-	8	8	4	3-8*	100**	-	100		40
Pract. Core 3 & 4	Practical 2 <b>based on theory paper-3 and 4</b>	-	8	8	4	3-8*	100**	-	100		40
Seminar 1	Seminar 1	2	-	2	1			25	25	10	
	<b>TOTAL</b>	<b>18</b>	<b>16</b>	<b>34</b>	<b>25</b>		<b>520</b>	<b>105</b>	<b>625</b>	<b>170</b>	<b>80</b>

<b>Semester II for M.Sc. Information Technology</b>											
Code	Theory / Practical	Teaching scheme (Hours / Week)			Credits	Examination Scheme					
		Th	Pract	Total		Duration in hrs.	Max. Marks		Total Marks	Minimum Passing Marks	
							External Marks	Internal Ass		Th	Pract
Core 5	Paper 5 <b>Windows Programming using VC++</b>	4	-	4	4	3	80	20	100	40	
Core 6	Paper 6 <b>Theory of Computation and Compiler Construction</b>	4	-	4	4	3	80	20	100	40	
Core 7	Paper 7 <b>Network Programming</b>	4	-	4	4	3	80	20	100	40	
Core 8	Paper 8 <b>Open source Web Programming using PHP</b>	4	-	4	4	3	80	20	100	40	
Pract. Core 5 & 6	Practical 3 <b>based on theory paper-5 and 6</b>	-	8	8	4	3-8*	100**	-	100		40
Pract. Core 7 & 8	Practical 4 <b>based on theory paper-7 and 8</b>	-	8	8	4	3-8*	100**	-	100		40
Seminar 2	Seminar 2	2	-	2	1			25	25	10	
	<b>TOTAL</b>	<b>18</b>	<b>16</b>	<b>34</b>	<b>25</b>		<b>520</b>	<b>105</b>	<b>625</b>	<b>170</b>	<b>80</b>

<b>Semester III for M.Sc. Information Technology</b>												
Code	Theory / Practical	Teaching scheme (Hours / Week)			Credits	Examination Scheme						
		Th	Pract	Total		Duration in hrs.	Max. Marks		Total Marks	Minimum Passing Marks		
							External Marks	Internal Ass		Th	Pract	
Core 9	Paper 9 <b>Data Communication and Networks</b>	4	-	4	4	3	80	20	100	40		
Core 10	Paper 10 <b>Software Engineering</b>	4	-	4	4	3	80	20	100	40		
Core Elective 1	Paper 11 <b>CE1-1 Soft Computing</b> <b>CE1-2 Distributed Databases</b> <b>CE1-3 Object Oriented Analysis and Design using UML</b>	4	-	4	4	3	80	20	100	40		
Foundation Course 1/ Core(Subj ect Centric)1	Paper 12 <b>FC1-1 Operating System Concepts</b> <b>FC1-2 Principles of Management</b> <b>FC1- 3 E-Business</b>  <b>CDC1-1 CORBA</b> <b>CDC1-2 Digital &amp; Cyber Forensics</b>	4	-	4	4	3	80	20	100	40		
Pract. Core 9 & 10	Practical 5 <b>based on theory paper-9 and 10</b>	-	8	8	4	3-8*	100**	-	100			40
Pract. Core Elective 1	Practical 6 <b>based on paper 11</b>	-	8	8	4	3-8*	100**	-	100			40
Seminar 3	Seminar 3	2	-	2	1			25	25	10		

	<b>TOTAL</b>	<b>18</b>	<b>16</b>	<b>34</b>	<b>25</b>		<b>520</b>	<b>105</b>	<b>625</b>	<b>170</b>	<b>80</b>
<b>Semester IV for M.Sc. Information Technology</b>											
Code	Theory / Practical	Teaching scheme (Hours / Week)			Credits	Examination Scheme					
		Th	Pract	Total		Duration in hrs.	Max. Marks		Total Marks	Minimum Passing Marks	
							External Marks	Internal Ass		Th	Pract
Core 11	Paper 13 <b>Data Warehousing And Data Mining</b>	4	-	4	4	3	80	20	100	40	
Core 12	Paper 14 <b>Artificial Intelligence &amp; Expert System</b>	4	-	4	4	3	80	20	100	40	
Core Elective 2	Paper 15 <b>CE2-1 Design and Analysis of Algorithm CE2-2 Cloud Computing CE2-3 Mobile Computing</b>	4	-	4	4	3	80	20	100	40	
Foundation Course 2/ Core(Subject Centric)2	Paper 16 <b>FC2-1 Advances in Information Technology FC2-2 Banking Operations And Services FC2-3 Information Security And Cyber Law  CDC2-1 Enterprise Computing CDC2-2 Mobile &amp; Cyber Forensics</b>	4	-	4	4	3	80	20	100	40	
Pract. Core 11,	Practical 7 <b>based on theory</b>	-	8	8	4	3-8*	100**	-	100		40

12 & Elective 2	<b>paper-13,14,15.</b>										
Project	Project		8	8	4		100 **	-	100		40
Seminar 4	Seminar 4	2	-	2	1			25	25	10	
	<b>TOTAL</b>	<b>18</b>	<b>16</b>	<b>34</b>	<b>25</b>		<b>520</b>	<b>105</b>	<b>625</b>	<b>170</b>	<b>80</b>

Note: Th = Theory; Pr = Practical/lab, \* = If required, for two days.

\*\* = The Practical and Project shall be evaluated by both External and Internal Examiner in the respective Department / Center / Affiliated College as per guidelines appended with this direction.

**M.Sc. (Information Technology)**  
**Semester I**  
**Paper 1 : Computer Architecture and Organization**

**Hours/Week : 4**

**Credits : 4**

**Unit-1 :**

Principle of computer design : Software, hardware interaction, layers in computer architecture, central processing and machine language instruction, addressing modes, instruction types, instruction set selection, instruction and execution cycle.

**Unit-2 :**

Control Unit : Data path and control path design, microprogramming v/s hardwired control, pipelining in CPU design, RISC v/s CISC, superscalar processors.

**Unit-3 :**

Memory subsystem : Storage technologies, memory array organization, memory hierarchy, interleaving , cache memory and virtual memory including architectural aids to implement these.

**Unit-4 :**

Input/ Output Processing : Bus Interface, Data transfer techniques, I/O interrupts and channels,. Performance evaluation : SPECmarks , Transaction Processing Benchmarks.

**Books :**

1. Computer Architecture and Organization by Tenenbaum
2. Computer Architecture and Organization by J. P. Hayes.
3. Parallel Processing by Hwang

## Paper 2 : Internet Computing with ASP.NET

Hours/Week : 4

Credits : 4

**Unit-1 :** HTML Basics: Introduction to Internet, Applications, Web designing, web browser, web pages, home page, web site, web servers, www. Concepts of hypertext, hypermedia, versions of HTML, elements of HTML, syntax, sections of HTML, building & executing html documents, Various tags of HTML: Headings & Title, Text-level elements, Changing Colors font, size using FONT> Tag, Text alignment & paragraph Creating links with <A Href> tag, Inserting image using <IMG> tag, Creating Table with <TABLE> tag, rowspan, colspan attributes. <FRAMESET> & <FRAME> tag, <FORM> tag, creating text boxes, buttons, checkboxes, radio buttons, hidden control, password, lists & dropdown list, textarea. Submitting a form, get & post method. ASP & HTML forms. Working with Cascading Style Sheet (CSS):

**Unit-2 :** ASP.NET Controls: Overview of dynamic web page, introduction & features of ASP.NET, understanding ASP.NET controls, applications, web servers, installation of IIS. Web fors, web form controls, server controls, client controls, adding controls to web form, buttons, text box, labels, checkbox, radio buttons, list box. Adding controls a runtime, Running a web application, creating a multiform web project, Form validation: client side and server side validation, Validation controls: required field comparison range, Calendar control, Ad rotator control, Internet Explorer control.

### Unit-3 :

**ADO.NET:** Overview of ADO.NET, from ADO to ADO.NET, ADO.NET architecture, Accessing data using data adapters and datasets, using command and data reader, binding data to data bind controls, displaying data in data grid.

**XML in .NET:** XML basics, attributes, fundamentals of XML classes: Document, text writer, text reader, XML validations, XML in ADO.NET, Data document

### Unit-4 :

**Web Services:** Introduction, State management, view state, session state, application state, service description language, building & consuming a web service. Web application development, Caching, Threading concepts, Creating threads in .NET, Managing threads, Thread Synchronization, features of .NET, role based security & code access security, permissions

### Books :

1. The Completer Reference ASP.NET – Mathew Macdonald (TMH)
2. Professional ASP.NET – Wrox publication
3. Learn HTML in a weekend – Steven E. Callihan (TMH)

### Reference Books:

1. VB.NET Programming Black Book – Steven Holzner (Dreamtech pub.)
2. Introduction to .NET framework – Wrox publication.
3. ASP.NET Unleashed - bpb publication.
4. Using HTML – Lee Anne Philips (PHI)



## **Paper 3 : Distributed Operating System**

**Hours/Week : 4**

**Credits : 4**

### **Unit-1 :**

**Fundamentals** Introduction to Distributed Computing System, Distributed Computing system model, Advantages of Distributed computing System, Introduction to Distributed Operating System, Introduction to Distributed Computing Environment

### **Unit-2 :**

**Message Passing** Introduction, Characteristics of Good message passing system, Issues in IPC by message passing Synchronization, Buffering, Multidatagram messages, Encoding and Decoding of message data, process addressing, Failure handling, Group Communication.

### **Unit-3 :**

**Remote Process Calls (RPC)** Introduction, RPC Model, Implementing RPC Mechanism, Stub generation, RPC messages, Types of RPC's Marshaling arguments and results, Server Management, Call semantics, Communication Protocols for RPC's Client-Server Binding, Exception handling Security.

### **Unit-4 :**

**Distributed Shared Memory (DSM)**, Introduction Resource and Process Management, Characteristics of good global Scheduling algorithm, Various approaches for resource management, Process migration, Threads, Clock synchronization, Event ordering, Mutual Exclusion, Deadlock, Election algorithm.

### **Books:**

1. Distributed Operating system, Sinha, PHI Publication.

## **Paper 4 : Advanced DBMS and Administration**

**Hours/Week : 4**

**Credits : 4**

### **Unit-1 :**

Relational Database design: Functional dependencies, and Normalization Normal forms based on primary keys (1 NF, 2 NF, 3 NF, BCNF, 4 NF, 5 NF) Loss less joins and dependency preserving decomposition Query Processing: Query Processing Stages, Query Interpretation, Equivalence of Expressions, Query Resource Utilization, Query Execution Statistics, Query Execution Plan, Estimation of Query Processing Cost, Table Scan, Sample Index Access, Fill Factor, Multiple Index Access, Methods for Joining Tables (Nested Loop, Merge Join, Hybrid Join, Multiple Join) Structure of a Query Optimizer

### **Unit-2 :**

Transaction Processing & Concurrency Control: Concept and definition of transaction, ACID properties, serializability, Prioritization, states of transaction, Types of failure, desirable properties of transaction schedules and recoverability, serial usability of schedules, levels of transaction consistency, deadlocks, long duration transactions, transaction performance, transaction processing as implemented in contemporary database, management system. Concurrency Control, locking techniques, techniques based on time-stamp ordering, multiple granularity. Crash Recovery: failure classification, recovery concepts, database backup, recovery concepts based on deferred update and on immediate update. Shadow paging, check points, on-line backup during database updates, crash recovery techniques.

Client/Server database: Evolution of client concept, Client/Server environment, characterization of Client/Server computing. Functions of clients server , application partitioning, the two-layer and three-layer architectures, communication between clients and servers.

### **Unit-3 :**

Oracle Database Architecture and Administration: Oracle database architecture, Design, Creation, Migration and Management of Oracle Databases and related database schemes, Data Dictionary views and standard package Maintaining the control, Redo Log files, Managing Tablespaces and Data Files, Storage structure and relationships, Managing rollback segment, Managing tables, Indexes, Managing data Integrity, Managing password security and resources, Managing users, Privileges, roles.

Oracle Backup and Recovery Strategies: Backup and recovery considerations, Oracle recovery structure and processes, Oracle backup and recovery configuration, Physical backup, Complete recovery of an Oracle database, Incomplete recovery of an Oracle database with Archiving, Oracle Export / Import utilities, Oracle standby database.

**Unit-4 :** Oracle Tuning and Troubleshooting: Oracle performance tuning methodology, Oracle alert and trace files, Tuning the shared pool, Buffer Cache, Redo Log buffer, Database configuration and I/O issues, Using Oracl Blocks efficiently, Optimizing sort operations, Rollback segment tuning, Monitoring and detecting lock contention, SQL issues and tuning considerations for different application. Integrity, Security: Need for Database Integrity, Integrity Constraints, Non-Procedural and Procedural Integrity

Constraints Specifications in SQL, Introduction to Database Security issues, Authorization and use.

**Books :**

1. Fundamental of Database Systems by R. Elmasri; S. Navate; Benjamin Cummings;
2. Introduction to database systems by C. J .Date
3. Database system concept by Korth
- 4 .DBA Handbook oracle press by Loney

**Reference Books:**

1. Principles of Database Management by James Martin
2. Relational database design for Micro computers Application by Prentice Hall (Jackson)
3. Database Management Systems by Bipin Desai

**M.Sc. (Information Technology)**  
**Semester II**  
**Paper 5 : Windows Programming using VC++**

**Hours/Week : 4**

**Credits : 4**

**Unit-1 :**

Windows, Visual C++, Application Frameworks Fundamentals and MFC Libraries View Class.

Introduction, MFC, ATL and WFC, Windows Programming Model, Components, Application Framework, MFC Library, Event Handling, Mapping Modes and Scrolling Views, Graphic Device Interface, Colors and Fonts, Modal Dialog and Windows Common Control, Modeless Dialog and Windows Common Dialog, ActiveX Controls and Internet Explorer Common Controls, Win32 Memory Management, Bitmaps, Message Processing and Multithreaded Programming.

**Unit-2 :**

Document View Architecture : Menus, Keyboard Accelerators, Rich Edit Control and Property Sheets, Tool bar and Status Bars, Reusable Frame Window Base Class, Separating the Documents from its View, Reading and Writing Documents- SDI applications, MDI applications, Printing and Print Preview, Splitter Windows and Multiple Views, Context-Sensitive Help, DLL's, MFC Programs without Documents or View Classes

**Unit-3 :**

Active X: COM, Automation and OLE : Component Object Model, Automation, Uniform Data Transfer- Clipboard Transfer and OLE, Drag and Drop, Structured Storage, OLE Embedded Components and Containers, Introducing the Active Template Library, ATL and ActiveX Controls.

**Unit-4 :**

Database Management: Database Management with Microsoft ODBC, Database Management with Microsoft Data Access Objects, OLE DB Templates.

Programming for the Internet: TCP/IP, Winsock, WinInet, Programming the Microsoft Internet Information Server, ActiveX document Servers and the Internet, Introducing the Dynamic HTML, Visual C++ for Windows CE.

**Books :**

1. Programming Microsoft Visual C++ by D. J. Kruglilski, G Shepherd and Scot Wingo  
Publication : Microsoft Press Fifth Edition.

**Reference Books:**

1. Visual C++ 6 From The Ground Up: Mueller: TMH Publication
2. VC++ 6 The Complete Reference: Pappas, TMH Publication

## **Paper 6 : Theory of Computation and Compiler Construction**

**Hours/Week : 4**

**Credits : 4**

### **Unit-1 :**

Finite Automation and Regular Expression : Finite State systems, Basic Definitions, Non - deterministic finite Automata, Finite Automata with moves, Regular Expressions, Two way finite automata, Finite automata with output, Application on Finite Automata.

Properties of Regular Sets : The pumping lemma for Regular Sets, Close properties of Regular sets, Decision Algorithms for Regular Sets.

Context Free Grammars : Motivation and Introduction, Context Free Grammar, Derivation Tree, Simplification of context Free Grammars, Chomsky Normal form, Greibach normal form, The existence of inherently ambiguous context free languages.

Properties of Context free languages : The pumping lemma for CFL's , Closure properties of CFL's, Decision Algorithm for CFL's

### **Unit-2 :**

Push Down Automata : Informal description, Definitions, Push – Down Automata & Context free languages.

Turing Machine : Introduction, The Turing Machine Model, Computable languages and functions , Techniques Turing Machine construction, Modification of Turing Machines, Church's Hypothesis, Turing Machine as enumerators, Restricted Turing Machine equivalent to the basic model. Undecidability : Problems, properties of recursive and recursively enumerable problem, Turing Machine and undecidable problem, Rice theorem, Tool for proving CFL undecidable, Greibach's Theorem.

The Chomsky : Regular Grammars, Unrestricted Grammars, Context – Sensitive languages, Relation between classes of languages.

### **Unit-3 :**

Introduction to Compilers :

Compilers and translators, need, the structure of a compiler, Lexical Analysis, Syntax analysis, Intermediate code Generation, Optimization, Code Generation, Book keeping, Error Handling, Compiler writing tools. Basic parsing Techniques: Parsers, Shift-reduce parsing, Operator precedence parsing, Top-down parsing, predictive parsers, automatic construction of efficient parsers : LR parsers the canonical collection of LF (O) items, constructing SLR parsing tables, constructing LALR parsing tables, Ambiguous grammar.

### **Unit-4 :**

Syntax directed translation : syntax directed translation schemes, implementation, intermediate code, postfix notation, parse tree and syntax trees, three- address code, quadruple, triple, translation of Symbol Table: Data Structure, Representation of Scope Information, Code Optimization: The principal source optimization, Loop optimization, The DAG Representation of basic blocks, Value number and algebraic laws, Global data-flow analysis. Code Generation : Object Programmers Problems in code generation, A machine model, a simple code generator, Register Allocation and assignment, Code Generation from DAG's Peephole Optimization.

**Books :**

1. Introduction to Automata Theory, Languages and Computation: John E. Hopcroft & Jeffrey D. Ullman.
2. Compilers Principles, Techniques and Tools Aho, Ullman, Ravi Sethi, Pearson Education.
3. Theory of Computer Science : E. V. Krishnamoorthy.
4. Theory of computer Science : K. L. P. Mishra.

**Reference Books:**

1. D. I. A. Cohen : Introduction to Computer Theory (JW)
2. H. R. Lewis & C. H. Papadimitriou : Elements of Theory Of Computation (PHI)
3. J. Carroll and D. Long : Theory of Finite Automata (PHI)
4. M. Davis & Weyukur : Computability, Complexity & Languages.
5. M. Machtey & P. R. Young : An introduction to General Theory of Algorithm (Elsevier).
6. Zvi Havi : Switching and Finite Automata Theory (TMH).

## Paper 7 : Network Programming

Hours/Week : 4

Credits : 4

### Unit-1 :

**Introduction to Network Programming:** OSI model, Unix standards, TCP and UDP & TCP connection establishment and Format, Buffer sizes and limitation, standard internet services, Protocol usage by common internet application.

**Sockets :** Address structures, value – result arguments, Byte ordering and manipulation function and related functions Elementary TCP sockets – Socket, connect, bind, listen, accept, fork and exec function, concurrent servers. Close function and related function.

### Unit-2 :

**TCP client server :** Introduction, TCP Echo server functions, Normal startup, terminate and signal handling server process termination, Crashing and Rebooting of server host shutdown of server host.

**I/O Multiplexing and socket options:** I/O Models, select function, Batch input, shutdown function, poll function, TCP Echo server, getsockopt and setsockopt functions. Socket states, Generic socket option IPV6 socket option ICMPV6 socket option IPV6 socket option and TCP socket options.

### Unit-3 :

**Elementary UDP sockets:** Introduction UDP Echo server function, lost datagram, summary of UDP example, Lack of flow control with UDP, determining outgoing interface with UDP.

**Elementary name and Address conversions:** DNS, gethost by Name function, Resolver option, Function and IPV6 support, uname function, other networking information.

### Unit-4 :

**IPC :** Introduction, File and record locking, Pipes, FIFOs streams and messages, Name spaces, system IPC, Message queues, Semaphores.

**Remote Login:** Terminal line disciplines, Pseudo-Terminals, Terminal modes, Control Terminals, rlogin Overview, RPC Transparency Issues.

### Books :

1. UNIX Network Programming, Vol. I, Sockets API, 2<sup>nd</sup> Edition. - W.Richard Stevens, Pearson Edn. Asia.
2. UNIX Network Programming, 1<sup>st</sup> Edition, - W.Richard Stevens. PHI.

### Reference Books:

1. UNIX Systems Programming using C++ T CHAN, PHI.
2. UNIX for Programmers and Users, 3<sup>rd</sup> Edition Graham GLASS, King abls, Pearson Education
3. Advanced UNIX Programming 2<sup>nd</sup> Edition M. J. ROCHKIND, Pearson Education

## Paper 8 : Open Source Web Programming using PHP

Hours/Week : 4

Credits : 4

### Unit-1 :

**Introduction to PHP:** What Does PHP Do, A Brief History of PHP, Installing PHP, A Walk Through PHP Language Basics: Lexical Structure, Data Types, Variables, Expressions and Operators, Flow-Control Statements, Including Code, Embedding PHP in Web Pages, Installing and Configuring PHP on Windows and Linux Platforms

### Unit-2 :

**Functions:** Calling a Function, Defining a Function, Variable Scope, Function Parameters, Return Values, Variable Functions, Anonymous Functions, Strings: Quoting String Constants, Printing Strings, Accessing Individual Characters, Cleaning Strings, Encoding and Escaping, Comparing Strings, Manipulating and Searching Strings, Regular Expressions, POSIX-Style Regular Expressions, Perl-Compatible Regular Expressions, **Arrays:** Indexed Versus Associative Arrays, Identifying Elements of an Array, Storing Data in Arrays, Multidimensional Arrays, Extracting Multiple Values, Converting Between Arrays and Variables, Traversing Arrays, Sorting, Acting on Entire Arrays, Using Arrays

### Unit-3 :

**Classes and Objects:** Terminology, Creating an Object, Accessing Properties and Methods, Declaring a Class, Introspection, Serialization, Web Techniques: HTTP Basics, Variables, Server Variables, Server Information, Processing Forms, Setting Response Headers, Session, cookies, files, Maintaining State, SSL, Using PHP to Access a Database: Relational Databases and SQL, Mysql database Basics, Advanced Database Techniques

### Unit-4 :

**Graphics:** Embedding an Image in a Page, The GD Extension, Basic Graphics Concepts, Creating and Drawing Images, Images with Text, Dynamically Generated Buttons, Scaling Images, Color Handling, **PDF:** PDF Extensions, Documents and Pages, Text, Images and Graphics, Navigation, Other PDF Features

**XML :** Lightning Guide to XML, Generating XML, Parsing XML, Transforming XML with XSLT, Web Services, **Security:** Global Variables and Form Data, Filenames, File Uploads, File Permissions, Concealing PHP Libraries, PHP Code, Shell Commands, Security Redux, Application Techniques, Code Libraries, Tinplating Systems, Handling Output, Error Handling, Performance Tuning.

### Books :

1. PHP 5.1 for beginners by Evan Bayross and Sharman Shah, SPD Publications
2. Programming PHP by Rasmus Lerdorf and Kevin Tatroe, Orilly Publications



**M.Sc. (Information Technology)**  
**Semester III**  
**Paper 9 : Data Communication and Networks**

**Hours/Week : 4**

**Credits : 4**

**Unit-1 :** Introduction: Network structure and architectures and services OSI reference model. The Physical Layer: theoretical basis for data communication, transmission media. Analog Transmission, Digital Transmission, Transmission and Switching, ISDN.

The Data Link Layer: Design issues, Error detection and correction, Elementary data link protocols, sliding window protocol, protocols performance, protocols specification and verification. Examples of the Data link layer.

Network Layer: Design issues, routing algorithms, Congestion control algorithms, Internet working, Examples of the network layer.

**Unit-2 :** The Transport Layer: Design issues, Connection Management.

The session layer: Design issues and remote procedure call.

The Presentation Layer: Design issues, data compression techniques, cryptography.

The Application Layer: Design issues, file transfer, access and management, virtual terminals.

**Unit-3 :** Network Security Fundamentals: Introduction, security Vulnerabilities and Threats, Classification of Security Services.

Cryptography: Encryption principles, Conventional Encryption DES, IDEA, Algorithms, CBC, Location of Encryption Devices key Distribution.

**Unit-4 :** Message Digests and Checksums, Message Authentication, Message Digests, Hash Functions and SHA, CRCs. Public key Systems: RSA Diffie-Hellman, DSS, Key Management.

Intruders: Intrusion Techniques, Intrusion Detection, Authentication, Password- Based Authentication, Address- Based Authentication, Certificates, Authentication Services, Email Security, Firewalls, Design Principles, Packet Filtering, Access Control, Trusted Systems, Monitoring and Management.

**Books :**

1. Computer Networks – Andrew S Tanenbum (PHI)
2. Network Security and Essentials: Application and standers
3. Willam Stalling – Pearson Education.
4. Cryptography and network security
5. Willam Stalling – Pearson Education.

**Reference Books:**

1. Internet Security: Timspeed, Juanita Ellis, Digital Press Publication
2. Internet Security: Jan L. Harington, Morgan Kaufmann Publication
3. Firewall Network System: John R. Vacca, Scott R. Ellis, Digital Press
4. Network Algorithm, George Varghese, Morgan Kaufmann Publication
5. TCP/IP Addressing: Buck Graham, Morgan Kaufmann Publication
6. Data Communication and Networking: Behrouz A. Forouzan, TMH.

## Paper 10 : Software Engineering

Hours/Week : 4

Credits : 4

**Unit-1** : Introduction to Software Engineering : The evolving role of software, Changing Nature of Software, Software myths.

A Generic view of process : Software engineering- A layered technology, a process framework, The Capability Maturity Model Integration (CMMI), Process patterns, process assessment, personal and team process models.

Process models : The waterfall model, Incremental process models, Evolutionary process models, The Unified process.

Software Requirements : Functional and non-functional requirements, User requirements, System requirements, Interface specification, the software requirements document.

**Unit-2** : Requirements engineering process : Feasibility studies, Requirements elicitation and analysis, Requirements validation, Requirements management.

System models : Context Models, Behavioral models, Data models, Object models, structured methods. Modeling with UML .

Design Engineering : Design process and Design quality, Design concepts, the design model.

Creating an architectural design : Software architecture, Data design, Architectural styles and patterns, Architectural Design.

**Unit-3** : Object-Oriented Design : Objects and object classes, An Object-Oriented design process, Design evolution. Performing User interface design : Golden rules, User interface analysis and design, interface analysis, interface design steps, Design evaluation.

Testing Strategies : A strategic approach to software testing, test strategies for conventional software, Black-Box and White-Box testing, Validation testing, System testing, the art of Debugging. Product metrics : Software Quality, Metrics for Analysis Model, Metrics for Design Model, Metrics for source code, Metrics for testing, Metrics for maintenance.

**Unit-4** : Metrics for Process and Products : Software Measurement, Metrics for software quality.

Risk management : Reactive vs. Proactive Risk strategies, software risks, Risk identification, Risk projection, Risk refinement, RMMM, RMMM Plan.

Quality Management : Quality concepts, Software quality assurance, Software Reviews, Formal technical reviews, Statistical Software quality Assurance, Software reliability, The ISO 9000 quality standards.

### Books :

1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition. McGrawHill International Edition.
2. Software Engineering- Sommerville, 7th edition, Pearson education.

### Reference Books:

1. Software Engineering- K.K. Agarwal & Yogesh Singh, New Age International Publishers
2. Software Engineering, an Engineering approach- James F. Peters, Witold Pedrycz, John Wiely.
3. Systems Analysis and Design- Shely Cashman Rosenblatt, Thomson Publications.
4. Software Engineering principles and practice- Waman S Jawadekar, The McGraw-Hill Companies.

## **Paper 11 : CE1-1( Core Elective 1)**

### **Soft Computing**

**Hours/Week : 4**

**Credits : 4**

**Unit-1 :** Introduction of soft computing, soft computing vs hard computing. Soft computing techniques. Computational Intelligence and applications, problem space and searching: Graph searching, different searching algorithms like breadth first search, depth first search techniques, heuristic searching Techniques like Best first Search, A\* algorithm, AO\* Algorithms. Game Playing: Minimax search procedure, adding alpha-beta cutoffs, additional refinements, Iterative deepening, Statistical Reasoning: Probability and Bayes theorem, Certainty factors and Rules based systems, Bayesian Networks, Dempster Shafer theorem

**Unit-2 :** Neural Network: Introduction, Biological neural network: Structure of a brain, Learning methodologies. Artificial Neural Network(ANN): Evolution of, Basic neuron modeling , Difference between ANN and human brain, characteristics, McCulloch-Pitts neuron models, Learning (Supervised & Unsupervised) and activation function, Architecture, Models, Hebbian learning , Single layer Perceptron, Perceptron learning, Windrow-Hoff/ Delta learning rule, winner take all , linear Separability, Multilayer Perceptron, Adaline, Madaline, different activation functions Back propagation network, derivation of EBPA, momentum, limitation, Applications of Neural network.

**Unit-3 :** Unsupervised learning in Neural Network: Counter propagation network, architecture, functioning & characteristics of counter Propagation network, Associative memory, hope field network and Bidirectional associative memory. Adaptive Resonance Theory: Architecture, classifications, Implementation and training. Introduction to Support Vector machine, architecture and algorithms, Introduction to Kohanan's Self organization map, architecture and algorithms

**Unit-4 :** Fuzzy systems: Introduction, Need, classical sets (crisp sets) and operations on classical sets Interval Arithmetics ,Fuzzy set theory and operations, Fuzzy set versus crisp set, Crisp relation & fuzzy relations, Membership functions, Fuzzy rule base system : fuzzy propositions, formation, decomposition & aggregation of fuzzy rules, fuzzy reasoning, fuzzy inference systems, fuzzy decision making & Applications of fuzzy logic, fuzzification and defuzzification. Fuzzy associative memory. Fuzzy Logic Theory, Modeling & Control Systems

Books :

1. S.N. Shivnandam, "Principle of soft computing", Wiley India.
2. David Poole, Alan Mackworth "Computational Intelligence: A logical Approach" Oxford.
3. Russell & Yuhui, "Computational Intelligence: Concepts to Implementations", Elsevier.
4. Eiben and Smith "Introduction to Evolutionary Computing" Springer
5. Janga Reddy Manne; "Swarm Intelligence and Evolutionary Computing"; Lap Lambert Academic Publishing
6. E. Sanchez, T. Shibata, and L. A. Zadeh, Eds., "Genetic Algorithms and Fuzzy Logic Systems: Soft Computing Perspectives, Advances in Fuzzy Systems - Applications and Theory", Vol. 7, River Edge, World Scientific, 1997.

**Paper 11 : CE1-2( Core Elective 1)**  
**Distributed Databases**

**Hours/Week : 4**

**Credits : 4**

**Unit-1 :**

Features of Distributed versus Centralized Databases, Principles Of Distributed Databases, Levels Of Distribution Transparency, Reference Architecture for Distributed Databases , Types of Data Fragmentation, Integrity Constraints in Distributed Databases  
Translation of Global Queries to Fragment Queries, Equivalence Transformations for Queries, Transforming Global Queries into Fragment Queries, Distributed Grouping and Aggregate Function Evaluation, Parametric Queries

**Unit-2 :**

Optimization of Access Strategies, A Framework for Query Optimization, Join Queries, General Queries The Management of Distributed Transactions, A Framework for Transaction Management, Supporting Atomicity of Distributed Transactions, Concurrency Control for Distributed Transactions, Architectural Aspects of Distributed Transactions

**Unit-3 :**

Concurrency Control, Foundation of Distributed Concurrency Control, Distributed Deadlocks, Concurrency Control based on Timestamps, Optimistic Methods for Distributed Concurrency Control. Reliability, Basic Concepts, Nonblocking Commitment Protocols, Reliability and concurrency Control, Determining a Consistent View of the Network, Detection and Resolution of Inconsistency, Checkpoints and Cold Restart, Distributed Database Administration, Catalog Management in Distributed Databases, Authorization and Protection

**Unit-4 :**

Architectural Issues, Alternative Client/Server Architectures, Cache Consistency Object Management, Object Identifier Management, Pointer Swizzling, Object Migration, Distributed Object Storage, Object Query Processing, Object Query Processor Architectures, Query Processing Issues, Query Execution , Transaction Management, Transaction Management in Object DBMSs , Transactions as Objects  
Database Integration, Scheme Translation, Scheme Integration, Query Processing Query Processing Layers in Distributed Multi-DBMSs, Query Optimization Issues Transaction Management Transaction and Computation Model Multidatabase Concurrency Control, Multidatabase Recovery, Object Orientation And Interoperability Object Management Architecture CORBA and Database Interoperability Distributed Component Model COM/OLE and Database Interoperability, PUSH-Based Technologies

**Books :**

1. Distributed Database Principles & Systems, Stefano Ceri, Giuseppe Pelagatti McGraw-Hill
2. Principles of Distributed Database Systems, M. Tamer Ozsu, Patrick Valduriez - Pearson Education

## **Paper 11 : CE1-3(Core Elective 1)**

### **Object Oriented Analysis and Design using UML**

**Hours/Week : 4**

**Credits : 4**

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

**Introduction:** Two views of software Developments: SSAD and OOAD, Why Object – Orientation? Object and classes, Abstraction and encapsulation, Methods and Message, Interfaces, Inheritance and Polymorphism, Access Control, The Business case for OO Developments.

**Object Oriented Methodologies:** Object Oriented Design – Booch, Object Modeling Techniques- Rumbaugh, Object – Oriented Analysis – Coad- Yourdan, Object – Oriented Software Engineering – Ivar Jacobson,

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

Unified Approach: Diagramming and Notational Techniques using the UML, UML Notation, {Analysis Diagramming Techniques.} == Introduction to all (ten) Diagram, {Design Diagramming Techniques}, Generalization / Specialization., Aggregation and composition, Association , Cardinality, Navigability, Icons , relationships and adornments.

**Object-Oriented Systems Development Process:** Rational Unified Process, Four Major phases: Inception , Elaboration, Construction, Transition, Requirements Engineering: Problem analysis, Understanding Stockholders need, Type of requirements, Use-case Model : Writing Requirements

#### **Unit-3 :**

**Analysis:** Behavioral Analysis, Domain Analysis or Business Object Analysis, Use-case Driven Object Oriented analysis : The UML approach., Develop use-case Model, Use-case Description, Documentation, Activity Diagram, Identify the classes., Introduction to different approaches for identifying classes, “Noun Phrase” approach OR , “Conman Class Pattern” approach Or , “CRC” approach Or, Usecase Driven Approach. Containment and Composition, Aggregation, Inheritance , Sub Types and IS-A Hierarchies, Association and Link Relationships., Diagramming System Events.

#### **Unit-4 :**

**Design Phases:** Translating Analysis Concept into Design, Optimizing classes and Objects: The Multi-tiered Architecture View, ,Mapping System functions to objects., Object to Object Visibility, Collaboration Diagram, Sequential Diagram, Specification Class Diagram, Specifying Object Interfaces, Designing the Data Access layer, Design User Interface layer, Designing System Interfaces, Controls and Security. **Design Refinement** Designing for Extensibility, Design for reusability, Portioning class space, hecking Completeness and correctness. **Persistent Object and Database Issues:** The Cood Data Management Domain, Object Persistence, Object-oriented Database Management System, Object- Oriented verses Relational Database, Mapping object to Relational Data structure. **Testing:** Introduction to Testing Strategies, Impact of Object Orientation on Testing. Testing Business Process, Design Matrix, Discovering reusable pattern.

**Books :**

1. Object Oriented Analysis and Design with Applications, Grady Booch., Benjamin / Cummings , 1994.
2. Object –Oriented Modeling and Design. – J Rumbaugh , M Blaha , W .Premerlani
3. Principles of Object- Oriented Software Development , Anton Eliens , Addison Wesley.
4. Applying UML And Pattern - Craig Larman Pearson Education INC
5. UML Distilled - Martin flowler Pearson Education INC

**Reference Books:**

1. Object Oriented System Development - Ali Bahrami . McGRAW-HILL International Edition.
2. Object-Oriented Software Engineering – Ivar Jacobson Pearson Education INC
3. The Unified Modeling Language User Guide – Grade Booch, James Rumbaugh , Ivar Jacobson. Pearson Education INC
4. The Unified Modeling Language Reference Guide – Grade Booch, James Rumbaugh , Ivar Jacobson. Pearson Education INC
5. Design Object- Oriented Software - Rebecea Wrifs- Brock. Brian Wilkerson, Lauren Wiener ,
6. Object Oriented Analysis and Design – Bennett , Simon McGraw Hill.
7. Designing Flexible Object Oriented System with UML – Charless Richter Techmedia
8. Instant UML – Muller – Apress LP
9. UML Instant – Thomas A Pendar – Wiley Publication
10. UML in Nutshell

## **Paper 12 : FC1-1 (Foundation 1)**

### **Operating System Concepts**

**Hours/Week : 4**

**Credits : 4**

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

OS As An Extended Machine, OS As An Resource Manager, History Of OS & Its Generation, Mainframe OS, Server OS, Multiprocessor OS, Personal Computer OS, Real Time OS, Embedded OS, Smart Card OS, Processor, Memory, I/O Devices, Buses, Processes, Deadlocks, Memory Management, I/O, Files, Security, The Shell, System Calls, OS Structure.

#### **Unit II - Processes & Threads**

Process Model, Process Creation, Process Termination, Process Hierarchies, Process State Implementation Of Processes, Thread Model, Thread Model, Thread Usage, Implementing Threads In User Space & Kernel, Hybrid Implementation, Scheduler Activations, Pop-Up Threads, Interprocess Communication, Scheduling.

#### **Unit III - File System Concepts in OS.**

File Name, File Structure, File Types, File Access, File Attributes, File Operations Memory Mapped Files, Single Level Directory System, Two Level Directory System, Hierarchical Directory System, Path Name, Directory Operations, File System Layout, Implementing Files, Implementing Directories, Shared Files, CD-Rom File System, Ms-Dos File System, Windows File System, Unix File System.

#### **Unit IV**

**Introduction to Disk Operating System (DOS)** - File types, Directory Structure, Booting - Warm and Cold Booting, Types of DOS commands (Internal and External), Directory commands, Commands related to file management, General commands, batch commands, wild card characters & its use.

**Introduction to windows Operating System** Advantages of windows operating system, GUI, use of help features, changing system settings, system tools, use of run command, setting peripherals, drivers, editing graphics in windows, new features in windows XP/Vista versions.

#### **Introduction to UNIX Operating System**

History of UNIX File System: Pdp-11 UNIX, Portable UNIX, Berkeley Unix, Standard Unix, Linux. Overview Of Unix, Processes In Unix Memory Management In Unix, I/O In Unix, Security In Unix.

#### **Books:**

1. Modern Operating System By Andrew Tannenbaum, PHI Publication.
2. UNIX the Complete Book a Guide for the professional By Jason Manger, Galgotia Publication
3. Red Hat Linux 7 By Brain Proffitt, PHI Publication.
4. Dos/Unix & Windows: I.T. Today (Encyclopedia) By S. Jaiswal
5. Operating System Concept: Sillberschatz Galvin
6. MSDOS; Manual

## **Paper 12 : FC1-2 (Foundation 1)**

### **PRINCIPLES OF MANAGEMENT**

**Hours/Week : 4**

**Credits : 4**

**Unit I:** Introduction - Nature, function, definition and importance of management, Definition, nature, purpose and scope of management, Functions of a manager, an overview of planning, organizing, staffing leading and controlling. Is management a science or art? Development of Management Thought - Scientific management; Contribution of Taylor, Fayol, Mary Follet, Elton Mayo; Hawthorne experiments, Contingency approach, Indian heritage in production and consumption. Management and administration, Management as a profession, Professionalism of management in India, Management ethics and management culture, Skills required of manager, Classification of skills, Methods of skills development

**Unit II:** Management Planning - Concept of planning, objectives, Nature, Types of plan, Stages involved in planning, Characteristics of a good plan, Importance, Limitations of planning, Making planning effective, Strategic planning in Indian Industry, MBO. Decision Making - Concept, characteristics of decisions, Types of decisions, Steps Involved in decision making, Importance of decision making, Methods of decision making, Committee Decision Making.

**Unit III:** Organisation - Concepts, Principle of organization, Importance, Features of good organization structure, Types of Organisation structure. Authority, Responsibilities and Accountability, Delegation of Authority Barriers to effective delegation, Span of control. Coordination & Direction Concept - Importance and need for coordination, Principles of coordination, Methods of achieving effective coordination; Meaning of direction, Importance and Principles of direction, Characteristics of good directives.

**Unit IV:** Control - Concept, planning-control relationship, process of control -setting objectives, establishing standards, measuring performance, correcting deviations. Brief review of Traditional Techniques & Modern Techniques of Control; Human response to control; Dimensions or Types of Control - (a) Feed forward control (b) Concurrent Control (Real Time Information & Control), (c) Feedback Control v) Techniques of Control.

#### Books:

1. Essentials of Management, Harold Koontz & Heinz, Wehrich, 5th Tata McGraw Hill
2. Management Stoner, Freeman, Gilbert Jr. ,6th ,Prentice Hall
3. Management (A Global Perspective), Heinz Wehrich & Harnold Koontz, 10th Tata McGraw Hill
4. A Dictionary of Business 3ed. By Elizabeth Martin – Oxford
5. Fundamentals of Management, Robins ,3rd Pearson Education Asia
6. Management, 6e, Stoner, Pearson Education Asia



## Paper 12 : FC1-3 (Foundation 1)

### E-BUSINESS

Hours/Week : 4

Credits : 4

**UNIT- I:** Introduction-Definition of E-commerce, Unique Features of E-commerce Technology: Ubiquity, Global Reach, Universal Standards, Richness, Interactivity, Information Density, Personalization/Customization, Social Technology: User Content Generation and Social Networking, Web 2.0, Play My version; Growth of the Internet and the Web, Origins and Growth of E-commerce, Insight on Technology: Spider Webs, Bow Ties, Scale-Free Networks and Deep Web Technology and E-commerce in Perspective E-Business Technologies-The Internet: Key Technology Concepts: Packet Switching, Transmission Control Protocol/Internet Protocol (TCP/IP), IP Addresses, Domain Names, DNS, and URLs, Client/Server Computing The Internet Today: The Internet Backbone, Internet Exchange Points, Campus Area Networks (CANs), Internet Service Providers, Intranets and Extranets, Who Govern the Internet? Building an E-commerce Website: Planning: The Systems Development Life Cycle, Systems Analysis/Planning: Identify Business Objectives, System Functionality and Information Requirements. , System Design: Hardware and Software Platforms, Building Your-Own versus Outsourcing, Host your Own versus Outsourcing,

**UNIT – II:** E-Business Models- Eight Key Elements of a Business Model: Value Proposition, Revenue Model, Market Opportunity, Competitive Environment, Competitive Advantage, Market Strategy, Major Business to-Consumer (B2C) Business Models: Portal, E-tailer, Insight on Technology: Search, ads and Apps: The future for Google, (and Microsoft), Content Provider, Transaction Broker, Market Creator, Service Provider, Community Provider, Major Business-to-business (B2B) Business Model: E-distributor, EProcurement, Exchanges, Insight on Business: Onvia Evolves, Industry Consortia, Private Industrial Networks, Business Models in Emerging E-commerce Areas: Consumer-toconsumer (C2C) Business Models, Peer-to-peer (P2P) Business Models, M-commerce Business Models , E-Commerce Enablers: The Gold Rush Models, Insight on Society: Is Privacy Possible in a Wireless World?, How the Internet and the Web Change Business: Strategy, Structure, and Process, Industry structure , Industry Value Chains, Firm Value Chains, Firm Value Webs, Business Strategy.

**UNIT- III:** Back Office Automatics For E-Business - Basics of Enterprise Resource Planning, ERP Decision, Enterprise Architecture Planning, ERP Implementation, ERP Architecture and Toolkit Evolution, Implementation Supply Chain Management And Efulfillment: The Basics of Supply Chain Management, Internet-Enabled SCM, E-Supply Chain Fusion, Management Issues in e-supply Chain Fusion, The continuing Evolution of eSupply Chains, A Roadmap for Managers, Demystifying E-Procurement: Buy-Side, SellSide, Net Markets And Trading Exchanges: Evolution of e-Procurement Models, Evolution of Procurement Processes, e- Procurement Infrastructure Integrating Ordering, Fulfillment, and payment, E-Procurement, Analysis and Administration Applications, Marketplace Enables, A Roadmap for e-Procurement Managers.

**UNIT-IV:** Moving To E-Business - Spotting E-Business Trends, Trends Driving E-

Business, Customer-Oriented Trends, E- Service Trends, Organizational Trends, Employee Megatrends, Enterprise Technology, Trends, General Technology Trends, What These 20 Trends Have In Common, Digitizing The Business: E-Business Patterns, E-Business Patterns: The Structural Foundation, The E-Channel Pattern, The Click-And-Brick Pattern, The EPortal Pattern, The E- Market Maker Pattern, The Pure-E —Digital Products Pattern, Thinking E-Business Design: More Than Technology, The Race To Create Novel E-Business Designs, Step: 1: Self – Diagnosis, Step: 2: Reverse The Value Chain, Step: 3: Choose A Focus, Step 4: Execute Flawlessly, Lessons From E-Business Design. Ethical, Social And Political Issues -Understanding Ethical, Social, and Political Issues in E-commerce, A Model for organizing the issues, Basic Ethical Concepts: Responsibility, Accountability, and Liability, Analyzing Ethical Dilemmas, Candidate Ethical Principles, Privacy and Information Rights, Information Collected at Ecommerce Sites, Profiling and Behaviourial Targeting, The Internet and Government Invasions of Privacy:, Ecommerce Surveillance, Legal Protections, Informed Consent, Intellectual Property Rights, Types of Intellectual Property Protection, Copyright: The Problem of Perfect Copies and Encryption, Patents: Business Methods and Processes, Trademarks: Online Infringement and Dilution, Challenge: Balancing the Protection of Property with other values.

Books:

1. E-Business & E-Commerece for Managers, Deitel, Pearson Education
2. Michael Allen's E-Learning Library: Creating Successful E-Learning: A Rapid System For Getting It Right First Time, Every Time (Michael Allen's E-Library) by Michael W. Allen
3. E-Business Amanagement Perspective,Reynolds, Oxford Higher Education
4. Harvard Business Review on Corporate Governance (Harvard Business Review Paperback Series) by Walter J. Salmon, Jay William Lorsch, Gordon Donaldson, and John Pound
5. E-Commerce: Business, Technology, Society (3rd Edition) by Kenneth Laudon and Carol Traver
6. Knowledge Management by Carl Frappaolo

## Paper 12 : CDC1-1 (Core Subject Centric 1)

### CORBA

Hours/Week : 4

Credits : 4

#### Unit-1 :

Introduction of CORBA, Distributed Objects, CORBA Components, Object Management Architecture, CORBA Services, CORBA Business objects. Object Web reference CORBA, CORBA and Java objects, CORBA Java/ IDL Mapping.

#### Unit-2:

Static CORBA, Mapping CORBA IDL to Java, ORBlets and Applets, CORBA-enabled Applet, Java ORB and C++ ORB. Dynamic CORBA: CORBA Naming services, CORBA Object naming. Client/ Server naming scenario, creating namespace, finding objects.

#### Unit-3 :

Dynamic Invocations, Dynamic Invocation interfaces, CORBA Case studies with a) Socket vs CORBA/ Java ORB, Java sockets, java streams, Datagram socket, buffered socket, Data stream socket, b) HTTP/CGI versus CORBA/Java ORB, c) Servlet versus CORBA/Java ORB, d)RMI versus CORBA/Java ORB.

#### Unit-4 :

DOM versus CORBA/ Java ORB: Looking DCOM through CORBA, DCOM style interfaces, DCOM and Java, CORBA Initialization interfaces, Server side of CORBA: CORBA::BOA interface, CORBA::POA interface, Object activation, POA Interfaces, Metadata: CORBA IDL, CORBA interface repository, CORBA IDL to Java Mapping: CORBA Modules, Exceptions, Parameter and Holder Classes, Helper Classes, AttributeCORBA constant, CORBA Primitive types, CORBA Constructed types, interfaces, sequences, arrays, structures, enums, unions, typedefs, CORBA Serverside mapping: Inheritance, Delegations, CORBA pseudo objects: CORBA::ORB mapping, CORBA::Object mapping, CORBA::NamedValue Mapping, CORBA::NVList Mapping, CORBA::Request Mapping, CORBA:: ServerRequest and DSI mapping, CORBA::TypeCodes

#### Books :

1. Client /Server Programming with Java and CORBA (Paperback) by Dan Harkey and Robert Orfali, John Wiley and Sons
2. Advance CORBA Programming with C++ by Michi Henning, Addison Wesley Professional Computing Series

## Paper 12 : CDC1-2 (Core Subject Centric 1)

### DIGITAL & CYBER FORENSICS

Hours/Week : 4

Credits : 4

**Unit I:** Recent amendments in IT Act, internet & web technologies, web hosting and development, attributes in cyberspace and legal framework of cyberspace, hacking, virus, obscenity, pornography, programme manipulation, Copyright, Patent, software piracy, intellectual property rights, trademark, domain disputes, and computer security, etc., Encryption and Decryption methods. Search and seizures of evidence. Investigation of cyber crimes and tools for analysis.

**Unit II:** Information security: Domains, Common Attacks, Impact of Security Breaches. Protecting Critical Systems (Information Risk Management, Risk Analysis etc) Information Security in Depth Physical security (Data security Systems and network security) Program Security: Secure programs, Non-malicious program errors, Viruses and other malicious code, Targeted malicious code, Controls against program threats File protection mechanism, Authentication: Authentication basics, Password, Challenge response, Biometrics. Network Security: Threats in networks, Network security control, Firewalls, Intrusion detection systems, Secure e-mail, Networks and cryptography, Example protocols: PEM, SSL, IPsec. Principles of network forensics, Attack Traceback and attributes, Critical Needs Analysis. IDS: Network based Intrusion Detection and Prevention Systems, Host based Intrusion Prevention System. Cloud Computing-Its Forensic and Security Aspects.

**Unit III:** Cyber Crime Investigations: Where Evidence Resides on Windows systems, Conducting a Windows investigation, File Auditing and Theft of information, Handling the Departing Employee, Steps in a Unix Investigation, Reviewing Pertinent Logs, Performing Keywords Searches, Reviewing Relevant Files, Identifying Unauthorized User Accounts or Groups, Identifying Rogue Processes, Checking for Unauthorized Access Points, Analyzing Trust Relationships, Detecting Trojan Loadable Kernel Models. Finding Network based Evidence, Generating Session data with TCP Trace, Reassembling sessions using TCP flow and Ethereal.

**Unit IV:** Open source tools for digital forensics and Registry Forensic- Open source, Open source examination platform, preparing the examination system, using LINUX and Windows as host, Study of Sleuth Kit: Installing Sleuth Kit, Sleuth Kit tools (Volume layer tools, File system Layer tools, Data unit Layer tools, Metadata Layer Tools) Registry Analysis, Understanding Windows Registry and Registry Structure.

#### Books:

1. C. P. Pfleeger, and S. L. Pfleeger, "Security in Computing", Pearson Education.
2. Computer Forensic Investigating Data and Image Files, EC Council Press
3. Robert Jones, Internet Forensics Using Digital Evidence to Solve Computer Crimes, O'Reilly Media Publication
4. Forouzan Data Communication and Networking McGraw Hill
5. Stallings, "Cryptography And Network Security: Principles and practice"
6. Kevin Mandia, Chris Prorise and Matt Pepe, Incident response and computer forensics, McGraw Hill Publication
7. Cory Altheide, Harlan Carvey, Digital Forensics with Open source Tools, Syngress Publication

8. Michael E Whitman and Herbert J Mattord, "Principles of Information Security", Vikas Publishing House, New Delhi, 2003
9. Micki Krause, Harold F. Tipton, " Handbook of Information Security Management", Vol 1-3 CRC Press LLC, 2004.
10. Stuart Mc Clure, Joel Scrambray, George Kurtz, "Hacking Exposed", Tata McGrawHill, 2003
11. Matt Bishop, " Computer Security Art and Science", Pearson/PHI, 2002.`
12. Advances in digital forensic VI by kam pui chow, sujeet shenoi
13. Malware forensic by Cameron malin
14. Windows registry forensic by Harlan carvey,
15. Digital forensic for network internet and cloud computing clint garrison
16. Indian Patents Law and Procedure, D. P. Mittal, 2002, New Delhi, Allied Services (P) Ltd. 1999
17. Patent Act,1970.
18. Copyright Act, 1957.
19. Trade Mark Act,1999.
20. Information Technology Act,2000.
21. Linux kernel development , paperback
22. Beginning linux, paperback 77. Linux command line and shell script , paperback

**M.Sc. (Information Technology)**  
**Semester IV**  
**Paper 13 : Data Warehousing And Data Mining**

**Hours/Week : 4**

**Credits : 4**

**Unit-1** : Introduction : Fundamentals of data mining, Data Mining Functionalities, Classification of Data Mining systems, Major issues in Data Mining.

Data Preprocessing : Needs Preprocessing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.

Data Warehouse and OLAP Technology for Data Mining Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, Further Development of Data Cube Technology, From Data Warehousing to Data Mining.

**Unit-2** : Data Mining Primitives, Languages, and System Architectures : Data Mining Primitives, Data Mining Query Languages, Designing Graphical User Interfaces Based on a Data Mining Query Language Architectures of Data Mining Systems.

Concepts Description : Characterization and Comparison : Data Generalization and Summarization- Based Characterization, Analytical Characterization: Analysis of Attribute Relevance, Mining Class Comparisons: Discriminating between Different Classes, Mining Descriptive Statistical Measures in Large Databases.

**Unit-3** : Mining Association Rules in Large Databases : Association Rule Mining, Mining Single-Dimensional Boolean Association Rules from Transactional Databases, Mining Multilevel Association Rules from Transaction Databases, Mining Multidimensional Association Rules from Relational Databases and Data Warehouses, From Association Mining to Correlation Analysis, Constraint-Based Association Mining.

Classification and Prediction : Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Classification by Backpropagation, Classification Based on Concepts from Association Rule Mining, Other Classification Methods, Prediction, Classifier Accuracy.

**Unit-4** : Cluster Analysis Introduction : Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Density-Based Methods, Grid-Based Methods, Model-Based Clustering Methods, Outlier Analysis.

Mining Complex Types of Data : Multidimensional Analysis and Descriptive Mining of Complex, Data Objects, Mining Spatial Databases, Mining Multimedia Databases, Mining Time-Series and Sequence Data, Mining Text Databases, Mining the World Wide Web.

**Books :**

1. Data Mining – Concepts and Techniques - Jiawei Han & Micheline Kamber  
Harcourt India.

**Reference Books:**

1. Data Mining Introductory and advanced topics –Margaret H Dunham, Pearson Education
2. Data Mining Techniques – Arun K Pujari, University Press.
3. Data Warehousing in the Real World – Sam Anahory & Dennis Murray. Pearson Edn .
- 4 Data Warehousing Fundamentals – Paulraj Ponnaiah Wiley Student Edition.
5. The Data Warehouse Life cycle Tool kit – Ralph Kimball Wiley Student Edition.

## **Paper 14 : Artificial Intelligence & Expert System**

**Hours/Week :4**

**Credits : 4**

### **Unit-1 :**

AI problems, AI Techniques, Tic-tac-toe, Question Answering, Problem as a state space search, A water jug problem, production system, Control strategies, Heuristic Search, Problem Characteristics, Production system characteristics, Design of search programs  
AI Search techniques :- Depth-first, Breadth-first search, Generate-and-test, Hill climbing, Best-first search, Constraint satisfaction, Mean-ends-analysis, A\* Algorithm, AO\* algorithm.

### **Unit-2 :**

Knowledge Representation:- Representations and mappings, Knowledge Representations, Issues in Knowledge Representation, Predicate Logic:- Representing Instance and Isa Relationships, Computable Functions and predicates, Resolution, Natural Deduction, Logic programming, Forward versus Backward Reasoning, Matching, Control knowledge, Expert System.

### **Unit-3 :**

Games playing : Minimax search procedure , adding alpha-beta cutoffs, additional refinements,

Planning :- Component of a planning system, Goal task planning, Nonlinear planning, Hierarchical Planning.

### **Unit-4 :**

Understanding, Understanding as Constraint satisfaction, Natural Language Processing, Syntactic Processing, Unification grammars, Semantic Analysis, Introduction to pattern recognition, Parallel and Distributed AI, Psychological Modeling, Distributed Reasoning Systems,

### **Books :**

1. Artificial Intelligence by Elaine Rich, Mcgrawhill Inc.
2. Artificial Intelligence and Expert Systems – Jankiraman, Sarukes (M)

### **Reference Books:**

1. Expert System : Theory and Practice- Ermine (PHI)
2. Lisp Programming – Rajeo Sangal – (TMH)
3. Rule based Expert System – M.Sasikumar (Narosa)
4. Artificial intelligence – Russell-Pearson- Ist Text book.
5. Principles of AI- Nils Nilson
6. A.I. by R.J.Winston - Pearson
7. ES : Theory and Practice- Ermine – PHI.
8. Int. ti Expert System – Jackson – Pearson.

**Paper 15 : CE2-1 ( Core Elective 2)**  
**Design and Analysis of Algorithm**

**Hours/Week : 4**

**Credits : 4**

**Unit-1 :**

Elementary Algorithmics: Introduction- Problems and Instances- The Efficiency of algorithms- Average and worst case Analysis. Asymptotic Notation: A notation for the order of – Other asymptotic notation- Conditional asymptotic notation- Asymptotic notation with several parameters- Operations on asymptotic notation.

Analysis of Algorithms: Introduction- Analyzing control structures- Average case analysis- Amortized Analysis- Solving recurrences.

**Unit-2 :**

Greedy Algorithms: Making change- General Characteristics of Greedy algorithms- Minimum spanning trees and shortest paths- Knapsack Problems- Scheduling.

Divide and Conquer: Introduction- Multiplying large numbers- The general template- binary search- sorting- Finding the median- Matrix multiplication- Introduction to cryptography.

**Unit-3 :**

Dynamic Programming: The Principle of Optimality- making change the knapsack problem- shortest paths- Chained matrix multiplication- approaches using recursion- Memory functions.

**Unit-4 :**

Back tracking & Branch Bound: Traversing trees- Depth first search of directed and undirected graph- Breadth first search- Back tracking- Branch and bound- The minimax principle, Introduction to NP- Completeness; Classes P and NP- Polynomial reductions- NP- Complete Problems NP- Hard problems- Non- Deterministic algorithms.

**Books :**

1. Fundamentals of Algorithms - Gilles Brassard & Paul Bratley. Prentice-Hall (India)Ltd.

**Reference Books:**

1. Fundamentals of Computer Algorithms by Ellis Horowitz & Sartaj Sahani. Galgotia Publication.
2. Computer Algorithms: Introduction to Design & Analysis. Sara Baase & Alien Van Gelder. Addison Wesley Publishing Company.



## **Paper 15 : CE2-2 ( Core Elective 2)**

### **Cloud Computing**

**Hours/Week : 4**  
**Credits : 4**

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

Introduction to Cloud Computing, The Evolution of Cloud Computing, Hardware Evolution, Internet Software Evolution, Server Virtualization, Web Services Deliver from the Cloud, Communication-as-a-Service, Infrastructure-as-a-Service, Monitoring-as-a-Service, Platform-as-a-Service, Software-as-a-Service, Building Cloud Network

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

Federation in the Cloud, Presence in the Cloud, Privacy and its Relation to Cloud-Based Information Systems, Security in the Cloud, Common Standards in the Cloud, End-User Access to the Cloud Computing

#### **Unit-3 :**

Introduction, Advancing towards a Utility Model, Evolving IT infrastructure, Evolving Software

Applications, Continuum of Utilities, Standards and Working Groups, Standards Bodies and Working Groups, Service Oriented Architecture, Business Process Execution Language, Interoperability Standards for Data Center Management, Utility Computing Technology, Virtualization, Hyper Threading, Blade Servers, Automated Provisioning, Policy Based Automation, Application Management, Evaluating Utility Management Technology, Virtual Test and development Environment, Data Center Challenges and Solutions, Automating the Data Center

#### **Unit-4 :**

Software Utility Application Architecture, Characteristics of an SaaS, Software Utility Applications,

Cost Versus Value, Software Application Services Framework, Common Enablers, Conceptual view to Reality, Business Profits, - Implementing Database Systems for Multitenant Architecture

#### **Books:**

1. John W. Rittinghouse and James F. Ransome, "Cloud Computing Implementation, Management and Security", 2010, CRC Press, Taylor & Francis Group, Boca Raton London New York. [Unit -11 and Unit II]
2. Alfredo Mendoza, "Utility Computing Technologies, Standards, and Strategies", Artech House INC, 2007. [Unit -11I to Unit V]
3. Bunker and Darren Thomson, "Delivering Utility Computing", 2006, John Wiley & Sons Ltd.
4. George Reese, "Cloud Application Architectures", O'reilly Publications, 2009.

**Paper 15 : CE2-3 ( Core Elective 2)**  
**Mobile Computing**

**Hours/Week : 4**

**Credits : 4**

**Unit-1 :**

Mobile Communications: An Overview: Mobile Communication, Mobile Computing, Mobile Computing Architecture, Mobile Devices, Mobile System Networks, Data Dissemination, Mobility Management, Security Mobile Devices and Systems: Mobile Phones, Digital Music Players, Handheld Pocket Computers, Handheld Devices: Operating Systems, Smart Systems, Limitations of Mobile Devices, Automotive Systems GSM and Similar Architectures: GSM-Services and System, Architecture, Radio Interfaces, Protocols, Localization, Calling Handover, Security, New Data Services, General Packet Radio Service, High-speed Circuit Switched Data, DECT

**Unit-2 :**

Wireless Medium Access Control and CDMA based Communication: Medium Access Control, Introduction to CDMA-based Systems, Spread Spectrum in CDMA Systems, Coding Methods in CDMA, IS-95 cdmaOne System, IMT- 2000i - mode , OFDM , Mobile IP Network Layer: IP and Mobile IP Network Layers, Packet Delivery and Handover Management, Location Management, Registration, Tunnelling and Encapsulation Route Optimization, Dynamic Host Configuration Protocol, Mobile Transport Layer, Conventional TCP/IP Transport, Layer Protocols, Indirect TCP, Snooping TCP, Mobile TCP, Other Methods of TCP-layer Transmission for Mobile Networks, TCP Over 2.5G/3G Mobile Networks

**Unit-3 :**

Databases: Database Hoarding Techniques, Data Caching, Client-Server Computing and Adaptation, Transactional Models, Query Processing, Data Recovery Process, Issues relating to Quality of Service, Data Dissemination and Broadcasting Systems: Communication Asymmetry, Classification of Data-Delivery Mechanisms, Data Dissemination Broadcast Models, Selective Tuning and Indexing Techniques, Digital Audio Broadcasting, Digital Video Broadcasting, Data Synchronization in Mobile Computing Systems: Synchronization, Synchronization Software for Mobile Devices, Synchronization Protocols, SyncML Synchronization Language for Mobile Computing, Sync4J (Funambol), Synchronized Multimedia , Markup Language (SMIL)

**Unit-4 :**

Mobile Devices Server and Management: Mobile Agent, Application Server, Gateways, Portals, Service Discovery, Device Management, Mobile File Systems, Security, Mobile Adhoc and Sensor Networks: Introduction to Mobile Ad-hoc Network, MANET, Wireless Sensor Networks, Applications Wireless LAN, Mobile Internet Connectivity, and Personal Area Network: Wireless LAN (WiFi) Architecture and Protocol Layers, WAP 1.1 and WAP 2.0, Architectures, XHTML-MP (Extensible Hypertext Markup Language Mobile Profile), Bluetooth-enabled Devices Network, Layers in Bluetooth Protocol, Security in Bluetooth Protocol, IrDA, ZigBee Mobile Application Languages XML, Java, J2ME, and JavaCard: Introduction, XML, JAVA, Java 2 Micro Edition (J2ME), JavaCard, Mobile Operating Systems : Operating System PalmOS, Windows CE, Symbian OS, Linux for Mobile Devices 530

**Books :**

1. Mobile Computing, Raj Kamal, Oxford University Press

**Reference Books:**

1. Mobile Communications Jochen Schiller, Addison-Wesley.
2. Handbook of Wireless Networks and Mobile Computing, Stojmenovic and Cacute, Wiley,
3. Mobile Computing Principles: Designing and Developing Mobile
4. Applications with UML and XML, Reza Behravanfar, Cambridge University Press,

## Paper 16 : FC2-1 (Foundation 2)

### Advances in Information Technology

Hours/Week : 4

Credits : 4

#### Unit I:

Software and programming languages. Introduction, The Software: Software types, Systems Software, Application Software, Types of Programming Languages. Characteristics of good programming language, Development of programming languages-machine language, assembly language, high level language. Introduction to Microsoft Office, working with MS Word, MS Excel, MS Power point, Data Base, Data Base Management System

#### Unit II:

Computer communication, need for networks, forms of data communication – analog, digital; data transmission modes, data transmission media (Twisted pair, co-axial, Fibre Optic, Microwave, Satellite communication), Bandwidth, Protocols, modems, Multiplexing, Types of network-, LAN, WAN, MAN, Network topology, types of topologies, advantages & limitations .

#### Unit III:

Concept of E-Commerce and Internet. Brief history and development of internet, WWW, Internet architecture – servers, browsers, URL; service providers – shell account, TCP/IP internet services and Internet applications , Intranet, Extranet, Virus, Types of Viruses, Anti-Virus, Firewall and Anti-Spy ware Utilities, Open Source Software.

#### Unit IV:

Current Trends in Wireless communication: Mobile Internet, GPS, 3G, 4G, Wi-Fi, Bluetooth, Wireless Application Protocol,

Electronic Commerce, Types of E-Commerce and their utilities, M-Commerce.

Advanced Trends in IT - Mobile Computing, Cloud Technology, Bioinformatics, Virtual Reality, Neural Network, Grid Computing, Intelligent Software Agent, , Virtual LAN Technology, Distributed Computing, OLAP, Data Mining, BPO & KPO, Artificial Intelligence & Expert System, ERP, E-Banking.

#### Books:

- 1) Dr. Madhulika Jain, Shashank & Satish Jain ,”Information technology Concepts”, BPB Publication, New Delhi, ISBN-- 8176562769
- 2) Information Technology - Dr. Sushila Madan (Taxmann’s)
- 3) Computer Fundamentals By P. K. Sinha
- 4) Business On The Net An Introduction To The Whats And Hows Of Ecommerce By K. N. Agarwala & Others (Macmilan)
- 5) Verma,“Computer, Internet & Multimedia – Dictionary”, Universities Press

## Paper 16 : FC2-2 (Foundation 2)

### BANKING OPERATIONS AND SERVICES

Hours/Week : 4

Credits : 4

**Unit I:** Overview - Definition-utility of banks – banks and economic development -types of banks with their individual functions –Role of RBI – Monetary management –business in the globalized era, Rights of a banker, Clayton's case, Banker's Obligation to honour cheques, Secrecy of customers' accounts. Customers' Accounts -Introduction for opening new accounts, opening of savings, current and fixed deposit accounts Minor's accounts, Club accounts, Partnership accounts, Joint stock company's account. Attorney's account, Joint accounts, Insolvency of the customer

**Unit II:** Payment and Collection of Cheques - Form of Cheque, Date, Amount, Insufficiency of funds, customer's signature, Countermanding payment of cheque, Crossing, Not Negotiable Crossing, Endorsements and Effect of Material Alterations. Liability for conversion, Protection to the collecting Banker, Duties of Collecting Banker.

**Unit III:** Bills of Exchange - Definition, Parties, Accommodation Bill, Calculation of Date of Maturity, Dishonour of Bills, Noting and Protesting, Drawee in Case of Need. Bank Drafts - salient features Advances - Advances against various securities, Life Policy, Fixed Deposit Receipt, Goods, Shares, Advances against Guarantees, Advances to Small-scale industries, Registration of Charge under Companies Act, 1956. Accounts Receivable financing Advances for priority sectors—Hypothecation, Documentation.

**Unit IV:** Investment Banking services: Fee based and Fund based services: Credit Cards, Debit Cards, , Venture Capital, Factoring, Forfeiting and Bill Discounting. Leasing and Hire Purchase, Housing Finance, Other investment banking a services including distribution of Insurance and Mutual fund products, PMS – Process and monitoring. Merchant Banking Services - Merchant Banking: An Introduction, Issue Management, Corporate Restructuring and Mergers and Project Financing. Securitization. Credit Rating.

Books:

1. Management of Banking and Financial Services, Padmalatha Suresh & Justin Paul, Pearson Education
2. Basics of Banking IIBF, Mumbai Taxmann Publications – paper I
3. Banking Law & Practices by H.C. Agarwal, Siwan Publications. –paper I
4. Indian Financial System & Commercial Banking by Shri B. Raviramchandran, Dr. Dwivedi et al, IIBF, Mumbai Paper I
5. An introduction to documentary Credit – RupNarayan Bose, Macmilan India Ltd. New Delhi –paper I
6. Financial Institutions, Markets & money by David S. Kidwell & others, John Willy & Sons
7. The Indian Financial System, 3rd Edition, Bharati V. Pathak, Pearson Education

**Paper 16 : FC2-3 (Foundation 2)**  
**INFORMATION SECURITY AND CYBER LAW**

**Hours/Week : 4**

**Credits : 4**

**Unit-I :** - Information Security : Overview, need for information security, objectives of Information security. - Global information systems and their evolution, basics of information systems, role of the Internet and the World Wide Web - Understanding about the threats to information systems security Building blocks of InfoSec, How Organizations manage security of their information systems Information security risk analysis fundamentals - Importance of physical security and biometrics controls for protecting information systems assets - Security considerations for the mobile work force - Network security perspectives, networking and digital communications (overview only), security of wireless networks.

**Unit-II :** - Cryptographic techniques and Encryption, Intrusion Detection Systems and Firewalls, security of virtual private networks - Security issues in application development with emphasis on integration of enterprise applications, database security, operating security and security of electronic mailing systems - Security models and frameworks and standards through introduction to the ISO 27001, SSE-CMM (systems security engineering – capability maturity model), COBIT (Control Objectives for Information and related technologies) and the SarbanesOxley Act (SOX) and SAS 70 (statement on auditing standards) - Privacy Fundamentals, business practices' impact on data privacy, technological impact on data privacy, privacy issues in web services and applications based on web services - Information security best practices – staffing, audits, disaster recovery planning and business continuity planning and asset management - Ethical issues and intellectual property concerns for information security professionals – copy right, data protection etc.

**Unit-III :** - Introduction of IT Act 2000, main features of IT Act 2000, Digital Signature - Access Control : Operating system Access Controls, Group and Roles, Access Control lists, Unix Operating System Security, Windows NT, Capabilities, Added Features in Windows 2000, Granularity, Sandboxing and Proof-carrying code, Hardware protection, Other technical Attacks. - Cryptography & PKI : Symmetric Cryptography, Asymmetric Cryptography, Keys, Hash Functions, Digital Signatures. - Distributed Systems - Concurrency, Fault Tolerance and Fault Recovery, Naming.

**Unit-IV** - Multilevel and Multilateral Security : Multilevel Security, Multilateral Security - Electronic Banking –Banking and Bookkeeping. - Monitoring Systems –Introduction, Alarms, Prepayment Masters. - Biometrics : Physiological biometric techniques, behavioral biometric techniques, - New biometric techniques, biometric systems. - Incident Response : Incident Response, Prerequisites to planning an IRT. - Network attack and Defence : Most Common Attacks, Scripts Kiddies and Packaged Defence. - Management Issues : Organisational Issues, - Protecting E-commerce Systems – Introduction - Hacking – Introduction

Books :

1. Information Systems Security Management - Nina S. Godbole (Wiley India Pvt. Ltd.)
2. Security Engineering - Ross Anderson
3. Information Security Management Handbook -Harold Tpton & Micki Krause (Auerbach Publications)

4. Network Security Essentials: Applications and Standards - W. Stallings (Pearson Education)
5. eSecurity and You - Sandeep Oberoi (Tata McGraw-Hill)
6. Cyber Laws – Singh Yatindra
7. Cyber Crime – Bansal S K
8. Cyber law , E-commerce & M-Commerce – Ahmand Tabrez
9. Handbook of Cyber and E-commerce laws – Bakshi P M & Suri R K
10. Management Fundamentals and Information Systems Dr. Sushila Madan (Taxmann's)

## Paper 16 : CDC2-1 (Core Subject Centric 2)

### Enterprise Computing

Hours/Week : 4  
Credits : 4

#### Unit-1 :

##### Enterprise Foundations

Enterprise Architectural overview - object oriented software development for enterprise - Component Based software development for enterprise. Java Enterprise System. Enterprise Data - Basis of JDBC - interfaces -drivers. Advanced JDBC features.

#### Unit-2 :

##### Distributed Enterprise Communications Enabling

Distributed Enterprise Communications Basis - RMI Communication – CORBA communication - DCOM Communication – Software Development for RMI Communication

#### Unit-3 :

##### Services For Distributed Enterprise Systems

Naming Services, Directory and Trading services, Activation Services, Message Services, Transaction Services, Security Services and High assurance Enterprise applications.

Web Browsers and Web Servers in Enterprise. Web Programming, XML. Java Servlets - Java Server pages.

#### Unit-4 :

##### Interoperability and Multitier Enterprise Computing

Java Beans, EJB, Enterprise Application Integration, Interoperability between various computing technologies - Tools For Enterprise Computing - Patterns –Frame work

#### Books:

1. Paul J Perrone, Venkata S.R. Krishna R and Chayanti, " Building Java Enterprise Systems with J2EE", Techmedia , New Delhi, 2000.
2. George Reese, " Database programming, with JDBC and Java" Second Edition, O'Reilly Publishers , New Delhi, 2000.
3. Dustin R. Callaway - "Inside Servlets " - Addison Wesley Longman Inc, New Delhi, 2001.
4. Tom Valesky - "Enterprise Java Beans" - Addison Wesley Longman Inc. New Delhi, 2000.
5. Ed Roman - "Mastering EJB" - John Wiley & Sons, New Delhi, 2001



## Paper 16 : CDC2-2 (Core Subject Centric 2)

### MOBILE & CYBER FORENSICS

Hours/Week : 4

Credits : 4

**Unit I:** Mobile Forensic: History, Professional Applications, Types of evidence, Internal memory, External memory, Service provider logs, Forensic process, Seizure, Acquisition, examination and analysis, Data acquisition types, Manual acquisition, Logical acquisition, File system acquisition Physical acquisition tools, Commercial Forensic Tools, Open Source Tools, Forensic desoldering, Chip re-balling, JTAG, Command Line Tools, System commands AT commands dd Non-Forensic Commercial Tools, Flasher tools, controversies.

**Unit II:** Live Forensic : live response, volatile memory analysis, volatility, PTFinder, the impact on investigated system, memory image analysis, recovering cached and internet artifacts , internet browsing artifacts, volatile data acquisition, volatile forensic method, runtime disk explorer, logical acquisition, memory dump analyzer, crash dump analyzer, cryptanalysis, MAC times, metadata issues, analyzing file time stamps.

**Unit III:** Image Forensic: Detecting traces of re-sampling, more images are spliced together, detect high quality and consistent image forgeries, detect geometric transformations such as scaling, rotation or skewing re-sampling and interpolation. Detecting near-duplicated image regions, common type of digital image forgery, copy-move forgery, Noise inconsistencies analysis to conceal traces of tampering altered image regions. Application of cyclostationarity analysis to image forensics, (cyslostationary signals) exhibit periodicity in their statistics. Find the traces of geometric transformation shows promising results. Double JPEG compression, CFA analysis, quantization tables analysis, etc.

**Unit IV:** Network & Anti-Computer Forensics: Ethernet analysis, Network interface card analysis, wireless forensic , attackers footprints , firewall logs, IDS/IPS, web proxies, traffic captures, DHCP log examination, sniffing traffic , analyzing proxy cache, tools like tcpdumps, Snort, ngrep, tcpextract, and wireshark. Email tracker pro, analyzing index.dat, input debugging, controlled flooding, ICMP traceback, packet marking techniques, honeypots and honeynets, source path isolation engine (SPIE). Anti-Computer Forensic: Definition, Sub-categories, Purpose and goals, Data hiding, Encryption, Steganography, Other forms of data hiding, Artifact wiping, Disk cleaning utilities, File wiping utilities, Disk degaussing / destruction techniques, Trail obfuscation, Attacks against computer forensics Physical, Effectiveness of anti-forensics

#### Books:

1. Wireless security model randall Nichols
2. Mobile application security by himanshu dwivedi
3. Wireless crime and forensic investigation by Gregory kipper
4. Digital image forensic by husrev taha, nasir memon
5. Computer forensic investigating data and image files by Ec-council
6. Network forensic tracking hackers by sherri Davidoff
7. Mastering windows network forensic by steven anson
8. Anti computer forensic by Gred numitor
9. Computer forensic Nathan Clarke
10. Gregory Kipper. Investigator's Guide to Steganography, Auerbach Publications.
11. Wireshark 101 essential skills for network analysis by laura chapel

12. Internet safety by leo notenboom
13. Guide to secure intranet and extranet server by Verisign
14. Intrusion detection with Snort by by rafeeq ur rehman
15. Improving web application security by Microsoft press
16. Open source security tools by tony howlett
17. Web application security by bryan Sullivan
18. Data recovery e-book V 1.5

### Subject wise Core Elective Papers

M. Sc. Subject	Core elective paper to be opted in sem III (Sem V in case of M. Sc. (Tech) Applied Geology)	Core elective paper to be opted in sem IV (Sem VI in case of M. Sc. (Tech) Applied Geology)
M. Sc. (Information Technology)	Soft Computing	Design and Analysis of Algorithm
	Distributed Databases	Cloud Computing
	Object Oriented Analysis and Design using UML	Mobile Computing

**Foundation Course:** (Candidate can opt for any one foundation course paper as shown below in the semester III and IV (Semester V & VI in case of M. Sc. (Tech) Applied Geology). However, Student shall opt for this paper from any other subject other than his / her main subject for post graduation. If the candidate decides to opt for foundation course papers then he/she shall not be eligible to opt for Core (Discipline Centric) papers in their respective subjects). List of foundation courses available:

M. Sc. Subject	Foundation Course I in semester III (Sem V in case of M. Sc. (Tech) Applied Geology)	Foundation Course II in Semester IV (Sem VI in case of M. Sc. (Tech) Applied Geology)
M. Sc. (Information Technology)	Operating system concepts	Advances in information technology
	Principles of Management	Banking Operations And Services
	E-Business	Information Security And Cyber Law

**Core (Discipline Centric):** (Candidate can opt for this paper as shown below in the semester III and IV (Semester V & VI in case of M. Sc. (Tech) Applied Geology) in their main subject of post graduation only. If the candidate decides to opt for Core (Discipline Centric) papers in their main subject of post graduation then he/she shall not be eligible to opt for Foundation Course papers neither in their own subject nor in any other subject). List of Core (Discipline Centric) course available in the respective subject:

M. Sc. Subject	Core (Discipline Centric) I in semester III (Sem V in case of M. Sc. (Tech) Applied Geology)	Core (Discipline Centric) II in Semester IV (Sem VI in case of M. Sc. (Tech) Applied Geology)
M. Sc. (Information Technology)	CORBA	Enterprise Computing
	Digital & Cyber Forensics	Mobile & Cyber Forensics