SCHEME OF TEACHING AND EXAMINATION

B.E. COMPUTER SCIENCE AND ENGINEERING

V SEMESTER

Sl. No.	Subject Code	Title of the Subject	Teaching Dept.	Teaching Hrs / Week		Examination			
				Theory	Practical.	Duration (Hrs)	Marks		
							IA	Theory / Practical.	Total
1	06IS51	Software Engineering	CSE/ISE	04	-	03	25	100	125
2	06CS52	Systems Software	CSE/ISE	04	-	03	25	100	125
3	06CS53	Operating Systems	CSE/ISE	04	-	03	25	100	125
4	06CS54	Database Management Systems	CSE/ISE	04	-	03	25	100	125
5	06CS55	Computer Networks - I	CSE/ISE	04	-	03	25	100	125
6	06CS56	Formal Languages and Automata Theory	CSE/ISE	04	-	03	25	100	125
7	06CSL57	Database Applications Laboratory	CSE/ISE	-	03	03	25	50	75
8	06CSL58	Algorithms Laboratory	CSE/ISE	-	03	03	25	50	75
Total				**24**	**06**	**24**	**200**	**700**	**900**

SCHEME OF TEACHING AND EXAMINATION

B.E. COMPUTER SCIENCE AND ENGINEERING

VI SEMESTER

Sl. No.	Subject Code	Title of the Subject	Teaching Dept.	Teaching Hrs / Week		Examination			
				Theory	Practical	Duration (Hrs)	Marks		
							IA	Theory / Practical	Total
1	06AL61	Management and Entrepreneurship	CSE/ISE MBA	04	-	03	25	100	125
2	06CS62	Unix Systems Programming	CSE/ISE	04	-	03	25	100	125
3	06CS63/06IS662	Compiler Design	CSE/ISE	04	-	03	25	100	125
4	06CS64	Computer Networks - II	CSE/ISE	04	-	03	25	100	125
5	06CS65/06IS665	Computer Graphics and Visualization	CSE/ISE	04	-	03	25	100	125
6	06CS66x	**Elective I (Group-A)**	CSE/ISE	04	-	03	25	100	125
7	06CSL67	Computer Graphics and Visualization Laboratory	CSE/ISE	-	03	03	25	50	75
8	06CSL68	Systems Software and Compiler Design Laboratory	CSE/ISE	-	03	03	25	50	75
Total				**24**	**06**	**24**	**200**	**700**	**900**

Elective I (Group - A)

06CS661	Operations Research	06CS664	Pattern Recognition
06CS662	Signals and Systems	06CS665	Stochastic Models and Applications
06CS663	Data Compression		

SCHEME OF TEACHING AND EXAMINATION

B.E. COMPUTER SCIENCE AND ENGINEERING

VII SEMESTER

Sl. No.	Subject Code	Title of the Subject	Teaching Dept.	Teaching Hrs / Week		Examination			
				Theory	Practical.	Duration (Hrs)	Marks		
							IA	Theory / Practical.	Total
1	06CS71	Object-Oriented Modeling and Design	CSE/ISE	04	-	03	25	100	125
2	06IS72	Software Architectures	CSE/ISE	04	-	03	25	100	125
3	06CS73	Programming the Web	CSE/ISE	04	-	03	25	100	125
4	06CS74/06IS752	Embedded Computing Systems	CSE/ISE	04	-	03	25	100	125
5	06CS75x	**Elective II (Group-B)**	CSE/ISE	04	-	03	25	100	125
6	06CS76x	**Elective III (Group-C)**	CSE/ISE	04	-	03	25	100	125
7	06CSL77	Networks Laboratory	CSE/ISE	-	03	03	25	50	75
8	06CSL78	Web Programming Laboratory	CSE/ISE	-	03	03	25	50	75
Total				**24**	**06**	**24**	**200**	**700**	**900**

Elective II (Group - B)

06CS751	Advanced DBMS
06CS752	Digital Signal Processing
06CS753	Java and J2EE
06CS754	Multimedia Computing
06CS755	Data Mining
06CS756	Neural Networks

Elective III (Group - C)

06CS761	C# Programming and .Net
06CS762	Digital Image Processing
06CS763	Game Theory
06CS764	Artificial Intelligence
06CS765	VLSI Design and Algorithms
06CS766	Fuzzy Logic

SCHEME OF TEACHING AND EXAMINATION

B.E. COMPUTER SCIENCE AND ENGINEERING

VIII SEMESTER

Sl. No.	Subject Code	Title of the Subject	Teaching Dept.	Teaching Hrs / Week		Examination			
				Theory	Practical.	Duration (Hrs)	Marks		
							IA	Theory / Practical.	Total
1	06CS81	Advanced Computer Architectures	CSE/ISE	04	-	03	25	100	125
2	06CS82	System Modeling and Simulation	CSE/ISE	04	-	03	25	100	125
3	06CS83x	**Elective IV (Group-D)**	CSE/ISE	04	-	03	25	100	125
4	06CS84x	**Elective V (Group-E)**	CSE/ISE	04	-	03	25	100	125
5	06CS85	Project Work	CSE		06	03	100	100	200
6	06CS86	Seminar	CSE	-	03	-	50	-	50
Total				**16**	**09**	**15**	**250**	**500**	**750**

Elective IV (Group-D)

06CS831	Mobile Computing
06CS832	Web 2.0 & Rich Internet Application
06CS833	Storage Area Networks
06CS834	Network Management Systems
06CS835	Information and Network Security
06CS836	Microcontroller-Based Systems

Elective V (Group-E)

06CS841	Ad-hoc Networks
06CS842/06IS81	Software Testing
06CS84 3	ARM Based System Design
06CS84 4	Services Oriented Architecture
06CS845	Grid Computing
06CS846	Programming Languages

SCHEME OF TEACHING AND EXAMINATION
B.E. COMPUTER SCIENCE AND ENGINEERING

V SEMESTER

Sl. No.	Subject Code	Title of the Subject	Teaching Dept.	Teaching Hrs / Week		Examination			
				Theory	Practical.	Duration (Hrs)	Marks		
							IA	Theory / Practical.	Total
1	06IS51	Software Engineering	CSE/ISE	04	-	03	25	100	125
2	06CS52	Systems Software	CSE/ISE	04	-	03	25	100	125
3	06CS53	Operating Systems	CSE/ISE	04	-	03	25	100	125
4	06CS54	Database Management Systems	CSE/ISE	04	-	03	25	100	125
5	06CS55	Computer Networks - I	CSE/ISE	04	-	03	25	100	125
6	06CS56	Formal Languages and Automata Theory	CSE/ISE	04	-	03	25	100	125
7	06CSL57	Database Applications Laboratory	CSE/ISE	-	03	03	25	50	75
8	06CSL58	Algorithms Laboratory	CSE/ISE	-	03	03	25	50	75
			Total	**24**	**06**	**24**	**200**	**700**	**900**

SCHEME OF TEACHING AND EXAMINATION

VI SEMESTER **B.E. COMPUTER SCIENCE AND ENGINEERING**

Sl. No.	Subject Code	Title of the Subject	Teaching Dept.	Teaching Hrs / Week		Examination			
				Theory	Practical	Duration (Hrs)	Marks		
							IA	Theory / Practical	Total
1	06AL61	Management and Entrepreneurship	CSE/ISE MBA	04	-	03	25	100	125
2	06CS62	Unix Systems Programming	CSE/ISE	04	-	03	25	100	125
3	06CS63/06IS662	Compiler Design	CSE/ISE	04	-	03	25	100	125
4	06CS64	Computer Networks - II	CSE/ISE	04	-	03	25	100	125
5	06CS65 / 06IS665	Computer Graphics and Visualization	CSE/ISE	04	-	03	25	100	125
6	06CS66x	Elective I (Group-A)	CSE/ISE	04	-	03	25	100	125
7	06CSL67	Computer Graphics and Visualization Laboratory	CSE/ISE	-	03	03	25	50	75
8	06CSL68	Systems Software and Compiler Design Laboratory	CSE/ISE	-	03	03	25	50	75
Total				**24**	**06**	**24**	**200**	**700**	**900**

Elective I – Group A

06CS661	Operations Research
06CS662	Signals and Systems
06CS663	Data Compression

06CS664	Pattern Recognition
06CS665	Stochastic Models and Applications

SCHEME OF TEACHING AND EXAMINATION

B.E. COMPUTER SCIENCE AND ENGINEERING

VII SEMESTER

Sl. No.	Subject Code	Title of the Subject	Teaching Dept.	Teaching Hrs / Week		Examination			
				Theory	Practical.	Duration (Hrs)	Marks		
							IA	Theory / Practical.	Total
1	06CS71	Object-Oriented Modeling and Design	CSE/ISE	04	-	03	25	100	125
2	06IS72	Software Architectures	CSE/ISE	04	-	03	25	100	125
3	06CS73	Programming the Web	CSE/ISE	04	-	03	25	100	125
4	06CS74 / 06IS752	Embedded Computing Systems	CSE/ISE	04	-	03	25	100	125
5	06CS75x	Elective II (Group-B)	CSE/ISE	04	-	03	25	100	125
6	06CS76x	Elective III (Group-C)	CSE/ISE	04	-	03	25	100	125
7	06CSL77	Networks Laboratory	CSE/ISE	-	03	03	25	50	75
8	06CSL78	Web Programming Laboratory	CSE/ISE	-	03	03	25	50	75
Total				**24**	**06**	**24**	**200**	**700**	**900**

Elective II – Group B

06CS751	Advanced DBMS
06CS752	Digital Signal Processing
06CS753	Java and J2EE
06CS754	Multimedia Computing
06CS755	Data Mining
06CS756	Neural Networks

Elective III – Group C

06CS761	C# Programming and .Net
06CS762	Digital Image Processing
06CS763	Game Theory
06CS764	Artificial Intelligence
06CS765	VLSI Design and Algorithms
06CS766	Fuzzy Logic

SCHEME OF TEACHING AND EXAMINATION

B.E. COMPUTER SCIENCE AND ENGINEERING

VIII SEMESTER

Sl. No.	Subject Code	Title of the Subject	Teaching Dept.	Teaching Hrs / Week		Examination			
				Theory	Practical.	Duration (Hrs)	Marks		
							IA	Theory / Practical.	Total
1	06CS81	Advanced Computer Architectures	CSE/ISE	04	-	03	25	100	125
2	06CS82	System Modeling and Simulation	CSE/ISE	04	-	03	25	100	125
3	06CS83x	Elective IV(Group-D)	CSE/ISE	04	-	03	25	100	125
4	06CS84x	Elective V(Group-E)	CSE/ISE	04	-	03	25	100	125
5	06CS85	Project Work	CSE		06	03	100	100	200
6	06CS86	Seminar	CSE	-	03	-	50	-	50
			Total	**16**	**09**	**15**	**250**	**500**	**750**

Elective IV – Group D

06CS831	Mobile Computing
06CS832	Web 2.0 & Rich Internet Application
06CS833	Storage Area Networks
06CS834	Network Management Systems
06CS835	Information and Network Security
06CS836	Microcontroller-Based Systems

Elective V– Group E

06CS841	Ad-hoc Networks
06CS842 / 06IS81	Software Testing
06CS84 3	ARM Based System Design
06CS84 4	Services Oriented Architecture
06CS845	Grid Computing
06CS846	Programming Languages

V SEMESTER

SOFTWARE ENGINEERING

Subject Code	:	**06IS51**	IA Marks	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

OVERVIEW: Introduction: FAQ's about software engineering, Professional and ethical responsibility. Socio-Technical systems: Emergent system properties; Systems engineering; Organizations, people and computer systems; Legacy systems.

6 Hours

UNIT - 2

CRITICAL SYSTEMS, SOFTWARE PROCESSES: Critical Systems: A simple safety-critical system; System dependability; Availability and reliability. Software Processes: Models, Process iteration, Process activities; The Rational Unified Process; Computer-Aided Software Engineering.

7 Hours

UNIT - 3

REQUIREMENTS: Software Requirements: Functional and Non-functional requirements; User requirements; System requirements; Interface specification; The software requirements document. Requirements Engineering Processes: Feasibility studies; Requirements elicitation and analysis; Requirements validation; Requirements management.

6 Hours

UNIT - 4

SYSTEM MODELS, PROJECT MANAGEMENT: System Models: Context models; Behavioral models; Data models; Object models; Structured methods. Project Management: Management activities; Project planning; Project scheduling; Risk management.

7 Hours

PART - B

UNIT - 5

SOFTWARE DESIGN: Architectural Design: Architectural design decisions; System organization; Modular decomposition styles; Control styles. Object-Oriented design: Objects and Object Classes; An Object-Oriented design process; Design evolution.

7 Hours

UNIT - 6

DEVELOPMENT: Rapid Software Development: Agile methods; Extreme programming; Rapid application development. Software Evolution: Program evolution dynamics; Software maintenance; Evolution processes; Legacy system evolution.

6 Hours

UNIT - 7

VERIFICATION AND VALIDATION: Verification and Validation: Planning; Software inspections; Automated static analysis; Verification and formal methods. Software testing: System testing; Component testing; Test case design; Test automation.

7 Hours

UNIT - 8

MANAGEMENT: Managing People: Selecting staff; Motivating people; Managing people; The People Capability Maturity Model. Software Cost Estimation: Productivity; Estimation techniques; Algorithmic cost modeling, Project duration and staffing.

6 Hours

TEXT BOOKS:

1. **Software Engineering** – Ian Somerville, 8th Edition, Pearson Education, 2007.

REFERENCE BOOKS:

1. **Software Engineering: A Practitioners Approach -** Roger S. Pressman, 7th Edition, McGraw-Hill, 2007.
2. **Software Engineering Theory and Practice -** Shari Lawrence Pfleeger, Joanne M. Atlee, 3rd Edition, Pearson Education, 2006.
3. **Software Engineering Principles and Practice -** Waman S Jawadekar, Tata McGraw Hill, 2004.

SYSTEMS SOFTWARE

Subject Code	:	**06CS52**	IA Marks	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

MACHINE ARCHITECTURE: Introduction, System Software and Machine Architecture, Simplified Instructional Computer (SIC) - SIC Machine Architecture, SIC/XE Machine Architecture, SIC Programming Examples.

6 Hours

UNIT - 2

ASSEMBLERS - 1: Basic Assembler Function - A Simple SIC Assembler, Assembler Algorithm and Data Structures, Machine Dependent Assembler Features - Instruction Formats & Addressing Modes, Program Relocation.

6 Hours

UNIT - 3

ASSEMBLERS - 2: Machine Independent Assembler Features – Literals, Symbol-Definition Statements, Expression, Program Blocks, Control Sections and Programming Linking, Assembler Design Operations - One-Pass Assembler, Multi-Pass Assembler, Implementation Examples - MASM Assembler.

6 Hours

UNIT - 4

LOADERS AND LINKERS: Basic Loader Functions - Design of an Absolute Loader, A Simple Bootstrap Loader, Machine-Dependent Loader Features – Relocation, Program Linking, Algorithm and Data Structures for a Linking Loader; Machine-Independent Loader Features - Automatic Library Search, Loader Options, Loader Design Options - Linkage Editor, Dynamic Linkage, Bootstrap Loaders, Implementation Examples - MS-DOS Linker.

8 Hours

PART - B

UNIT - 5

EDITORS AND DEBUGGING SYSTEMS: Text Editors - Overview of Editing Process, User Interface, Editor Structure, Interactive Debugging Systems - Debugging Functions and Capabilities, Relationship With Other Parts of The System, User-Interface Criteria.

6 Hours

UNIT - 6

MACRO PROCESSOR: Basic Macro Processor Functions - Macro Definitions and Expansion, Macro Processor Algorithm and Data Structures, Machine-Independent Macro Processor Features - Concatenation of Macro Parameters, Generation of Unique Labels, Conditional Macro Expansion, Keyword Macro Parameters, Macro Processor Design Options - Recursive Macro Expansion, General-Purpose Macro Processors, Macro Processing Within Language Translators, Implementation Examples - MASM Macro Processor, ANSI C Macro Processor.

8 Hours

UNIT - 7

LEX AND YACC – 1: Lex and Yacc - The Simplest Lex Program, Recognizing Words With LEX, Symbol Tables, Grammars, Parser-Lexer Communication, The Parts of Speech Lexer, A YACC Parser, The Rules Section, Running LEX and YACC, LEX and Hand- Written Lexers, Using

LEX - Regular Expression, Examples of Regular Expressions, A Word Counting Program, Parsing a Command Line.

6 Hours

UNIT - 8

LEX AND YACC - 2: Using YACC - Grammars, Recursive Rules, Shift/Reduce Parsing, What YACC Cannot Parse, A YACC Parser - The Definition Section, The Rules Section, Symbol Values and Actions, The LEXER, Compiling and Running a Simple Parser, Arithmetic Expressions and Ambiguity, Variables and Typed Tokens.

6 Hours

TEXT BOOKS:

1. **System Software** - Leland. L. Beck, 3rd Edition, Addison-Wesley, 1997.
2. **Lex and Yacc -** John. R. Levine, Mason and Doug Brown, O'Reilly, SPD, 1998.

REFERENCE BOOK:

1. **System Programming and Operating Systems** – D.M.Dhamdhere, 2nd Edition, Tata McGraw - Hill, 1999.

OPERATING SYSTEMS

Subject Code	:	**06CS53**	IA Marks	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

INTRODUCTION TO OPERATING SYSTEMS, SYSTEM STRUCTURES: What operating systems do; Computer System organization; Computer System architecture; Operating System structure; Operating System operations; Process management; Memory management; Storage management; Protection and security; Distributed system; Special-purpose systems; Computing environments. Operating System Services; User - Operating System interface; System calls; Types of system calls; System programs; Operating System design and implementation; Operating System structure; Virtual machines; Operating System generation; System boot.

6 Hours

UNIT - 2

PROCESS MANAGEMENT: Process concept; Process scheduling; Operations on processes; Inter-process communication. Multi-Threaded

Programming: Overview; Multithreading models; Thread Libraries; threading issues. Process Scheduling: Basic concepts; Scheduling criteria; Scheduling algorithms; Multiple-Processor scheduling; Thread scheduling.

7 Hours

UNIT - 3

PROCESS SYNCHRONIZATION: Synchronization: The Critical section problem; Peterson's solution; Synchronization hardware; Semaphores; Classical problems of synchronization; Monitors.

7 Hours

UNIT - 4

DEADLOCKS: Deadlocks: System model; Deadlock characterization; Methods for handling deadlocks; Deadlock prevention; Deadlock avoidance; Deadlock detection and recovery from deadlock.

6 Hours

PART - B

UNIT - 5

MEMORY MANAGEMENT: Memory Management Strategies: Background; Swapping; Contiguous memory allocation; Paging; Structure of page table; Segmentation. Virtual Memory Management: Background; Demand paging; Copy-on-write; Page replacement; Allocation of frames; Thrashing.

7 Hours

UNIT - 6

FILE SYSTEM, IMPLEMENTATION OF FILE SYSTEM: File System: File concept; Access methods; Directory structure; File system mounting; File sharing; Protection. Implementing File System: File system structure; File system implementation; Directory implementation; Allocation methods; Free space management.

7 Hours

UNIT - 7

SECONDARY STORAGE STRUCTURES, PROTECTION: Mass storage structures; Disk structure; Disk attachment; Disk scheduling; Disk management; Swap space management. Protection: Goals of protection, Principles of protection, Domain of protection, Access matrix, Implementation of access matrix, Access control, Revocation of access rights, Capability-Based systems.

6 Hours

UNIT - 8

CASE STUDY: THE LINUX OPERATING SYSTEM : Linux history; Design principles; Kernel modules; Process management; Scheduling; Memory management; File systems, Input and output; Inter-process communication.

6 Hours

TEXT BOOK:

1. **Operating System Principles –** Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, 7th edition, Wiley-India, 2006.

REFERENCE BOOKS:

1. **Operating Systems: A Concept Based Approach** – D.M Dhamdhere, 2nd Edition, Tata McGraw- Hill, 2002.
2. **Operating Systems** – P.C.P. Bhatt, 2nd Edition, PHI, 2006.
3. **Operating Systems** – Harvey M Deital, 3rd Edition, Addison Wesley, 1990.

DATABASE MANAGEMENT SYSTEMS

Subject Code	:	**06CS54**	IA Marks	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

INTRODUCTION: Introduction; An example; Characteristics of Database approach; Actors on the screen; Workers behind the scene; Advantages of using DBMS approach; A brief history of database applications; when not to use a DBMS. Data models, schemas and instances; Three-schema architecture and data independence; Database languages and interfaces; The database system environment; Centralized and client-server architectures; Classification of Database Management systems.

6 Hours

UNIT - 2

ENTITY-RELATIONSHIP MODEL: Using High-Level Conceptual Data Models for Database Design; An Example Database Application; Entity Types, Entity Sets, Attributes and Keys; Relationship types, Relationship Sets, Roles and Structural Constraints; Weak Entity Types; Refining the ER Design; ER Diagrams, Naming Conventions and Design Issues; Relationship types of degree higher than two.

6 Hours

UNIT - 3

RELATIONAL MODEL AND RELATIONAL ALGEBRA: Relational Model Concepts; Relational Model Constraints and Relational Database Schemas; Update Operations, Transactions and dealing with constraint violations; Unary Relational Operations: SELECT and PROJECT; Relational Algebra Operations from Set Theory; Binary Relational

Operations : JOIN and DIVISION; Additional Relational Operations; Examples of Queries in Relational Algebra; Relational Database Design Using ER- to-Relational Mapping.

8 Hours

UNIT - 4

SQL - 1: SQL Data Definition and Data Types; Specifying basic constraints in SQL; Schema change statements in SQL; Basic queries in SQL; More complex SQL Queries.

6 Hours

PART - B

UNIT - 5

SQL - 2: Insert, Delete and Update statements in SQL; Specifying constraints as Assertion and Trigger; Views (Virtual Tables) in SQL; Additional features of SQL; Database programming issues and techniques; Embedded SQL, Dynamic SQL; Database stored procedures and SQL / PSM.

6 Hours

UNIT - 6

DATABASE DESIGN - 1: Informal Design Guidelines for Relation Schemas; Functional Dependencies; Normal Forms Based on Primary Keys; General Definitions of Second and Third Normal Forms; Boyce-Codd Normal Form.

6 Hours

UNIT - 7

DATABASE DESIGN: Properties of Relational Decompositions; Algorithms for Relational Database Schema Design; Multivalued Dependencies and Fourth Normal Form; Join Dependencies and Fifth Normal Form; Inclusion Dependencies; Other Dependencies and Normal Forms.

6 Hours

UNIT - 8

TRANSACTION MANAGEMENT : The ACID Properties; Transactions and Schedules; Concurrent Execution of Transactions; Lock- Based Concurrency Control; Performance of locking; Transaction support in SQL; Introduction to crash recovery; 2PL, Serializability and Recoverability; Lock Management; Introduction to ARIES; The log; Other recovery-related structures; The write-ahead log protocol; Checkpointing; Recovering from a System Crash; Media Recovery; Other approaches and interaction with concurrency control.

8 Hours

TEXT BOOKS:

1. **Fundamentals of Database Systems –** Elmasri and Navathe, 5th Edition, Addison-Wesley, 2007

2. **Database Management Systems** – Raghu Ramakrishnan and Johannes Gehrke – 3rd Edition, McGraw-Hill, 2003.

REFERENCE BOOKS:

1. **Data Base System Concepts** – Silberschatz, Korth and Sudharshan, 5th Edition, Mc-GrawHill, 2006.
2. **An Introduction to Database Systems** – C.J. Date, A. Kannan, S. Swamynatham, 8th Edition, Pearson Education, 2006.

COMPUTER NETWORKS – I

Subject Code	:	**06CS55**	IA Marks	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

INTRODUCTION: Data Communications; Networks; the Internet; Protocols and Standards; Layered tasks; The OSI Model and the layers in the OSI model; TCP / IP Protocol Suite.

6 Hours

UNIT - 2

DATA, SIGNALS, AND DIGITAL TRANSMISSION: Analog and digital signals; Transmission impairment; Data rate limits; Performance; Digital-to-Digital conversion; Analog-to-Digital conversion; Transmission modes.

8 Hours

UNIT - 3

ANALOG TRANSMISSION AND MULTIPLEXING: Digital - to - Analog conversion; Analog - to - Analog conversion; Multiplexing; Spread spectrum.

6 Hours

UNIT - 4

TRANSMISSION MEDIA, ERROR DETECTION AND CORRECTION: Twisted pair cable, Coaxial cable, Fiber-Optic cable, Radio waves, Microwaves, Infrared. Introduction to error detection / correction; Block coding; linear block codes; Cyclic codes, Checksum.

6 Hours

PART - B

UNIT - 5

DATA LINK CONTROL: Framing; Flow and Error control; Protocols; Noiseless channels; Noisy channels; HDLC; Point-to-point Protocol - framing, transition phases.

7 Hours

UNIT - 6

MULTIPLE ACCESS, ETHERNET: Random Access; Controlled Access; Channelization. Ethernet: IEEE standards; Standard Ethernet and changes in the standard; Fast Ethernet; Gigabit Ethernet.

7 Hours

UNIT - 7

WIRELESS LANS AND CONNECTION OF LANS: IEE 802.11; Bluetooth. Connecting devices; Backbone Networks; Virtual LANs.

6 Hours

UNIT - 8

OTHER TECHNOLOGIES: Cellular telephony; SONET / SDH: Architecture, Layers, Frames; STS multiplexing. ATM: Design goals, problems, architecture, switching, layers.

6 Hours

TEXT BOOKS:

1. **Data Communications and Networking** – Behrouz A. Forouzan, 4th Edition, Tata McGraw-Hill, 2006.

REFERENCE BOOKS:

1. **Communication Networks: Fundamental Concepts and Key Architectures -** Alberto Leon, Garcia and Indra Widjaja, 3rd Edition, Tata McGraw- Hill, 2004.
2. **Data and Computer Communication,** William Stallings, 8th Edition, Pearson Education, 2007.
3. **Computer Networks: A Systems Approach -** Larry L. Peterson and Bruce S. David, 4th Edition, Elsevier, 2007.
4. **Introduction to Data Communications and Networking** – Wayne Tomasi, Pearson Education, 2005.
5. **Computer and Communication Networks** – Nader F. Mir, Pearson Education, 2007.

FORMAL LANGUAGES AND AUTOMATA THEORY

Subject Code	:	**06CS56**	IA Marks	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

INTRODUCTION TO FINITE AUTOMATA: Introduction to Finite Automata; The central concepts of Automata theory; Deterministic finite automata; Nondeterministic finite automata.

7 Hours

UNIT - 2

FINITE AUTOMATA, REGULAR EXPRESSIONS: An application of finite automata; Finite automata with Epsilon-transitions; Regular expressions; Finite Automata and Regular Expressions; Applications of Regular Expressions.

7 Hours

UNIT - 3

REGULAR LANGUAGES, PROPERTIES OF REGULAR LANGUAGES: Regular languages; Proving languages not to be regular languages; Closure properties of regular languages; Decision properties of regular languages; Equivalence and minimization of automata.

6 Hours

UNIT - 4

CONTEXT-FREE GRAMMARS AND LANGUAGES: Context –free grammars; Parse trees; Applications; Ambiguity in grammars and Languages.

6 Hours

PART - B

UNIT - 5

PUSHDOWN AUTOMATA: Definition of the Pushdown automata; The languages of a PDA; Equivalence of PDA's and CFG's; Deterministic Pushdown Automata.

7 Hours

UNIT - 6

PROPERTIES OF CONTEXT-FREE LANGUAGES: Normal forms for CFGs; The pumping lemma for CFGs; Closure properties of CFL

6 Hours

UNIT - 7

INTRODUCTION TO TURING MACHINE: Problems that Computers cannot solve; The turning machine; Programming techniques for Turning

Machines; Extensions to the basic Turning Machines; Turing Machine and Computers.

7 Hours

UNIT - 8

UNDECIDABILITY: A Language that is not recursively enumerable; An Undecidable problem that is RE; Post's Correspondence problem; Other undecidable problems.

6 Hours

TEXT BOOK:

1. **Introduction to Automata Theory, Languages and Computation** – John E.. Hopcroft, Rajeev Motwani, Jeffrey D.Ullman:, 3rd Edition, Pearson education, 2007.

REFERENCE BOOKS:

1. **Fundamentals of the Theory of Computation: Principles and Practice** – Raymond Greenlaw, H.James Hoove, Morgan Kaufmann, 1998.
2. **Introduction to Languages and Automata Theory** – John C Martin, 3rd Edition, Tata McGraw-Hill, 2007.
3. **Introduction to Computer Theory** – Daniel I.A. Cohen, 2nd Edition, John Wiley & Sons, 2004.
4. **An Introduction to the Theory of Computer Science, Languages and Machines** – Thomas A. Sudkamp, 3rd Edition, Pearson Education, 2006.

DATABASE APPLICATIONS LABORATORY

Subject Code	:	**06CSL57**	IA Marks	:	25
No. of Practical Hrs./ Week	:	03	Exam Hours	:	03
Total No. of Practical Hrs.	:	42	Exam Marks	:	50

1. Consider the Insurance database given below. The primary keys are underlined and the data types are specified:

PERSON (driver – id #: String, name: string, address: string)
CAR (regno: string, model: string, year: int)
ACCIDENT (report-number: int, accd-date: date, location: string)
OWNS (driver-id #:string, Regno:string)
PARTICIPATED (driver-id: string, Regno:string, report-number:int, damage amount:int)

(i) Create the above tables by properly specifying the primary keys and the foreign keys.
(ii) Enter at least five tuples for each relation.

(iii) Demonstrate how you
   a. Update the damage amount to 25000 for the car with a specific Regno in the ACCIDENT table with report number 12.
   b. Add a new accident to the database.

(iv) Find the total number of people who owned cars that were involved in accidents in 2008.

(v) Find the number of accidents in which cars belonging to a specific model were involved.

(vi) Generate suitable reports.

(vii) Create suitable front end for querying and displaying the results.

2. Consider the following relations for an order processing database application in a company:

CUSTOMER (cust #: int , cname: string, city: string)
ORDER (order #: int, odate: date, cust #: int, ord-Amt: int)
ORDER – ITEM (order #: int, item #: int, qty: int)
ITEM (item # : int, unit price: int)
SHIPMENT (order #: int, warehouse#: int, ship-date: date)
WAREHOUSE (warehouse #: int, city: string)

(i) Create the above tables by properly specifying the primary keys and the foreign keys.

(ii) Enter at least five tuples for each relation.

(iii) Produce a listing: CUSTNAME, #oforders, AVG_ORDER_AMT, where the middle column is the total numbers of orders by the customer and the last column is the average order amount for that customer.

(iv) List the order# for orders that were shipped from *all* the warehouses that the company has in a specific city.

(v) Demonstrate the deletion of an item from the ITEM table and demonstrate a method of handling the rows in the ORDER_ITEM table that contain this particular item.

(vi) Generate suitable reports.

(vii) Create suitable front end for querying and displaying the results.

3. Consider the following database of student enrollment in courses & books adopted for each course:

STUDENT (regno: string, name: string, major: string, bdate:date)
COURSE (course #:int, cname:string, dept:string)
ENROLL (regno:string, course#:int, sem:int, marks:int)
BOOK _ ADOPTION (course# :int, sem:int, book-ISBN:int)
TEXT (book-ISBN:int, book-title:string, publisher:string, author:string)

(i) Create the above tables by properly specifying the primary keys and the foreign keys.

(ii) Enter at least five tuples for each relation.

(iii) Demonstrate how you add a new text book to the database and make this book be adopted by some department.
(iv) Produce a list of text books (include Course #, Book-ISBN, Book-title) in the alphabetical order for courses offered by the 'CS' department that use more than two books.
(v) List any department that has *all* its adopted books published by a specific publisher.
(vi) Generate suitable reports.
(vii) Create suitable front end for querying and displaying the results.

4. The following tables are maintained by a book dealer:

AUTHOR (author-id:int, name:string, city:string, country:string)
PUBLISHER (publisher-id:int, name:string, city:string, country:string)
CATALOG (book-id:int, title:string, author-id:int, publisher-id:int, category-id:int, year:int, price:int)
CATEGORY (category-id:int, description:string)
ORDER-DETAILS (order-no:int, book-id:int, quantity:int)

(i) Create the above tables by properly specifying the primary keys and the foreign keys.
(ii) Enter at least five tuples for each relation.
(iii) Give the details of the authors who have 2 or more books in the catalog and the price of the books is greater than the average price of the books in the catalog and the year of publication is after 2000.
(iv) Find the author of the book which has maximum sales.
(v) Demonstrate how you increase the price of books published by a specific publisher by 10%.
(vi) Generate suitable reports.
(vii) Create suitable front end for querying and displaying the results.

5. Consider the following database for a banking enterprise:

BRANCH(branch-name:string, branch-city:string, assets:real)
ACCOUNT(accno:int, branch-name:string, balance:real)
DEPOSITOR(customer-name:string, accno:int)
CUSTOMER(customer-name:string, customer-street:string, customer-city:string)
LOAN(loan-number:int, branch-name:string, amount:real)
BORROWER(customer-name:string, loan-number:int)

(i) Create the above tables by properly specifying the primary keys and the foreign keys
(ii) Enter at least five tuples for each relation
(iii) Find all the customers who have at least two accounts at the Main branch.

(iv) Find all the customers who have an account at all the branches located in a specific city.
(v) Demonstrate how you delete tuples in ACCOUNT relation at every branch located in a specific city.
(vi) Generate suitable reports.
(vii) Create suitable front end for querying and displaying the results.

Instructions:

1. The exercises are to be solved in an RDBMS environment like Oracle or DB2.
2. Suitable tuples have to be entered so that queries are executed correctly.
3. Front end may be created using either VB or VAJ or any other similar tool.
4. The student need not create the front end in the examination. The results of the queries may be displayed directly.
5. Relevant queries other than the ones listed along with the exercises may also be asked in the examination.
6. Questions must be asked based on lots.

ALGORITHMS LABORATORY

Subject Code	:	**06CSL58**	IA Marks	:	25
No. of Practical Hrs./ Week	:	03	Exam Hours	:	03
Total No. of Practical Hrs.	:	42	Exam Marks	:	50

IMPLEMENT THE FOLLOWING USING C/C++ LANGUAGE:

1. Implement Recursive Binary search and Linear search and determine the time required to search an element. Repeat the experiment for different values of n, the number of elements in the list to be searched and plot a graph of the time taken versus n.

2. Sort a given set of elements using the Heapsort method and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n.
3. Sort a given set of elements using Merge sort method and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n.

4. Sort a given set of elements using Selection sort and determine the time required to sort elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n.

5. Implement 0/1 Knapsack problem using dynamic programming.

6. From a given vertex in a weighted connected graph, find shortest paths to other vertices using Dijkstra's algorithm.

7. Sort a given set of elements using Quick sort method and determine the time required sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n.

8. Find Minimum Cost Spanning Tree of a given undirected graph using Kruskal's algorithm.

9. a. Print all the nodes reachable from a given starting node in a digraph using BFS method.
   b. Check whether a given graph is connected or not using DFS method.

10. Find a subset of a given set S = {sl,s2,.....,sn} of n positive integers whose sum is equal to a given positive integer d. For example, if S= {1, 2, 5, 6, 8} and d = 9 there are two solutions{1,2,6}and{1,8}.A suitable message is to be displayed if the given problem instance doesn't have a solution.

11. a. Implement Horspool algorithm for String Matching.
    b. Find the Binomial Co-efficient using Dynamic Programming.

12. Find Minimum Cost Spanning Tree of a given undirected graph using Prim's algorithm.

13. a. Implement Floyd's algorithm for the All-Pairs- Shortest-Paths problem.
    b. Compute the transitive closure of a given directed graph using Warshall's algorithm.
14. Implement N Queen's problem using Back Tracking.

VI SEMESTER

MANAGEMENT AND ENTREPRENEURSHIP

Subject Code	:	**06AL61**	IA Marks	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

MANAGEMENT

UNIT - 1

MANAGEMENT: Introduction - Meaning - nature and characteristics of Management, Scope and functional areas of management - Management as a science, art or profession Management & Administration - Roles of Management, Levels of Management, Development of Management Thought - early management approaches - Modern management approaches.

7 Hours

UNIT - 2

PLANNING: Nature, importance and purpose of planning process - Objectives - Types of plans (Meaning only) - Decision making - Importance of planning - steps in planning & planning premises - Hierarchy of plans.

6 Hours

UNIT - 3

ORGANIZING AND STAFFING: Nature and purpose of organization - Principles of organization - Types of organization - Departmentation - Committees – Centralization Vs Decentralization of authority and responsibility - Span of control - MBO and MBE (Meaning only) Nature and importance of Staffing - Process of Selection & Recruitment (in brief)

6 Hours

UNIT - 4

DIRECTING & CONTROLLING: Meaning and nature of directing - Leadership styles, Motivation Theories, Communication - Meaning and importance – Coordination, meaning and importance and Techniques of Co - ordination. Meaning and steps in controlling - Essentials of a sound control system - Methods of establishing control (in brief) **7 Hours**

PART - B
ENTREPRENEURSHIP

UNIT - 5

ENTREPRENEUR: Meaning of Entrepreneur; Evolution of the Concept, Functions of an Entrepreneur, Types of Entrepreneur, Intrapreneur - an emerging Class. Concept of Entrepreneurship - Evolution of Entrepreneurship, Development of Entrepreneurship; Stages in entrepreneurial process; Role of entrepreneurs in Economic Development; Entrepreneurship in India; Entrepreneurship – its Barriers.

6 Hours

UNIT - 6

SMALL SCALE INDUSTRY: Definition; Characteristics; Need and rationale: Objectives; Scope; role of SSI in Economic Development. Advantages of SSI Steps to start an SSI - Government policy towards SSI; Different Policies of S.S.I.; Government Support for S.S.I. during 5 year plans, Impact of Liberalization, Privatization, Globalization on S.5.1., Effect of WTO/GATT Supporting Agencies of Government for S.5.!., Meaning; Nature of Support; Objectives; Functions; Types of Help; Ancillary Industry and Tiny Industry (Definition only).

6 Hours

UNIT - 7

INSTITUTIONAL SUPPORT: Different Schemes; TECKSOK; KIADB; KSSIDC; KSIMC; DIC Single Window Agency: SISI; NSIC; SIDBI; KSFC .

6 Hours

UNIT - 8

PREPARATION OF PROJECT : Meaning of Project; Project Identification; Project Selection; Project Report; Need and Significance of Report; Contents; formulation; Guidelines by Planning Commission for Project report; Network Analysis; Errors of Project Report; Project Appraisal. Identification of Business Opportunities:Market Feasibility Study; Technical Feasibility Study; Financial Feasibility Study & Social Feasibility Study

6 Hours

TEXT BOOKS:

1. **Principles of Management** – P.C. Tripathi, P.N. Reddy – Tata McGraw Hill, 2007.
2. **Dynamics of Entrepreneurial Development & Management** – Vasant Desai:, Himalaya Publishing House, 2007.
3. **Entrepreneurship Development** – Poornima M Charantimath – Small Business Enterprises, Pearson Education, 2006.

REFERENCE BOOKS:

1. **Management Fundamentals Concepts, Application, Skill Development** – Robert Lusier –, Thompson, 2007.
2. **Entrepreneurship Development** – S S Khanka, S Chand & Co, 2007.
3. **Management** – Stephen Robbins:, 17th Edition, Pearson Education / PHI, 2003.
4. Web Sites for the Institutions listed in the Unit 7 on Institutional Support.

UNIX SYSTEMS PROGRAMMING

Subject Code	:	**06CS62**	IA Marks	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

INTRODUCTION: UNIX and ANSI Standards: The ANSI C Standard, The ANSI/ISO C++ Standards, Difference between ANSI C and C++, The POSIX Standards, The POSIX.1 FIPS Standard, The X/Open Standards. UNIX and POSIX APIs: The POSIX APIs, The UNIX and POSIX Development Environment, API Common Characteristics.

6 Hours

UNIT - 2

UNIX FILES: File Types, The UNIX and POSIX File System, The UNIX and POSIX File Attributes, Inodes in UNIX System V, Application Program Interface to Files, UNIX Kernel Support for Files, Relationship of C Stream Pointers and File Descriptors, Directory Files, Hard and Symbolic Links.

6 Hours

UNIT - 3

UNIX File APIs: General File APIs, File and Record Locking, Directory File APIs, Device File APIs, FIFO File APIs, Symbolic Link File APIs, General File Class, regfile Class for Regular Files, dirfile Class for Directory Files, FIFO File Class, Device File Class, Symbolic Link File Class, File Listing Program.

7 Hours

UNIT - 4

UNIX PROCESSES: The Environment of a UNIX Process: Introduction, main function, Process Termination, Command-Line Arguments, Environment List, Memory Layout of a C Program, Shared Libraries, Memory Allocation, Environment Variables, setjmp and longjmp Functions, getrlimit, setrlimit Functions, UNIX Kernel Support for Processes.

7 Hours

PART - B

UNIT - 5

PROCESS CONTROL: Introduction, Process Identifiers, fork, vfork, exit, wait, waitpid, waited, wait3, wait4 Functions, Race Conditions, exec Functions, Changing User IDs and Group IDs, Interpreter Files, system Function, Process Accounting, User Identification, Process Times.

Process Relationships: Introduction, Terminal Logins, Network Logins, Process Groups, Sessions, Controlling Terminal, tcgetpgrp, tcsetpgrp, and tcgetsid Functions, Job Control, Shell Execution of Programs, Orphaned Process Groups. **7 Hours**

UNIT - 6

SIGNALS AND DAEMON PROCESSES: Signals: The UNIX Kernel Support for Signals, signal, Signal Mask, sigaction, The SIGCHLD Signal and the waitpid Function, The sigsetjmp and siglongjmp Functions, Kill, Alarm, Interval Timers, POSIX.lb Timers. Daemon Processes: Introduction, Daemon Characteristics, Coding Rules, Error Logging, Single-instance daemons; Daemon conventions; Client-Server Model.

7 Hours

UNIT - 7

INTERPROCESS COMMUNICATION: Introduction; Pipes, popen, pclose Functions; Coprocesses; FIFOs; XSI IPC; Message Queues; Semaphores.

6 Hours

UNIT - 8

NETWORK IPC: SOCKETS:

Introduction; Socket Descriptors; Addressing; Connection establishment; Data transfer; Socket options; Out-of-band data; Nonblocking and asynchronous I/O.

6 Hours

TEXT BOOKS:

1. **Unix System Programming Using C++** – Terrence Chan - Prentice Hall India, 1999.

2. **Stephen A. Rago: Advanced Programming in the UNIX Environment** – W.Richard Stevens, 2nd Edition, Pearson Education / PHI, 2005.

REFERENCE BOOKS:

1. **Advanced Unix Programming** – Marc J. Rochkind:, 2nd Edition, Pearson Education, 2005.
2. **The Design of the UNIX Operating System** – Maurice.J.Bach:, Pearson Education / PHI, 1987.
3. **Unix Internals** – Uresh Vahalia:, Pearson Education, 2001.

COMPILER DESIGN

Subject Code	:	**6CS63/06IS662**	IA Marks	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

INTRODUCTION, LEXICAL ANALYSIS: Language processors; The structure of a Compilers; The evolution of programming languages; The science of building a compiler; Applications of Compiler technology; Programming language basics; Lexical analysis: The Role of Lexical Analyzer; Input Buffering; Specifications of Tokens; Recognition of Tokens.

8 Hours

UNIT - 2

SYNTAX ANALYSIS – 1: Introduction; Context-free Grammars; Writing a Grammar; Top-down Parsing.

6 Hours

UNIT - 3

SYNTAX ANALYSIS – 2: Bottom-up Parsing; Introduction to LR Parsing: Simple LR.

6 Hours

UNIT - 4

SYNTAX ANALYSIS – 3: More powerful LR parsers; Using ambiguous grammars; Parser Generators.

6 Hours

PART - B

UNIT - 5

SYNTAX-DIRECTED TRANSLATION: Syntax-Directed definitions; Evaluation order for SDDs; Applications of Syntax-directed translation; Syntax-directed translation schemes.

6 Hours

UNIT - 6

INTERMEDIATE CODE GENERATION: Variants of syntax trees; Three-address code; Types and declarations; Translation of expressions; Type checking; Control flow; Back patching; Switch statements; Intermediate code for procedures.

8 hours

UNIT - 7

RUN-TIME ENVIRONMENTS: Storage Organization; Stack allocation of space; Access to non-local data on the stack; Heap management; Introduction to garbage collection.

6 Hours

UNIT - 8

CODE GENERATION: Issues in the design of Code Generator; The Target language; Addresses in the target code; Basic blocks and Flow graphs; Optimization of basic blocks; A Simple Code Generator.

6 Hours

TEXT BOOK:

1. **Compilers- Principles, Techniques and Tools** – Alfred V Aho, Monica S. Lam, Ravi Sethi, Jeffrey D Ullman – 2nd Edition, Addison-Wesley, 2007.

REFERENCE BOOKS:

1. **Crafting a Compiler with C** – Charles N. Fischer, Richard J. leBlanc, Jr., Pearson Education, 1991.
2. **Modern Compiler Implementation in C** – Andrew W Apple Cambridge University Press, 1997.
3. **Compiler Construction Principles & Practice** – Kenneth C Louden – Thomson Education, 1997.

COMPUTER NETWORKS – II

Subject Code	:	**06CS64/IS665**	IA Marks	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

PACKET-SWITCHING NETWORKS – 1: Network services and internal network operations; Packet network topology; Datagrams and virtual circuits; Routing in packet networks; Shortest-path routing; ATM networks.

6 Hours

UNIT - 2

PACKET-SWITCHING NETWORKS – 2, TCP / IP - 1: Traffic management at the packet level; Traffic management at the flow level; Traffic management at the flow-aggregate level. The TCP / IP architecture; The Internet protocol.

6 Hours

UNIT - 3

TCP / IP - 2: IPv6; User datagram protocol; Transmission control protocol; Internet routing protocols; Multicast routing; DHCP, NAT, and Mobile IP.

7 Hours

UNIT - 4

ATM NETWORKS: Why ATM? BISDN reference model; ATM layer; ATM adaptation layer; ATM signaling; PNNI routing; Classical IP over ATM.

7 Hours

PART - B

UNIT - 5

NETWORK MANAGEMENT, SECURITY: Network management overview; SNMP; Structure of Management information; MIB; Remote network monitoring. Security and cryptographic algorithms; Security protocols; Cryptographic algorithms.

6 Hours

UNIT - 6

QoS, Resource Allocation, VPNs, Tunneling, Overlay Networks: Overview of QOS; Integrated services QoS; Differentiated services QoS; Resource allocation.Virtual Private Networks; Multiprotocol Label switching; Overlay networks.

7 Hours

UNIT - 7

COMPRESSION OF DIGITAL VOICE AND VIDEO, VOIP, MULTIMEDIA NETWORKING: Overview of data compression; Digital voice and compression; Still images and JPEG compression; Moving images and MPEG compression; Limits of compression with loss; Compression methods without loss; Case Study: FAX compression for transmission. Overview of IP telephony; VoIP signaling protocols; Real-Time media transport protocols; Distributed multimedia networking; SCTP.

7 Hours

UNIT - 8

MOBILE AD-HOC NETWORKS, WIRELESS SENSOR NETWORKS: Overview of wireless adhoc networks; Routing in adhoc networks; Routing protocols for adhoc networks; security of adhoc networks. Sensor networks and protocol structures; Communication energy model; Clustering protocols; Routing protocols; Zigbee technology and IEEE 802.15.4

6 Hours

TEXT BOOKS:

1. **Communication Networks – Fundamental Concepts and Key architectures –** Alberto Leon-Garcia and Indra Widjaja:, 2nd Edition, Tata McGraw-Hill, 2004.
2. Computer and Communication Networks – Nader F. Mir:, Pearson Education, 2007.

REFERENCE BOOKS:

1. **Data Communications and Networking** – Behrouz A. Forouzan – 4th Edition, Tata McGraw-Hill, 2006.
2. **Data and Computer Communication** – William Stallings – 8th Edition, Pearson Education, 2007.
3. **Computer Networks A Systems Approach** – Larry L. Peterson and Bruce S. David – 4th Edition, Elsevier, 2007.
4. **Introduction to Data Communications and Networking** – Wayne Tomasi – Pearson Education, 2005.

COMPUTER GRAPHICS AND VISUALIZATION

Subject Code	:	**06CS65**	IA Marks	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

INTRODUCTION: Applications of computer graphics; A graphics system; Images: Physical and synthetic; Imaging systems; The synthetic camera model; The programmer's interface; Graphics architectures; Programmable pipelines; Performance characteristics. Graphics Programming: The Sierpinski gasket; Programming two-dimensional applications.

7 Hours

UNIT - 2

THE OPENGL: The OpenGL API; Primitives and attributes; Color; Viewing; Control functions; The Gasket program; Polygons and recursion; The three-dimensional gasket; Plotting implicit functions.

6 Hours

UNIT - 3

INPUT AND INTERACTION: Interaction; Input devices; Clients and servers; Display lists; Display lists and modeling; Programming event-driven input; Menus; Picking; A simple CAD program; Building interactive models; Animating interactive programs; Design of interactive programs; Logic operations.

7 Hours

UNIT - 4

GEOMETRIC OBJECTS AND TRANSFORMATIONS – 1: Scalars, points, and vectors; Three-dimensional primitives; Coordinate systems and frames; Modeling a colored cube; Affine transformations; Rotation, translation and scaling.

6 Hours

PART - B

UNIT - 5

GEOMETRIC OBJECTS AND TRANSFORMATIONS – 2: Transformations in homogeneous coordinates; Concatenation of transformations; OpenGL transformation matrices; Interfaces to three-dimensional applications; Quaternions.

5 Hours

UNIT - 6

VIEWING: Classical and computer viewing; Viewing with a computer; Positioning of the camera; Simple projections; Projections in OpenGL; Hidden-surface removal; Interactive mesh displays; Parallel-projection matrices; Perspective-projection matrices; Projections and shadows.

7 Hours

UNIT - 7

LIGHTING AND SHADING: Light and matter; Light sources; The Phong lighting model; Computation of vectors; Polygonal shading; Approximation of a sphere by recursive subdivisions; Light sources in OpenGL; Specification of materials in OpenGL; Shading of the sphere model; Global illumination.

6 Hours

UNIT - 8

IMPLEMENTATION: Basic implementation strategies; The major tasks; Clipping; Line-segment clipping; Polygon clipping; Clipping of other primitives; Clipping in three dimensions; Rasterization; Bresenham's algorithm; Polygon rasterization; Hidden-surface removal; Antialiasing; Display considerations.

8 Hours

TEXT BOOK:

1. **Interactive Computer Graphics A Top-Down Approach with OpenGL** -Edward Angel, 5th Edition, Addison-Wesley, 2008.

REFERENCE BOOKS:

1. **Computer Graphics Using OpenGL** – F.S. Hill,Jr. 2nd Edition, Pearson Education, 2001.
2. **Computer Graphics** – James D Foley, Andries Van Dam, Steven K Feiner, John F Hughes, Addison-wesley 1997.
3. **Computer Graphics - OpenGL Version** – Donald Hearn and Pauline Baker, 2nd Edition, Pearson Education, 2003.

OPERATIONS RESEARCH

Subject Code	:	**06CS661**	IA Marks	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

INTRODUCTION, LINEAR PROGRAMMING – 1: Introduction: The origin, nature and impact of OR; Defining the problem and gathering data; Formulating a mathematical model; Deriving solutions from the model; Testing the model; Preparing to apply the model; Implementation. Introduction to Linear Programming: Prototype example; The linear programming (LP) model.

6 Hours

UNIT - 2

LP – 2, SIMPLEX METHOD - 1: Assumptions of LP; Additional examples. The essence of the simplex method; Setting up the simplex method; Algebra of the simplex method; The simplex method in tabular form; Tie breaking in the simplex method.

7 Hours

UNIT - 3

SIMPLEX METHOD - 2: Adapting to other model forms; Post optimality analysis; Computer implementation. Foundation of the simplex method.

6 Hours

UNIT - 4

SIMPLEX METHOD - 2, DUALITY THEORY: The revised simplex method, a fundamental insight. The essence of duality theory; Economic interpretation of duality. Primal dual relationship; Adapting to other primal forms.

7 Hours

PART - B

UNIT - 5

DUALITY THEORY AND SENSITIVITY ANALYSIS, OTHER ALGORITHMS FOR LP: The role of duality in sensitive analysis; The essence of sensitivity analysis; Applying sensitivity analysis. The dual simplex method; parametric linear programming; The upper bound technique.

7 Hours

UNIT - 6

TRANSPORTATION AND ASSIGNMENT PROBLEMS: The transportation problem; A streamlined simplex method for the transportation problem; The assignment problem; A special algorithm for the assignment problem.

7 Hours

UNIT - 7

GAME THEORY, DECISION ANALYSIS: Game Theory: The formulation of two persons, zero sum games; Solving simple games- a prototype example; Games with mixed strategies; Graphical solution procedure; Solving by linear programming, Extensions. Decision Analysis: A prototype example; Decision making without experimentation; Decision making with experimentation; Decision trees.

6 Hours

UNIT - 8

METAHEURISTICS: The nature of Metaheuristics, Tabu Search, Simulated Annealing, Genetic Algorithms.

6 Hours

TEXT BOOK:

1. **Introduction to Operations Research** – Frederick S. Hillier and Gerald J. Lieberman – 8th Edition, Tata McGraw Hill, 2005.

REFERENCE BOOKS:

1. **Operations Research Applications and Algorithms** – Wayne L. Winston – 4th Edition, Thomson Course Technology, 2003.
2. **Operations Research: An Introduction** – Hamdy A Taha – 8th Edition, Prentice Hall India, 2007.

SIGNALS AND SYSTEMS

Subject Code	:	**06CS662**	IA Marks	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

INTRODUCTION: Definitions of a signal and a system; Classification of signals; Basic operations on signals; Elementary signals.

7 Hours

UNIT - 2

SYSTEMS, TIME-DOMAIN REPRESENTATIONS – 1: Systems viewed as interconnections of operations; Properties of systems; Convolution; Impulse response representation; Properties of impulse response representation.

7 Hours

UNIT - 3

TIME DOMAIN REPRESENTATION – 2: Differential and difference equation representations; Block diagram representations.

6 Hours

UNIT - 4

FOURIER REPRESENTATION – 1: Fourier representation: Introduction; Fourier representations for four signal classes; Orthogonality of complex sinusoidal signals.

6 Hours

PART - B

UNIT - 5

FOURIER REPRESENTATION –2: DTFS representations; Continuous-tine Fourier-series representations; DTFT and FT representations; Properties of Fourier representations.

6 Hours

UNIT - 6

APPLICATION OF FOURIER REPRESENTATIONS – 1: Frequency response of LTI systems; Solution of differential and difference equations using system function.

7 Hours

UNIT - 7

APPLICATIONS OF FOURIER REPRESENTATIONS – 2: Z-TRANSFORMS – 1: Fourier transform representations for periodic signals; Sampling of continuous time signals and signal reconstruction. Introduction to Z-transform; Properties of ROC; Properties of Z-transforms; Inversion of Z-transforms.

7 Hours

UNIT - 8

Z – TRANSFORMS – 2 : Transforms analysis of LTI systems; Transfer function; Stability and causality; Unilateral Z-transforms and its application to solve difference equations.

6 Hours

TEXT BOOK:

1. **Signals and Systems** – Simon Haykin and Barry Van Veen:, John Wiley and Sons, 2001, Reprint 2002.

REFERENCE BOOKS:

1. **Signals and Systems** – Alan V. Oppenheim, Alan S. Willsky and S. Hamid Nawab – Pearson Education Asia, 2nd edition, 1997, Indian reprint 2002.
2. **Signals and Systems** – Dr. D.ganesh Rao and Satish Tunga – A Simplified Approach, Sanguine Technical Publishers, 2003-04.

DATA COMPRESSION

Subject Code	:	**06CS663**	IA Marks	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

INTRODUCTION, LOSSLESS COMPRESSION –1: Compression techniques; Modeling and coding. Mathematical preliminaries for lossless compression: Overview; Basic concepts of Information Theory; Models; Coding; Algorithmic information theory; Minimum description length principle. Huffman coding: Overview; The Huffman coding algorithm, Minimum variance Huffman codes; Application of Huffman coding for text compression.

7 Hours

UNIT - 2

LOSSLESS COMPRESSION – 2: Dictionary Techniques: Overview; Introduction; Static dictionary; Adaptive dictionary; Applications: UNIX compress, GIF, PNG, V.42. Lossless image compression: Overview; Introduction; Basics; CALIC; JPEG-LS; Multiresoution approaches; Facsimile encoding: Run-length coding, T.4 and T.6.

6 Hours

UNIT - 3

BASICS OF LOSSY CODING: Some mathematical concepts: Overview; Introduction; Distortion criteria; Models.Scalar quantization: Overview; Introduction; The quantization problem; Uniform quantizer; Adaptive quantization.

6 Hours

UNIT - 4

VECTOR QUANTIZATION, DIFFERENTIAL ENCODING: Vector quantization: Overview; Introduction; Advantages of vector quantization over scalar quantization; The LBG algorithm. Differential Encoding:

Overview; Introduction; The basic algorithm; Prediction in DPCM; Adaptive DPCM; Delta modulation; Speech coding; Image coding.

7 Hours

PART - B

UNIT - 5

SOME MATHEMATICAL CONCEPTS, TRANSFORM CODING: Some mathematical concepts: Linear systems; Sampling; Discrete Fourier transform; Z-transform. Transform coding: Overview; introduction; The transform; Transforms of interest; Quantization and coding for transform coefficients; Application to image compression – JPEG; Application to audio compression – MDCT.

7 Hours

UNIT - 6

SUBBAND CODING, AUDIO CODING: Subband Coding: Overview; introduction; Filters; The basic subband coding algorithm; Bit allocation; Application to speech coding – G.722; Application to audio coding – MPEG audio; Application to image compression. Audio Coding: Overview; Introduction; MPEG audio coding; MPEG advanced audio coding; Dolby AC3; Other standards.

6 Hours

UNIT - 7

WAVELET-BASED COMPRESSION: Overview; Introduction; Wavelets; Multiresolution and the scaling function; Implementation using Filters; Image compression; Embedded zerotree coder; Set partitioning in hierarchical trees; JPEG 2000. **6 Hours**

UNIT - 8

VIDEO COMPRESSION: Overview; Introduction; Motion compensation; Video signal representation; H.261; Model-based coding; Asymmetric applications; MPEG-1 and MPEG-2; H.263; H.264, MPEG-4 and advanced video coding; Packet video.

7 Hours

TEXT BOOK:

1. **Introduction to Data Compression** – Khalid Sayood:, 3rd Edition, Elsevier, 2006.

REFERENCE BOOK:

1. **The Complete Reference** – D. Salomon: Data Compression:, Springer, 1998.

PATTERN RECOGNITION

Subject Code	:	**06CS664**	IA Marks	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

INTRODUCTION: Machine perception, an example; Pattern Recognition System; The Design Cycle; Learning and Adaptation.

6 Hours

UNIT - 2

BAYESIAN DECISION THEORY: Introduction, Bayesian Decision Theory; Continuous Features, Minimum error rate, classification, classifiers, discriminant functions, and decision surfaces; The normal density; Discriminant functions for the normal density.

7 Hours

UNIT - 3

MAXIMUM-LIKELIHOOD AND BAYESIAN PARAMETER ESTIMATION: Introduction; Maximum-likelihood estimation; Bayesian Estimation; Bayesian parameter estimation: Gaussian Case, general theory; Hidden Markov Models.

7 Hours

UNIT - 4

NON-PARAMETRIC TECHNIQUES: Introduction; Density Estimation; Parzen windows; k_n – Nearest- Neighbor Estimation; The Nearest- Neighbor Rule; Metrics and Nearest-Neighbor Classification.

6 Hours

PART - B

UNIT - 5

LINEAR DISCRIMINANT FUNCTIONS : Introduction; Linear Discriminant Functions and Decision Surfaces; Generalized Linear Discriminant Functions; The Two-Category Linearly Separable case; Minimizing the Perception Criterion Functions; Relaxation Procedures; Non-separable Behavior; Minimum Squared-Error procedures; The Ho-Kashyap procedures.

7 Hours

UNIT - 6

STOCHASTIC METHODS: Introduction; Stochastic Search; Boltzmann Learning; Boltzmann Networks and Graphical Models; Evolutionary Methods.

6 Hours

UNIT - 7

NON-METRIC METHODS: Introduction; Decision Trees; CART; Other Tree Methods; Recognition with Strings; Grammatical Methods.

6 Hours

UNIT - 8

UNSUPERVISED LEARNING AND CLUSTERING: Introduction; Mixture Densities and Identifiability; Maximum-Likelihood Estimates; Application to Normal Mixtures; Unsupervised Bayesian Learning; Data Description and Clustering; Criterion Functions for Clustering.

7 Hours

TEXT BOOK:

1. **Pattern Classification** – Richard O. Duda, Peter E. Hart, and David G.Stork:, 2nd Edition, Wiley-Interscience, 2001.

REFERENCE BOOK:

1. **Pattern Recognition and Image Analysis** – Earl Gose – Richard Johnsonbaugh, Steve Jost – Pearson Education, 2007.

STOCHASTIC MODELS AND APPLICATIONS

Subject Code	:	**06CS665**	IA Marks	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

INTRODUCTION - 1: Axioms of probability; Conditional probability and independence; Random variables; Expected value and variance; Moment-Generating Functions and Laplace Transforms; conditional expectation; Exponential random variables.

6 Hours

UNIT - 2

INTRODUCTION - 2: Limit theorems; Examples: A random graph; The Quicksort and Find algorithms; A self-organizing list model; Random permutations.

6 Hours

UNIT - 3

PROBABILITY BOUNDS, APPROXIMATIONS, AND COMPUTATIONS: Tail probability inequalities; The second moment and conditional expectation inequality; probability bounds via the Importance

sampling identity; Poisson random variables and the Poisson paradigm; Compound Poisson random variables.

7 Hours

UNIT - 4

MARKOV CHAINS: Introduction; Chapman-Kologorov Equations; Classification of states; Limiting and stationary probabilities; Some applications; Time-Reversible Markov Chains; Markov Chain Monte Carlo methods.

7 Hours

PART - B

UNIT - 5

THE PROBABILISTIC METHOD: Introduction; Using probability to prove existence; Obtaining bounds from expectations; The maximum weighted independent set problem: A bound and a ranom algorithm; The set covering problem; Antichains; The Lovasz Local lemma; A random algorithm for finding the minimal cut in a graph.

6 Hours

UNIT - 6

MARTINGALES: Martingales: Definitions and examples; The martingale stopping theorem; The Hoeffding-Azuma inequality; Sub-martingales.

6 Hours

UNIT - 7

POISSON PROCESSES, QUEUING THEORY - 1: The non-stationary Poisson process; The stationary Poisson process; Some Poisson process computations; Classifying the events of a non-stationary Poisson process; Conditional distribution of the arrival times. Queuing Theory: Introduction; Preliminaries; Exponential models.

7 Hours

UNIT - 8

QUEUING THEORY - 2: Birth-and-Death exponential queuing systems; The backwards approach in exponential queues; A closed queuing network; An open queuing network; The M/G/1 queue; Priority queues.

7 Hours

TEXT BOOK:

1. **Probability Models for Computer Science** – Sheldon M. Ross:, Elsevier, 2002.

REFERENCE BOOKS:

1. **Stochastic Models Analysis and Applications** – B. R. Bhat:, New Age International, 2000.

2. **Probability and Random Processes with Applications to Signal Processing and Communications** – Scott L. Miller, Donald G. Childers:, Elsevier, 2004.

COMPUTER GRAPHICS AND VISUALIZATION LABORATORY

Subject Code	:	**06CSL67**	IA Marks	:	25
No. of Practical Hrs./ Week	:	03	Exam Hours	:	03
Total No. of Practical Hrs.	:	42	Exam Marks	:	50

PART - A

IMPLEMENT THE FOLLOWING PROGRAMS IN C / C++

1. Program to recursively subdivide a tetrahedron to from 3D Sierpinski gasket. The number of recursive steps is to be specified by the user.
2. Program to implement Liang-Barsky line clipping algorithm.
3. Program to draw a color cube and spin it using OpenGL transformation matrices.
4. Program to create a house like figure and rotate it about a given fixed point using OpenGL functions.
5. Program to implement the Cohen-Sutherland line-clipping algorithm. Make provision to specify the input line, window for clipping and view port for displaying the clipped image.
6. Program to create a cylinder and a parallelepiped by extruding a circle and quadrilateral respectively. Allow the user to specify the circle and the quadrilateral.
7 Program, using OpenGL functions, to draw a simple shaded scene consisting of a tea pot on a table. Define suitably the position and properties of the light source along with the properties of the properties of the surfaces of the solid object used in the scene.
8. Program to draw a color cube and allow the user to move the camera suitably to experiment with perspective viewing. Use OpenGL functions.
9. Program to fill any given polygon using scan-line area filling algorithm. (Use appropriate data structures.)
10. Program to display a set of values $\{ f_{ij} \}$ as a rectangular mesh.

PART - B

Develop a suitable Graphics package to implement the skills learnt in the theory and the exercises indicated in Part A. Use the OpenGL.

REFERENCE BOOKS:

1. **Computer Graphics Using OpenGL** – F.S. Hill,Jr. – 2nd Edition, Pearson education, 2001.
2. **Interactive Computer Graphics A Top-Down Approach with OpenGL Edward Angel** – 2nd Edition, Addison-Wesley, 2000.

SYSTEM SOFTWARE AND COMPILER DESIGN LABORATORY

Subject Code	:	**06CSL68**	IA Marks	:	25
No. of Lecture Hrs./ Week	:	03	Exam Hours	:	03
Total No. of Lecture Hrs.	:	42	Exam Marks	:	50

PART - A

LEX AND YACC PROGRAMS:

Execute the following programs using LEX:

1) a. Program to count the number of characters, words, spaces and lines in a given input file.

   b.Program to count the numbers of comment lines in a given C program. Also eliminate them and copy the resulting program into separate file.

2) a. Program to recognize a valid arithmetic expression and to recognize the identifiers and operators present. Print them separately.
   b. Program to recognize whether a given sentence is simple or compound.
3) Program to recognize and count the number of identifiers in a given input file.

Execute the following programs using YACC:

4) a. Program to recognize a valid arithmetic expression that uses operators +, -, * and /.
   b. Program to recognize a valid variable, which starts with a letter, followed by any number of letters or digits.

5) a. Program to evaluate an arithmetic expression involving operators +, -, * and /.
   b. Program to recognize strings ‘aaab’, ‘abbb’, ‘ab’ and ‘a’ using the grammar ($a^n b^n$, n>= 0).
6) Program to recognize the grammar ($a^n b$, n>= 10).

PART - B

UNIX PROGRAMMING:

1. a) Non-recursive shell script that accepts any number of argument and prints them in the Reverse order, (For example, if the script is named rargs, then executing rargs A B C should produce C B A on the standard output).
   b) C program that creates a child process to read commands from the standard input and execute them (a minimal implementation of a shell – like program). You can assume that no arguments will be passed to the commands to be executed

2. a) Shell script that accepts two file names as arguments, checks if the permissions for these files are identical and if the permissions are identical, outputs the common permissions, otherwise outputs each file name followed by its permissions
   b) C program to create a file with 16 bytes of arbitrary data from the beginning and another 16 bytes of arbitrary data from an offset of 48. Display the file contents to demonstrate how the hole in file is handled.

3. a) Shell function that takes a valid directory names as an argument and recursively descends all the subdirectories, finds the maximum length of any file in that hierarchy and writes this maximum value to the standard output
   b) C program that accepts valid file names as command line arguments and for each of the arguments, prints the type of the file (Regular file, Directory file, Character special file, Block special file, Symbolic link etc.)

4. a) Shell script that accepts file names specified as arguments and creates a shell script that contains this file as well as the code to recreate these files. Thus if the script generated by your script is executed, it would recreate the original files(This is same as the "bundle" script described by Brain W. Kernighan and Rob Pike in " The Unix Programming Environment", Prentice – Hall India).
   b) C program to do the following: Using fork( ) create a child process. The child process prints its own process-id and id of its parent and then exits. The parent process waits for its child to finish (by executing the wait( )) and prints its own process-id and the id of its child process and then exits.

COMPILER DESIGN:

5. Write a C program to implement the syntax-directed definition of "if E then S1" and "if E then S1 else S2". (Refer Fig. 8.23 in the text book prescribed for 06CS62 Compiler Design, Alfred V Aho, Ravi Sethi, Jeffrey D Ullman: Compilers- Principles, Techniques and Tools, Addison-Wesley, 2007.)
6. Write a yacc program that accepts a regular expression as input and produce its parse tree as output.

INSTRUCTIONS:
In the examination, a combination of one LEX and one YACC problem has to be asked from part A for a total of 25 marks and one programming exercise from Part B has to be asked for a total of 25 marks.

VII SEMESTER

OBJECT-ORIENTED MODELING AND DESIGN

Subject Code	:	**06CS71**	IA Marks	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

INTRODUCTION, MODELING CONCEPTS, CLASS MODELING: What is Object Orientation? What is OO development? OO themes; Evidence for usefulness of OO development; OO modeling history.Modeling as Design Technique: Modeling; abstraction; The three models.Class Modeling: Object and class concepts; Link and associations concepts; Generalization and inheritance; A sample class model; Navigation of class models; Practical tips.

7 Hours

UNIT - 2

ADVANCED CLASS MODELING, STATE MODELING: Advanced object and class concepts; Association ends; N-ary associations; Aggregation; Abstract classes; Multiple inheritance; Metadata; Reification; Constraints; Derived data; Packages; Practical tips.State Modeling: Events, States, Transitions and Conditions; State diagrams; State diagram behavior; Practical tips.

6 Hours

UNIT - 3

ADVANCED STATE MODELING, INTERACTION MODELING: Advanced State Modeling: Nested state diagrams; Nested states; Signal generalization; Concurrency; A sample state model; Relation of class and state models; Practical tips. Interaction Modeling: Use case models; Sequence models; Activity models.Use case relationships; Procedural sequence models; Special constructs for activity models.

6 Hours

UNIT - 4

PROCESS OVERVIEW, SYSTEM CONCEPTION, DOMAIN ANALYSIS: Process Overview: Development stages; Development life cycle. System Conception: Devising a system concept; Elaborating a concept; Preparing a problem statement. Domain Analysis: Overview of analysis; Domain class model; Domain state model; Domain interaction model; Iterating the analysis.

7 Hours

PART - B

UNIT - 5

APPLICATION ANALYSIS, SYSTEM DESIGN: Application Analysis: Application interaction model; Application class model; Application state model; Adding operations. Overview of system design; Estimating performance; Making a reuse plan; Breaking a system in to sub-systems; Identifying concurrency; Allocation of sub-systems; Management of data storage; Handling global resources; Choosing a software control strategy; Handling boundary conditions; Setting the trade-off priorities; Common architectural styles; Architecture of the ATM system as the example.

7 Hours

UNIT - 6

CLASS DESIGN, IMPLEMENTATION MODELING, LEGACY SYSTEMS: Class Design: Overview of class design; Bridging the gap; Realizing use cases; Designing algorithms; Recursing downwards, Refactoring; Design optimization; Reification of behavior; Adjustment of inheritance; Organizing a class design; ATM example.Implementation Modeling: Overview of implementation; Fine-tuning classes; Fine-tuning generalizations; Realizing associations; Testing.Legacy Systems: Reverse engineering; Building the class models; Building the interaction model; Building the state model; Reverse engineering tips; Wrapping; Maintenance.

7 Hours

UNIT - 7

DESIGN PATTERNS – 1: What is a pattern and what makes a pattern? Pattern categories; Relationships between patterns; Pattern description.
Communication Patterns: Forwarder-Receiver; Client-Dispatcher-Server; Publisher-Subscriber.

6 Hours

UNIT - 8

DESIGN PATTERNS – 2, IDIOMS: Management Patterns: Command processor; View handler. Idioms: Introduction; What can idioms provide? Idioms and style; Where to find idioms; Counted Pointer example.

6 Hours

TEXT BOOKS:

1. **Object-Oriented Modeling and Design with UML** – Michael Blaha, James Rumbaugh, 2nd Edition, Pearson Education, 2005.
2. **Pattern-Oriented Software Architecture: A System of Patterns - Volume 1**– Frank Buschmann, Regine Meunier, Hans Rohnert, Peter Sommerlad, Michael Stal, John Wiley and Sons, 2006.

REFERENCE BOOKS:

1. **Object-Oriented Analysis and Design with Applications** – Grady Booch et al, 3rd Edition, Pearson Education, 2007.
2. **Practical Object-Oriented Design with UML** – Mark Priestley, 2nd Edition, Tata McGraw-Hill, 2003.
3. **Object-Oriented Design with UML and JAVA** – K. Barclay, J. Savage, Elsevier, 2008.
4. **The Unified Modeling Language User Guide** – Booch, G., Rumbaugh, J., and Jacobson I, 2nd Edition, Pearson, 2005.
5. **Design Patterns: Elements of Reusable Object-Oriented Software** – E. Gamma, R. Helm, R. Johnson, J. Vlissides, Addison-Wesley, 1995.
6. **Object-Oriented Systems Analysis and Design Using UML** – Simon Bennett, Steve McRobb and Ray Farmer, 2nd Edition, Tata McGraw-Hill, 2002.

SOFTWARE ARCHITECTURES

Subject Code	:	**06IS72**	IA Marks	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

INTRODUCTION: The Architecture Business Cycle: Where do architectures come from? Software processes and the architecture business cycle; What makes a "good" architecture? What software architecture is and what it is not; Other points of view; Architectural patterns, reference models and reference architectures; Importance of software architecture; Architectural structures and views.

6 Hours

UNIT - 2

ARCHITECTURAL STYLES AND CASE STUDIES: Architectural styles; Pipes and filters; Data abstraction and object-oriented organization; Event-based, implicit invocation; Layered systems; Repositories; Interpreters; Process control; Other familiar architectures; Heterogeneous architectures. Case Studies: Keyword in Context; Instrumentation software; Mobile robotics; Cruise control; Three vignettes in mixed style.

7 Hours

UNIT - 3

QUALITY: Functionality and architecture; Architecture and quality attributes; System quality attributes; Quality attribute scenarios in practice; Other system quality attributes; Business qualities; Architecture qualities.

Achieving Quality: Introducing tactics; Availability tactics; Modifiability tactics; Performance tactics; Security tactics; Testability tactics; Usability tactics; Relationship of tactics to architectural patterns; Architectural patterns and styles.

6 Hours

UNIT - 4

ARCHITECTURAL PATTERNS – 1: Introduction; from mud to structure: Layers, Pipes and Filters, Blackboard.

7 Hours

PART - B

UNIT - 5

ARCHITECTURAL PATTERNS – 2: Distributed Systems: Broker; Interactive Systems: MVC, Presentation-Abstraction-Control.

7 Hours

UNIT - 6

ARCHITECTURAL PATTERNS – 3: Adaptable Systems: Microkernel; Reflection.

6 Hours

UNIT - 7

SOME DESIGN PATTERNS: Structural decomposition: Whole – Part; Organization of work: Master – Slave; Access Control: Proxy.

6 Hours

UNIT - 8

DESIGNING AND DOCUMENTING SOFTWARE ARCHITECTURE: Architecture in the life cycle; designing the architecture; Forming the team structure; Creating a skeletal system. Uses of architectural documentation; Views; choosing the relevant views; Documenting a view; Documentation across views.

7 Hours

TEXT BOOKS:

1. **Software Architecture in Practice** – Len Bass, Paul Clements, Rick Kazman, 2nd Edition, Pearson Education, 2003.
2. **Pattern-Oriented Software Architecture, A System of Patterns - Volume 1 –** Frank Buschmann, Regine Meunier, Hans Rohnert, Peter Sommerlad, Michael Stal, , John Wiley and Sons, 2006.

3. **Mary Shaw and David Garlan**: Software Architecture-Perspectives on an Emerging Discipline, Prentice-Hall of India, 2007.

REFERENCE BOOK:

1. **Design Patterns- Elements of Reusable Object-Oriented Software** – E. Gamma, R. Helm, R. Johnson, J. Vlissides:, Addison-Wesley, 1995. **Web site for Patterns:** http://www.hillside.net/patterns/

PROGRAMMING THE WEB

Subject Code	:	**06CS73**	IA Marks	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

Fundamentals of Web, XHTML – 1: Internet, WWW, Web Browsers, and Web Servers; URLs; MIME; HTTP; Security; The Web Programmers Toolbox. XHTML: Origins and evolution of HTML and XHTML; Basic syntax; Standard XHTML document structure; Basic text markup.

6 Hours

UNIT - 2

XHTML – 2: Images; Hypertext Links; Lists; Tables; Forms; Frames; Syntactic differences between HTML and XHTML.

6 Hours

UNIT - 3

CSS: Introduction; Levels of style sheets; Style specification formats; Selector forms; Property value forms; Font properties; List properties; Color; Alignment of text; The Box model; Background images; The and tags; Conflict resolution.

6 Hours

UNIT - 4

JAVASCRIPT: Overview of Javascript; Object orientation and Javascript; General syntactic characteristics; Primitives, operations, and expressions; Screen output and keyboard input; Control statements; Object creation and modification; Arrays; Functions; Constructor; Pattern matching using regular expressions; Errors in scripts; Examples.

8 Hours

PART - B

UNIT - 5

JAVASCRIPT AND HTML DOCUMENTS: The Javascript execution environment; The Document Object Model; Element access in Javascript; Events and event handling; Handling events from the Body elements, Button elements, Text box and Password elements; The DOM 2 event model; The navigator object; DOM tree traversal and modification.

6 Hours

UNIT - 6

DYNAMIC DOCUMENTS WITH JAVASCRIPT: Introduction to dynamic documents; Positioning elements; Moving elements; Element visibility; Changing colors and fonts; Dynamic content; Stacking elements; Locating the mouse cursor; Reacting to a mouse click; Slow movement of elements; Dragging and dropping elements.

6 Hours

UNIT - 7

XML: Introduction; Syntax; Document structure; Document Type definitions; Namespaces; XML schemas; Displaying raw XML documents; Displaying XML documents with CSS; XSLT style sheets; XML processors; Web services.

6 Hours

UNIT - 8

PERL, CGI PROGRAMMING: Origins and uses of Perl; Scalars and their operations; Assignment statements and simple input and output; Control statements; Fundamentals of arrays; Hashes; References; Functions; Pattern matching; File input and output; Examples. The Common Gateway Interface; CGI linkage; Query string format; CGI.pm module; A survey example; Cookies.

8 Hours

TEXT BOOK:

1. **Programming the World Wide Web** – Robert W. Sebesta, 4th Edition, Pearson Education, 2008.

REFERENCE BOOKS:

1. **Internet & World Wide Web How to H program** – M. Deitel, P.J. Deitel, A. B. Goldberg, 3rd Edition, Pearson Education / PHI, 2004.
2. **Web Programming Building Internet Applications** – Chris Bates, 3rd Edition, Wiley India, 2006.
3. **The Web Warrior Guide to Web Programming** – Xue Bai et al, Thomson, 2003.

EMBEDDED COMPUTING SYSTEMS

Subject Code	:	**06CS74/IS752**	IA Marks	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

INTRODUCTION TO EMBEDDED SYSTEMS – 1: Embedded systems; Processor embedded into a system; Embedded hardware units and devices in a system; Embedded software in a system; Examples of embedded systems; Embedded System-on-Chip (SoC) and use of VLSI circuit design technology; Complex systems design and processors; Design process in embedded system.

7 Hours

UNIT - 2

INTRODUCTION TO EMBEDDED SYSTEMS – 2, DEVICES - 1: Formalization of system design; Design process and design examples; Classification of embedded systems; Skills required for an embedded system designer.I/O types and examples; Serial communication devices; Parallel device ports; Sophisticated interfacing features in device ports.

6 Hours

UNIT - 3

DEVICES - 2, COMMUNICATION BUSES FOR DEVICE NETWORKS: Wireless devices; Timer and counting devices; Watchdog timer; Real time clock; Networked embedded systems; Serial bus communication protocols; Parallel bus device protocols; Internet enabled systems; Wireless and mobile system protocols.

6 Hours

UNIT - 4

DEVICE DRIVERS AND INTERRUPTS SERVICE MECHANISM: Device access without interrupts; ISR concept; Interrupt sources; Interrupt servicing mechanism; Multiple interrupts; Context and the periods for context-switching, interrupt latency and deadline; Classification of processors' interrupt service mechanism from context-saving angle; Direct memory access; Device drivers programming.

7 Hours

PART - B

UNIT - 5

PROGRAM MODELING CONCEPTS, PROCESSES, THREADS, AND TASKS: Program models; DFG models; State machine programming

models for event controlled program flow; Modeling of multiprocessor systems. Multiple processes in an application; Multiple threads in an application; Tasks and task states; Task and data; Distinctions between functions, ISRs and tasks.

7 Hours

UNIT - 6

REAL-TIME OPERATING SYSTEMS – 1: Operating System services; Process management; Timer functions; Event functions; Memory management; Device, file and I/O sub-systems management; Interrupt routines in RTOS environment and handling of interrupt source calls.

6 Hours

UNIT - 7

REAL-TIME OPERATING SYSTEMS – 2: Real-Time Operating Systems; Basic design using an RTOS; RTOS task scheduling models, interrupt latency and response times of the tasks as performance metrics; OS security issues.

6 Hours

UNIT - 8

EMBEDDED SOFTWARE DEVELOPMENT, TOOLS: Introduction; Host and target machines; Linking and locating software; Getting embedded software in to the target system; Issues in hardware-software design and co-design; Testing on host machine; Simulators; Laboratory tools.

7 Hours

TEXT BOOK:

1. **Embedded Systems Architecture: Programming and Design –** Rajkamal, 2nd Edition, Tata McGraw Hill, 2008.

REFERENCE BOOKS:

1. **Computers as Components: Principles of Embedded Computer System Design** – Wayne Wolf, Elsevier, 2005.
2. **Embedded Systems Architecture** – Tammy Noergaard, Elsevier, 2005.
3. **Embedded Systems Design** – Steve Heath, 2nd Edition, Elsevier, 2003.
4. **Embedded/Real-Time Systems: Concepts, Design and Programming: The Ultimate Reference** – Dr. K.V.K.K. Prasad, Dreamtech Press, 2004.
5. **Embedded C** – Michael J.Point, Pearson Education, 2002.

ADVANCED DBMS

Subject Code	:	**06CS751**	IA Marks	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

OVERVIEW OF STORAGE AND INDEXING, DISKS AND FILES: Data on external storage; File organizations and indexing; Index data structures; Comparison of file organizations; Indexes and performance tuning. Memory hierarchy; RAID; Disk space management; Buffer manager; Files of records; Page formats and record formats.

7 Hours

UNIT - 2

TREE STRUCTURED INDEXING: Intuition for tree indexes; Indexed sequential access method; B+ trees, Search, Insert, Delete, Duplicates, B+ trees in practice.

7 Hours

UNIT - 3

HASH-BASED INDEXING: Static hashing; Extendible hashing, Linear hashing, comparisons.

6 Hours

UNIT - 4

OVERVIEW OF QUERY EVALUATION, EXTERNAL SORTING: The system catalog; Introduction to operator evaluation; Algorithms for relational operations; Introduction to query optimization; Alternative plans: A motivating example; What a typical optimizer does. When does a DBMS sort data? A simple two-way merge sort; External merge sort

6 Hours

PART - B

UNIT - 5

EVALUATING RELATIONAL OPERATORS: The Selection operation; General selection conditions; The Projection operation; The Join operation; The Set operations; Aggregate operations; The impact of buffering

6 Hours

UNIT - 6

A TYPICAL RELATIONAL QUERY OPTIMIZER: Translating SQL queries in to Relational Algebra; Estimating the cost of a plan; Relational

algebra equivalences; Enumeration of alternative plans; Nested sub-queries; Other approaches to query optimization.

7 Hours

UNIT - 7

PHYSICAL DATABASE DESIGN AND TUNING: Introduction; Guidelines for index selection, examples; Clustering and indexing; Indexes that enable index-only plans; Tools to assist in index selection; Overview of database tuning; Choices in tuning the conceptual schema; Choices in tuning queries and views; Impact of concurrency; DBMS benchmarking.

7 Hours

UNIT - 8

MORE RECENT APPLICATIONS: Mobile databases; Multimedia databases; Geographical Information Systems; Genome data management.

6 Hours

TEXT BOOKS:

1. **Database Management Systems** – Raghu Ramakrishnan and Johannes Gehrke, 3rd Edition, McGraw-Hill, 2003.
2. **Fundamentals of Database Systems** – Elmasri and Navathe, 5th Edition, Addison-Wesley, 2007. (Chapter 30)

REFERENCE BOOK:

1. **Database Systems** – Connolly and Begg, 3th Edition, Pearson Education, 2002.

DIGITAL SIGNAL PROCESSING

Subject Code	:	**06CS752**	IA Marks	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

THE DISCRETE FOURIER TRANSFORM: ITS PROPERTIES AND APPLICATIONS: Frequency Domain Sampling: The Discrete Fourier Transform: Frequency Domain Sampling and Reconstruction of Discrete-Time Signals, The Discrete Fourier Transform (DFT), The DFT as a Linear Transformation, Relationship of the DFT to other Transforms. Properties of the DFT: Periodicity, Linearity and Symmetry Properties, Multiplication of Two DFT's and Circular Convolution, Additional DFT Properties; Linear

Filtering Methods Based on the DFT: Use of the DFT in Linear Filtering, Filtering of Long Data Sequences; Frequency Analysis of Signals using the DFT. **7 Hours**

UNIT - 2

EFFICIENT COMPUTATION OF THE DFT: FAST FOURIER TRANSFORM ALGORITHMS: Efficient Computation of the DFT: FFT Algorithms: Direct Computation of the DFT, Divide-and-Conquer Approach to Computation of the DFT, Radix-2 FFT Algorithms, Radix-4 FFT Algorithms, Split-Radix FFT Algorithms, Implementation of FFT Algorithms.

Applications of FFT Algorithms: Efficient computation of the DFT of Two Real Sequences, Efficient computation of the DFT of a 2N-Point Real Sequence, Use of the FFT Algorithm in Linear filtering and Correlation. A Linear filtering approach to Computation of the DFT: The Goertzel Algorithm, The Chirp-Z Transform Algorithm. Quantization Effects in the Computation of the DFT: Quantization Errors in the Direct Computation of the DFT, Quantization Errors in FFT Algorithms.

7 Hours

UNIT - 3

IMPLEMENTATION OF DISCRETE-TIME SYSTEMS – 1: Structures for the Realization of Discrete-Time Systems. Structures for FIR Systems: Direct-Form Structures, Cascade-Form Structures, Frequency-Sampling Structures, Lattice Structure. Structures for IIR Systems: Direct-Form Structures, Signal Flow Graphs and Transposed Structures, Cascade-Form Structures, Parallel-Form Structures, Lattice and Lattice-Ladder Structures for IIR Systems.

6 Hours

UNIT - 4

IMPLEMENTATION OF DISCRETE-TIME SYSTEMS – 2 : State-Space System Analysis and Structures: State-Space Descriptions of Systems Characterized by Difference Equations, Solution of the State-Space Equations, Relationships between Input-Output and State-Space Descriptions, State-Space Analysis in the Z-Domain, Additional State-Space Structures. Representation of Numbers: Fixed-Point Representation of Numbers, Binary Floating-Point Representation of Numbers, Errors Resulting from Rounding and Truncation.

6 Hours

PART - B

UNIT - 5

IMPLEMENTATION OF DISCRETE-TIME SYSTEMS - 3: Quantization of Filter Coefficients: Analysis of Sensuitivity to Quantizatior

of Filter Coefficients, Quantization of Coefficients in FIR Filters. Round-Off Effects in Digital Filters: Limit-Cycle Oscillations in Recursive Systems, Scaling to Prevent Overflow, Statistical Characterization of Quantization effects in Fixed-Point Realizations of Digital Filters.

6 Hours

UNIT - 6

DESIGN OF DIGITAL FILTERS – 1: General Considerations: Causality and its Implications, Characteristics of Practical Frequency-Selective Filters. Design of FIR Filters: Symmetric And Antisymetric FIR Filters, Design of Linear-Phase FIR Filters Using Windows, Design of Linear-Phase FIR Filters by the Frequency-Sampling Method, Design of Optimum Equiripple Linear-Phase FIR Filters, Design of FIR Differentiators, Design of Hilbert Transformers, Comparison of Design Methods for Linear-Phase FIR filters.

7 Hours

UNIT - 7

DESIGN OF DIGITAL FILTERS – 2: Design of IIR Filters from Analog Filters: IIR Filter Design by Approximation of Derivatives, IIR Filter Design by Impulse Invariance, IIR Filter Design by the Bilinear Transformation, The Matched-Z Transformation, Characteristics of commonly used Analog Filters, Some examples of Digital Filters Designs based on the Bilinear Transformation.

6 Hours

UNIT - 8

DESIGN OF DIGITAL FILTERS – 3: Frequency Transformations: Frequency Transformations in the Analog Domain, Frequency Transformations in the Digital Domain. Design of Digital Filters based on Least-Squares method: Padé Approximations method, Least-Square design methods, FIR least-Squares Inverse (Wiener) Filters, Design of IIR Filters in the Frequency domain.

7 Hours

TEXT BOOK:

1. **Digital Signal Processing** – John G. Proakis and Dimitris G. Manolakis, 3rd Edition, Pearson Education, 2003.

REFERENCE BOOKS:

1. **Digital Signal Processing: System Analysis and Design** – Paulo S. R. Diniz, Eduardo A. B. da Silva and Sergio L. Netto, Cambridge University Press, 2002.
2. **Digital Signal Processing: A Computer Based Approach** – Sanjit K. Mitra, Tata McGraw-Hill, 2001.
3. **Digital Signal Processing -** Alan V.Oppenheim and Ronald W.Schafer, Pearson Education, 2003.

JAVA AND J2EE

Subject Code	:	**06CS753**	IA Marks	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

INTRODUCTION TO JAVA: Java and Java applications; Java Development Kit (JDK); Java is interpreted, Byte Code, JVM; Object-oriented programming; Simple Java programs.

Data types and other tokens: Boolean variables, int, long, char, operators, arrays, white spaces, literals, assigning values; Creating and destroying objects; Access specifiers. Operators and Expressions: Arithmetic Operators, Bitwise operators, Relational operators, The Assignment Operator, The? Operator; Operator Precedence; Logical expression; Type casting; Strings

Control Statements: Selection statements, iteration statements, Jump Statements.

6 Hours

UNIT - 2

CLASSES, INHERITANCE, EXCEPTIONS, APPLETS: Classes: Classes in Java; Declaring a class; Class name; Super classes; Constructors; Creating instances of class; Inner classes. Inheritance: Simple, multiple, and multilevel inheritance; Overriding, overloading. Exception handling**:** Exception handling in Java. The Applet Class: Two types of Applets; Applet basics; Applet Architecture; An Applet skeleton; Simple Applet display methods; Requesting repainting; Using the Status Window; The HTML APPLET tag; Passing parameters to Applets; getDocumentbase() and getCodebase(); ApletContext and showDocument(); The AudioClip Interface; The AppletStub Interface; Output to the Console.

6 Hours

UNIT - 3

MULTI THREADED PROGRAMMING, EVENT HANDLING: Multi Threaded Programming: What are threads? How to make the classes threadable; Extending threads; Implementing runnable; Synchronization; Changing state of the thread; Bounded buffer problems, read-write problem, producer-consumer problems. Event Handling: Two event handling mechanisms; The delegation event model; Event classes; Sources of events; Event listener interfaces; Using the delegation event model; Adapter classes; Inner classes.

7 Hours

UNIT - 4

SWINGS: Swings: The origins of Swing; Two key Swing features; Components and Containers; The Swing Packages; A simple Swing Application; Create a Swing Applet; Jlabel and ImageIcon; JTextField;The Swing Buttons; JTabbedpane; JScrollPane; JList; JComboBox; JTable.

7 Hours

PART - B

UNIT - 5

JAVA 2 ENTERPRISE EDITION OVERVIEW, DATABASE ACCESS: Overview of J2EE and J2SE. The Concept of JDBC; JDBC Driver Types; JDBC Packages; A Brief Overview of the JDBC process; Database Connection; Associating the JDBC/ODBC Bridge with the Database; Statement Objects; ResultSet; Transaction Processing; Metadata, Data types; Exceptions.

6 Hours

UNIT - 6

SERVLETS: Background; The Life Cycle of a Servlet; Using Tomcat for Servlet Development; A simple Servlet; The Servlet API; The Javax.servlet Package; Reading Servlet Parameter; The Javax.servlet.http package; Handling HTTP Requests and Responses; Using Cookies; Session Tracking.

7 Hours

UNIT - 7

JSP, RMI: Java Server Pages (JSP): JSP, JSP Tags, Tomcat, Request String, User Sessions, Cookies, Session Objects. Java Remote Method Invocation: Remote Method Invocation concept; Server side, Client side.

6 Hours

UNIT - 8

ENTERPRISE JAVA BEANS: Enterprise java Beans; Deployment Descriptors; Session Java Bean, Entity Java Bean; Message-Driven Bean; The JAR File.

7 Hours

TEXT BOOKS:

1. **Java - The Complete Reference** – Herbert Schildt, 7th Edition, Tata McGraw Hill, 2007.
2. **J2EE - The Complete Reference** – Jim Keogh, Tata McGraw Hill, 2007.

REFERENCE BOOKS:

1. **Introduction to JAVA Programming** – Y. Daniel Liang, 6th Edition, Pearson Education, 2007.
2. **The J2EE Tutorial** – Stephanie Bodoff et al, 2nd Edition, Pearson Education, 2004.

MULTIMEDIA COMPUTING

Subject Code	:	**06CS754**	IA Marks	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

INTRODUCTION, MEDIA AND DATA STREAMS, AUDIO TECHNOLOGY: Multimedia Elements; Multimedia Applications; Multimedia Systems Architecture; Evolving Technologies for Multimedia Systems; Defining Objects for Multimedia Systems; Multimedia Data Interface Standards; The need for Data Compression; Multimedia Databases. Media: Perception Media, Representation Media, Presentation Media, Storage Media, Transmission Media, Information Exchange Media, Presentation Spaces & Values, and Presentation Dimensions; Key Properties of a Multimedia System: Discrete & Continuous Media, Independence Media, Computer Controlled Systems, Integration; Characterizing Data Streams: Asynchronous Transmission Mode, Synchronous Transmission Mode, Isochronous Transmission Mode; Characterizing Continuous Media Data Streams. Sound: Frequency, Amplitude, Sound Perception and Psychoacoustics; Audio Representation on Computers; Three Dimensional Sound Projection; Music and MIDI Standards; Speech Signals; Speech Output; Speech Input; Speech Transmission.

7 Hours

UNIT - 2

GRAPHICS AND IMAGES, VIDEO TECHNOLOGY, COMPUTER-BASED ANIMATION: Capturing Graphics and Images Computer Assisted Graphics and Image Processing; Reconstructing Images; Graphics and Image Output Options. Basics; Television Systems; Digitalization of Video Signals; Digital Television; Basic Concepts; Specification of Animations; Methods of Controlling Animation; Display of Animation; Transmission of Animation; Virtual Reality Modeling Language.

7 Hours

UNIT - 3

DATA COMPRESSION - 1: Storage Space; Coding Requirements; Source, Entropy, and Hybrid Coding; Basic Compression Techniques; JPEG: Image Preparation, Lossy Sequential DCT-based Mode, Expanded Lossy DCT-based Mode, Lossless Mode, Hierarchical Mode.

6 Hours

UNIT - 4

DATA COMPRESSION - 2: H.261 (Px64) and H.263: Image Preparation, Coding Algorithms, Data Stream, H.263+ and H.263L; MPEG: Video Encoding, Audio Coding, Data Stream, MPEG-2, MPEG-4, MPEG-7; Fractal Compression.

6 Hours

PART - B

UNIT - 5

OPTICAL STORAGE MEDIA: History of Optical Storage; Basic Technology; Video Discs and Other WORMs; Compact Disc Digital Audio; Compact Disc Read Only Memory; CD-ROM Extended Architecture; Further CD-ROM-Based Developments; Compact Disc Recordable; Compact Disc Magneto-Optical; Compact Disc Read/Write; Digital Versatile Disc.

6 Hours

UNIT - 6

CONTENT ANALYSIS: Simple Vs. Complex Features; Analysis of Individual Images; Analysis of Image Sequences; Audio Analysis; Applications.

6 Hours

UNIT - 7

DATA AND FILE FORMAT STANDARDS: Rich-Text Format; TIFF File Format; Resource Interchange File Format (RIFF); MIDI File Format; JPEG DIB File Format for Still and Motion Images; AVI Indeo File Format; MPEG Standards; TWAIN.

7 Hours

UNIT - 8

MULTIMEDIA APPLICATION DESIGN: Multimedia Application Classes; Types of Multimedia Systems; Virtual Reality Design; Components of Multimedia Systems; Organizing Multimedia Databases; Application Workflow Design Issues; Distributed Application Design Issues.

7 Hours

TEXT BOOKS:

1. **Multimedia Fundamentals: Vol 1-Media Coding and Content Processing –** Ralf Steinmetz, Klara Narstedt, 2nd Edition, Pearson Education / PHI, 2003.
2. **Multimedia Systems Design** – Prabhat K. Andleigh, Kiran Thakrar, PHI, 2003.

REFERENCE BOOKS:

1. **Multimedia Communication Systems: – Techniques, Standards, and Networks –** K.R Rao, Zoran S. Bojkovic and Dragorad A. Milovanovic, Pearson Education, 2002.
2. **Multimedia information Networking** – Nalin K Sharad – PHI, 2002.

DATA MINING

Subject Code	:	**06CS755**	IA Marks	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

INTRODUCTION, DATA – 1: What is Data Mining? Motivating Challenges; The origins of data mining; Data Mining Tasks. Types of Data; Data Quality.

6 Hours

UNIT - 2

DATA – 2: Data Preprocessing; Measures of Similarity and Dissimilarity

6 Hours

UNIT - 3

CLASSIFICATION: Preliminaries; General approach to solving a classification problem; Decision tree induction; Rule-based classifier; Nearest-neighbor classifier.

8 Hours

UNIT - 4

ASSOCIATION ANALYSIS - 1: Problem Definition; Frequent Itemset generation; Rule Generation; Compact representation of frequent itemsets; Alternative methods for generating frequent itemsets.

6 Hours

PART - B

UNIT - 5

ASSOCIATION ANALYSIS – 2 : FP-Growth algorithm, Evaluation of association patterns; Effect of skewed support distribution; Sequential patterns.

6 Hours

UNIT - 6

CLUSTER ANALYSIS: Overview, K-means, Agglomerative hierarchical clustering, DBSCAN, Overview of Cluster Evaluation.

7Hours

UNIT - 7

FURTHER TOPICS IN DATA MINING: Multidimensional analysis and descriptive mining of complex data objects; Spatial data mining; Multimedia data mining; Text mining; Mining the WWW. Outlier analysis.

7 Hours

UNIT - 8

APPLICATIONS: Data mining applications; Data mining system products and research prototypes; Additional themes on Data mining; Social impact of Data mining; Trends in Data mining.

6 Hours

TEXT BOOKS:

1. **Introduction to Data Mining** – Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Pearson Education, 2007.
2. **Data Mining – Concepts and Techniques** – Jiawei Han and Micheline Kamber, 2nd Edition, Morgan Kaufmann, 2006.

REFERENCE BOOKS:

1. **Insight into Data Mining – Theory and Practice** – K.P.Soman, Shyam Diwakar, V.Ajay, PHI, 2006.

NEURAL NETWORKS

Subject Code	:	**06CS756**	IA Marks	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

INTRODUCTION: What is a Neural Network?, Human Brain, Models of Neuron, Neural Networks viewed as directed graphs, Feedback, Network Architectures, Knowledge representation, Artificial Intelligence and Neural Networks.

7 Hours

UNIT - 2

LEARNING PROCESSES – 1: Introduction, Error-correction learning, Memory-based learning, Hebbian learning, Competitive learning,

Boltzamann learning, Credit Assignment problem, Learning with a Teacher, Learning without a Teacher, Learning tasks, Memory, Adaptation.

6 Hours

UNIT - 3

LEARNING PROCESSES – 2, SINGLE LAYER PERCEPTRONS: Statistical nature of the learning process, Statistical learning theory, Approximately correct model of learning. Single Layer Perceptrons: Introduction, Adaptive filtering problem, Unconstrained optimization techniques, Linear least-squares filters**,** Least-mean square algorithm, Learning curves, Learning rate annealing techniques, Perceptron, Perceptron convergence theorem, Relation between the Perceptron and Bayes classifier for a Gaussian environment.

7 Hours

UNIT - 4

MULTILAYER PERCEPTRONS – 1: Introduction, Some preliminaries, Back-propagation Algorithm, Summary of back-propagation algorithm, XOR problem, Heuristics for making the back-propagation algorithm perform better, Output representation and decision rule, Computer experiment, Feature detection, Back-propagation and differentiation.

6 Hours

PART - B

UNIT - 5

MULTILAYER PERCEPTRONS – 2: Hessian matrix, Generalization, approximation of functions, Cross validation, Network pruning techniques, virtues and limitations of back- propagation learning, Accelerated convergence of back propagation learning, Supervised learning viewed as an optimization problem, Convolution networks.

7 Hours

UNIT - 6

RADIAL-BASIC FUNCTION NETWORKS – 1: Introduction, Cover's theorem on the separability of patterns, Interpolation problem, Supervised learning as an ill-posed Hypersurface reconstruction problem, Regularization theory, Regularization networks, Generalized radial-basis function networks, XOR problem, Estimation of the regularization parameter.

6 Hours

UNIT - 7

RADIAL-BASIC FUNCTION NETWORKS – 2, OPTIMIZATION - 1: Approximation properties of RBF networks, Comparison of RBF networks and multilayer Perceptrons, Kernel regression and it's relation to RBF

networks, Learning strategies, Computer experiment. Optimization using Hopfield networks: Traveling salesperson problem, Solving simultaneous linear equations, Allocating documents to multiprocessors.

6 Hours

UNIT - 8

OPTIMIZATION METHODS – 2: Iterated gradient descent, Simulated Annealing, Random Search, Evolutionary computation- Evolutionary algorithms, Initialization, Termination criterion, Reproduction, Operators, Replacement, Schema theorem.

7 Hours

TEXT BOOKS:

1. **Neural Networks – A Comprehensive Foundation -** Simon Haykin, 2nd Edition, Pearson Education, 1999.
2. **Artificial Neural Networks** – Kishan Mehrotra, Chilkuri K. Mohan, Sanjay Ranka, Penram International Publishing, 1997.

REFERENCE BOOK:

1. **Artificial Neural Networks** – B. Yegnanarayana, PHI, 2001.

C# PROGRAMMING AND .NET

Subject Code	:	**06CS761**	IA Marks	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

THE PHILOSOPHY OF .NET: Understanding the Previous State of Affairs, The .NET Solution, The Building Block of the .NET Platform (CLR,CTS, and CLS), The Role of the .NET Base Class Libraries, What C# Brings to the Table, An Overview of .NET Binaries (aka Assemblies), the Role of the Common Intermediate Language, The Role of .NET Type Metadata, The Role of the Assembly Manifast, Compiling CIL to Platform – Specific Instructions, Understanding the Common Type System, Intrinsic CTS Data Types, Understanding the Common Languages Specification, Understanding the Common Language Runtime A tour of the .NET Namespaces, Increasing Your Namespace Nomenclature, Deploying the .NET Runtime.

6 Hours

UNIT - 2

BUILDING C# APPLICATIONS: The Role of the Command Line Complier (csc.exe), Building C # Application using csc.exe Working with csc.exe Response Files, Generating Bug Reports , Remaining C# Compiler Options, The Command Line Debugger (cordbg.exe) Using the, Visual Studio .NET IDE, Other Key Aspects of the VS.NET IDE, C# "Preprocessor:" Directives, An Interesting Aside: The System. Environment Class.

6 Hours

UNIT - 3

C# LANGUAGE FUNDAMENTALS: The Anatomy of a Basic C# Class, Creating objects: Constructor Basics, The Composition of a C# Application, Default Assignment and Variable Scope, The C# Member Initialization Syntax, Basic Input and Output with the Console Class, Understanding Value Types and Reference Types, The Master Node: System, Object, The System Data Types (and C# Aliases), Converting Between Value Types and Reference Types: Boxing and Unboxing, Defining Program Constants, C# Iteration Constructs, C# Controls Flow Constructs, The Complete Set of C# Operators, Defining Custom Class Methods, Understating Static Methods, Methods Parameter Modifies, Array Manipulation in C #, String Manipulation in C#, C# Enumerations, Defining Structures in C#, Defining Custom Namespaces.

8 Hours

UNIT - 4

OBJECT- ORIENTED PROGRAMMING WITH C#: Forms Defining of the C# Class, Definition the "Default Public Interface" of a Type, Recapping the Pillars of OOP, The First Pillars: C#'s Encapsulation Services, Pseudo-Encapsulation: Creating Read-Only Fields, The Second Pillar: C#'s Inheritance Supports, keeping Family Secrets: The "Protected" Keyword, Nested Type Definitions, The Third Pillar: C #'s Polymorphic Support, Casting Between.

6 Hours

PART - B

UNIT - 5

EXCEPTIONS AND OBJECT LIFETIME: Ode to Errors, Bugs, and Exceptions, The Role of .NET Exception Handing, the System. Exception Base Class, Throwing a Generic Exception, Catching Exception, CLR System – Level Exception (System. System Exception), Custom Application-Level Exception (System. System Exception), Handling Multiple Exception, The Family Block, the Last Chance Exception Dynamically Identifying Application – and System Level Exception

Debugging System Exception Using VS. NET, Understanding Object Lifetime, the CIT of "new', The Basics of Garbage Collection,, Finalization a Type, The Finalization Process, Building an Ad Hoc Destruction Method, Garbage Collection Optimizations, The System. GC Type. **6 Hours**

UNIT - 6

INTERFACES AND COLLECTIONS: Defining Interfaces Using C# Invoking Interface Members at the object Level, Exercising the Shapes Hierarchy, Understanding Explicit Interface Implementation, Interfaces As Polymorphic Agents, Building Interface Hierarchies, Implementing, Implementation, Interfaces Using VS .NET, understanding the IConvertible Interface, Building a Custom Enumerator (IEnumerable and Enumerator), Building Cloneable objects (ICloneable), Building Comparable Objects (I Comparable), Exploring the system. Collections Namespace, Building a Custom Container (Retrofitting the Cars Type).

6 Hours

UNIT - 7

Callback Interfaces, Delegates, and Events, Advanced Techniques: Understanding Callback Interfaces, Understanding the .NET Delegate Type, Members of System. Multicast Delegate, The Simplest Possible Delegate Example, Building More a Elaborate Delegate Example, Understanding Asynchronous Delegates, Understanding (and Using) Events. The Advances Keywords of C#, A Catalog of C# Keywords Building a Custom Indexer, A Variation of the Cars Indexer Internal Representation of Type Indexer. Using C# Indexer from VB .NET. Overloading operators, The Internal Representation of Overloading Operators, interacting with Overload Operator from Overloaded- Operator- Challenged Languages, Creating Custom Conversion Routines, Defining Implicit Conversion Routines, The Internal Representations of Customs Conversion Routines

8 Hours

UNIT - 8

UNDERSTANDING .NET ASSEMBLES: Problems with Classic COM Binaries, An Overview of .NET Assembly, Building a Simple File Test Assembly, A C#. Client Application, A Visual Basic .NET Client Application, Cross Language Inheritance, Exploring the CarLibrary's, Manifest, Exploring the CarLibrary's Types, Building the Multifile Assembly ,Using Assembly, Understanding Private Assemblies, Probing for Private Assemblies (The Basics), Private A Assemblies XML Configurations Files, Probing for Private Assemblies (The Details), Understanding Shared Assembly, Understanding Shared Names, Building a Shared Assembly, Understanding Delay Signing, Installing/Removing Shared Assembly, Using a Shared Assembly,

6 Hours

TEXT BOOKS:

1. **Pro C# with .NET 3.0** – Andrew Troelsen, Special Edition, Dream tech Press, India, 2007.
2. **Programming in C#** – E. Balagurusamy, 5th Reprint, Tata McGraw Hill, 2004. (For Programming Examples)

REFERENCE BOOKS:

1. **Inside C#** – Tom Archer, WP Publishers, 2001.
2. **C#: The Complete Reference** – Herbert Schildt, Tata McGraw Hill, 2004.

DIGITAL IMAGE PROCESSING

Subject Code	:	**06CS762**	IA Marks	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

DIGITIZED IMAGE AND ITS PROPERTIES: Basic concepts, Image digitization, Digital image properties.

6 Hours

UNIT - 2

IMAGE PREPROCESSING: Image pre-processing: Brightness and geometric transformations, local preprocessing.

7 Hours

UNIT - 3

SEGMENTATION – 1: Thresholding, Edge-based segmentation.

6 Hours

UNIT - 4

SEGMENTATION – 2: Region based segmentation, Matching.

7 Hours

PART - B

UNIT - 5

IMAGE ENHANCEMENT: Image enhancement in the spatial domain: Background, Some basic gray level transformations, Histogram processing, Enhancement using arithmetic / logic operations, Basics of spatial filtering,

Smoothing spatial filters, Sharpening spatial filters. Image enhancement in the frequency domain: Background, Introduction to the Fourier transform and the frequency domain, Smoothing Frequency-Domain filters, Sharpening Frequency Domain filters, Homomorphic filtering.

7 Hours

UNIT - 6

IMAGE COMPRESSION: Image compression: Fundamentals, Image compression models, Elements of information theory, Error-Free Compression, Lossy compression.

6 Hours

UNIT - 7

SHAPE REPRESENTATION: Region identification, Contour-based shape representation and description, Region based shape representation and description, Shape classes.

7 Hours

UNIT - 8

MORPHOLOGY: Basic morphological concepts, Morphology principles, Binary dilation and erosion, Gray-scale dilation and erosion, Morphological segmentation and watersheds.

6 Hours

TEXT BOOKS:

1. **Image Processing, Analysis and Machine Vision** – Milan Sonka, Vaclav Hlavac and Roger Boyle, 2nd Edition, Thomson Learning, 2001.
2. **Digital Image Processing –** Rafel C Gonzalez and Richard E Woods, 2nd Edition, Pearson Education, 2003.

REFERENCE BOOKS:

1. **Fundamentals of Digital Image Processing** – Anil K Jain, Pearson Education/Prentice-Hall of India Pvt. Ltd., 1997.
2. **Digital Image Processing and Analysis** – B.Chanda, D Dutta Majumder, Prentice-Hall India, 2002.

GAME THEORY

Subject Code	:	**06CS763**	IA Marks	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

INTRODUCTION; STRATEGIC GAMES: What is game theory? The theory of rational choice; Interacting decision makers. Strategic games; Example: The prisoner's dilemma; Nash equilibrium; Examples of Nash equilibrium; Best-response functions; Dominated actions; Equilibrium in a single population: symmetric games and symmetric equilibria.

6 Hours

UNIT - 2

MIXED STRATEGY EQUILIBRIUM: Introduction; Strategic games in which players may randomize; Mixed strategy Nash equilibrium; Dominated actions; Pure equilibria when randomization is allowed, illustration; Equilibrium in a single population, illustration; The formation of players' beliefs; Extensions; Representing preferences by expected payoffs.

6 Hours

UNIT - 3

EXTENSIVE GAMES: Extensive games with perfect information; Strategies and outcomes; Nash equilibrium; Subgame perfect equilibrium; Finding subgame perfect equilibria of finite horizon games.

6 Hours

UNIT - 4

EXTENSIVE GAMES: EXTENSIONS, COALITIONAL GAMES AND THE CORE: Extensions: Allowing for simultaneous moves, illustration: entry in to a monopolized industry; Discussion: subgame perfect equilibrium and backward induction.Coalition games; The core; Illustration: ownership and the distribution of wealth; Other solution concepts.

8 Hours

PART - B

UNIT - 5

BAYESIAN GAMES: Motivational examples; General definitions; Two examples concerning information; Illustration: auctions; Auctions with an arbitrary distribution of valuations. Extensive games with imperfect information; Strategies; Nash equilibrium; Beliefs and sequential

equilibrium; Signaling games; Illustration: strategic information transmission.

6 Hours

UNIT - 6

STRICTLY COMPETITIVE GAMES, RATIONALIZABILITY: Strictly competitive games and maximization; Maximization and Nash equilibrium; Strictly competitive games; Maximization and Nash equilibrium in strictly competitive games. Rationalizability; Iterated elimination of strictly dominated actions; Iterated elimination of weakly dominated actions; Dominance solvability.

6 Hours

UNIT - 7

EVOLUTIONARY EQUILIBRIUM, ITERATED GAMES: Monomorphic pure strategy eulibrium; Mixed strategies and polymorphic equilibrium; Asymmetric contests; Variations on themes: Sibling behavior, Nesting behavior of wasps, the evolution of sex ratio. Repeated games: The main idea; Preferences; Repeated games; Finitely and infinitely repeated Prisoner's dilemma; Strategies in an infinitely repeated Prisoner's dilemma; Some Nash equilibria of an infinitely repeated Prisoner's dilemma.

7 Hours

UNIT - 8

REPEATED GAMES: GENERAL RESULTS, BARGAINING: Nash equilibria of general infinitely repeated games; Subgame perfect equilibria of general infinitely repeated games; Finitely repeated gazmes; Imperfect observability. Bargaining as an extensive game; Trade in market as an illustration; Nash's axiomatic model; Relation between strategic and axiomatic models.

7 Hours

TEXT BOOK:

1. **An Introduction to Game Theory –** Martin Osborne, Oxford University Press, Indian Edition, 2004.

REFERENCE BOOKS:

1. **Game Theory: Analysis of Conflict** – Roger B. Myerson, Harvard University Press, 1997.
2. **Microeconomic Theory** – Andreu Mas-Colell, Michael D. Whinston, and Jerry R. Green, Oxford University Press, New York, 1995.
3. **Game Theory and Strategy** – Philip D. Straffin, Jr., The Mathematical Association of America, January 1993.

ARTIFICIAL INTELLIGENCE

Subject Code	:	**06CS764**	IA Marks	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

INTRODUCTION: What is AI? Intelligent Agents: Agents and environment; Rationality; the nature of environment; the structure of agents. Problem-solving: Problem-solving agents; Example problems; Searching for solution; Uninformed search strategies.

7 Hours

UNIT - 2

INFORMED SEARCH, EXPLORATION, CONSTRAINT SATISFACTION, ADVERSIAL SEARCH: Informed search strategies; Heuristic functions; On-line search agents and unknown environment. Constraint satisfaction problems; Backtracking search for CSPs. Adversial search: Games; Optimal decisions in games; Alpha-Beta pruning.

7 Hours

UNIT - 3

LOGICAL AGENTS : Knowledge-based agents; The wumpus world as an example world; Logic; propositional logic Reasoning patterns in propositional logic; Effective propositional inference; Agents based on propositional logic.

6 Hours

UNIT - 4

FIRST-ORDER LOGIC, INFERENCE IN FIRST-ORDER LOGIC – 1: Representation revisited; Syntax and semantics of first-order logic; Using first-order logic; Knowledge engineering in first-order logic. Propositional versus first-order inference; Unification and lifting.

6 Hours

PART - B

UNIT - 5

INFERENCE IN FIRST-ORDER LOGIC – 2: Forward chaining; Backward chaining; Resolution.

6 Hours

UNIT - 6

KNOWLEDGE REPRESENTATION: Ontological engineering; Categories and objects; Actions, situations, and events; Mental events and mental objects; The Internet shopping world; Reasoning systems for categories; Reasoning with default information; Truth maintenance systems.

7 Hours

UNIT - 7

PLANNING, UNCERTAINTY, PROBABILISTIC REASONING: Planning: The problem; Planning with state-space approach; Planning graphs; Planning with propositional logic. Uncertainty: Acting under certainty; Inference using full joint distributions; Independence; Bayes' rule and its use.

Probabilistic Reasoning: Representing knowledge in an uncertain domain; The semantics of Bayesian networks; Efficient representation of conditional distributions; Exact inference in Bayesian networks.

7 Hours

UNIT - 8

LEARNING, AI: PRESENT AND FUTURE: Learning: Forms of Learning; Inductive learning; Learning decision trees; Ensemble learning; Computational learning theory. AI: Present and Future: Agent components; Agent architectures; Are we going in the right direction? What if AI does succeed?

6 Hours

TEXT BOOK:

1. **Artificial Intelligence: A Modern Approach** – Stuart Russel, Peter Norvig, 2nd Edition, Pearson Education, 2003.

REFERENCE BOOKS:

1. **Artificial Intelligence** - Elaine Rich, Kevin Knight, 2nd Edition, Tata McGraw Hill, 1991.
2. **Principles of Artificial Intelligence** – Nils J. Nilsson, Elsevier, 1980.

VLSI DESIGN AND ALGORITHMS

Subject Code	:	**06CS765**	IA Marks	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

DIGITAL SYSTEMS AND VLSI: Why Design Integrated Circuits? Integrated Circuits manufacturing; Integrated Circuit Design Technology.

6 Hours

UNIT - 2

TRANSISTORS AND LAYOUT: Fabrication Processes; Transistors; Wires and Vias; Design Rules; Layout design and Tools.

6 Hours

UNIT - 3

LOGIC GATES: Combinational logic functions; Static Complementary Gates; Alternative gate circuits; Low power gates; Delay through resistive interconnect; Delay through inductive interconnect.

7 Hours

UNIT - 4

COMBINATIONAL LOGIC NETWORKS: Standard cell-based layout; Simulation; Combinational Network delay; Logic and interconnect design; Power Optimization; Switch Logic networks; Combinational logic testing.

7 Hours

PART - B

UNIT - 5

SEQUENTIAL MACHINES: Latches and flip-flops; Sequential systems and clocking disciplines; Sequential systems design; Sequential testing.

6 Hours

UNIT - 6

FLOOR PLANNING: Floor planning methods; Off chip connections.

6 Hours

UNIT - 7

ARCHITECTURE DESIGN: Register Transfer design; High-level synthesis; Architecture for low power; Architecture testing.

6 Hours

UNIT - 8

CAD SYSTEMS AND DESIGN: CAD systems; Switch level simulation; Layout Synthesis; Layout analysis; Timing Analysis and optimization; Logic Synthesis; Test Generation; Sequential machine optimization; Scheduling and bonding; Placement algorithms; partitioning algorithm; Channel routing and global routing algorithms.

8 Hours

TEXT BOOKS:

1. **Modern VLSI Design** – Wayne Wolf, 3rd edition, Pearson Education, 2007.
2. **Algorithms for VLSI Design Automation** Sabih H Gerez, Wiley India, 2007.

FUZZY LOGIC

Subject Code	:	**06CS766**	IA Marks	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

INTRODUCTION, CLASSICAL SETS AND FUZZY SETS: Background, Uncertainty and Imprecision, Statistics and Random Processes, Uncertainty in Information, Fuzzy Sets and Membership, Chance versus Ambiguity. Classical Sets - Operations on Classical Sets, Properties of Classical (Crisp) Sets, Mapping of Classical Sets to Functions. Fuzzy Sets - Fuzzy Set operations, Properties of Fuzzy Sets. Sets as Points in Hypercubes.

7 Hours

UNIT - 2

CLASSICAL RELATIONS AND FUZZY RELATIONS: Cartesian Product, Crisp Relations - Cardinality of Crisp Relations, Operations on Crisp Relations, Properties of Crisp Relations, Composition. Fuzzy Relations - Cardinality of Fuzzy Relations, Operations on Fuzzy Relations, Properties of Fuzzy Relations, Fuzzy Cartesian Product and Composition, Non-interactive Fuzzy Sets. Tolerance and Equivalence Relations - Crisp Equivalence Relation, Crisp Tolerance Relation, Fuzzy Tolerance and Equivalence Relations. Value Assignments - Cosine Amplitude, Max-min Method, Other Similarity methods.

6 Hours

UNIT - 3

MEMBERSHIP FUNCTIONS: Features of the Membership Function, Standard Forms and Boundaries, Fuzzification, Membership Value Assignments – Intuition, Inference, Rank Ordering, Angular Fuzzy Sets, Neural Networks, Genetic Algorithms, Inductive Reasoning.

6 Hours

UNIT - 4

FUZZY-TO-CRISP CONVERSIONS, FUZZY ARITHMETIC: Lambda-Cuts for Fuzzy Sets, Lambda-Cuts for Fuzzy Relations, Defuzzification Methods. Extension Principle - Crisp Functions, Mapping and Relations, Functions of fuzzy Sets – Extension Principle, Fuzzy Transform (Mapping), Practical Considerations. Fuzzy Numbers Interval Analysis in Arithmetic, Approximate Methods of Extension - Vertex method, DSW Algorithm, Restricted DSW Algorithm, Comparisons. Fuzzy Vectors.

7 Hours

PART - B

UNIT - 5

CLASSICAL LOGIC AND FUZZY LOGIC: Classical Predicate Logic – Tautologies, Contradictions, Equivalence, Exclusive Or and Exclusive Nor, Logical Proofs, Deductive Inferences. Fuzzy Logic, Approximate Reasoning, Fuzzy Tautologies, Contradictions, Equivalence and Logical Proofs, Other forms of the Implication Operation, Other forms of the Composition Operation.

6 Hours

UNIT - 6

FUZZY RULE- BASED SYSTEMS: Natural Language, Linguistic Hedges, Rule-Based Systems - Canonical Rule Forms, Decomposition of Compound Rules, Likelihood and Truth Qualification, Aggregation of Fuzzy Rules. Graphical Techniques of Inference.

6 Hours

UNIT - 7

FUZZY DECISION MAKING: Fuzzy Synthetic Evaluation, Fuzzy Ordering, Preference and consensus, Multiobjective Decision Making, Fuzzy Bayesian Decision Method, Decision Making under Fuzzy States and Fuzzy Actions.

7 Hours

UNIT - 8

FUZZY CLASSIFICATION: Classification by Equivalence Relations - Crisp Relations, Fuzzy Relations. Cluster Analysis, Cluster Validity, c-Means Clustering - Hard c-Means (HCM), Fuzzy c-Means (FCM). Classification Metric, Hardening the Fuzzy c-Partition, Similarity Relations from Clustering.

7 Hours

TEXT BOOK:

1. **Fuzzy Logic with Engineering Applications –** Timothy J. Ross, McGraw-Hill, 1997.

REFERENCE BOOK:

1. **Neural Networks and Fuzzy systems: A Dynamical System Approach** – B Kosko, Prentice Hall, 1991.

NETWORKS LABORATORY

Subject Code	:	**06CSL77**	IA Marks	:	25
No. of Practical Hrs./ Week	:	03	Exam Hours	:	03
Total No. of Practical Hrs.	:	42	Exam Marks	:	50

Note: Student is required to solve one problem from PART-A and one problem from PART-B. The questions are allotted based on lots. Both questions carry equal marks.

PART - A

SIMULATION EXERCISES

The following experiments shall be conducted using either NS / OPNET or any other suitable simulator.

1. Simulate a three nodes point – to – point network with duplex links between them. Set the queue size and vary the bandwidth and find the number of packets dropped.
2. Simulate a four node point-to-point network with the links connected as follows:
   n0 – n2, n1 – n2 and n2 – n3. Apply TCP agent between n0-n3 and UDP between n1-n3. Apply relevant applications over TCP and UDP agents changing the parameter and determine the number of packets sent by TCP / UDP.
3. Simulate the different types of Internet traffic such as FTP and TELNET over a network and analyze the throughput.
4. Simulate the transmission of ping messages over a network topology consisting of 6 nodes and find the number of packets dropped due to congestion.
5. Simulate an Ethernet LAN using n nodes (6-10), change error rate and data rate and compare throughput.

6. Simulate an Ethernet LAN using n nodes and set multiple traffic nodes and determine collision across different nodes.
7. Simulate an Ethernet LAN using n nodes and set multiple traffic nodes and plot congestion window for different source / destination.
8. Simulate simple ESS and with transmitting nodes in wire-less LAN by simulation and determine the performance with respect to transmission of packets.

PART - B

Implement the following in C/C++:

1. Write a program for error detecting code using CRC-CCITT (16- bits).
2. Write a program for frame sorting technique used in buffers.
3. Write a program for distance vector algorithm to find suitable path for transmission.
4. Using TCP/IP sockets, write a client – server program to make the client send the file name and to make the server send back the contents of the requested file if present.
5. Implement the above program using as message queues or FIFOs as IPC channels.
6. Write a program for simple RSA algorithm to encrypt and decrypt the data.
7. Write a program for Hamming code generation for error detection and correction.
8. Write a program for congestion control using leaky bucket algorithm.

WEB PROGRAMMING LABORATORY

Subject Code	:	**06CSL78**	IA Marks	:	25
No. of Practical Hrs./ Week	:	03	Exam Hours	:	03
Total No. of Practical Hrs.	:	42	Exam Marks	:	50

Note: Student is required to solve one problem in the examination. The questions are allotted based on lots.

1. Develop and demonstrate a XHTML document that illustrates the use external style sheet, ordered list, table, borders, padding, color, and the tag.
2. Develop and demonstrate a XHTML file that includes Javascript script for the following problems:

a) Input: A number n obtained using prompt
Output: The first n Fibonacci numbers

b) Input: A number n obtained using prompt

Output: A table of numbers from 1 to n and their squares using alert

3. Develop and demonstrate a XHTML file that includes Javascript script that uses functions for the following problems:

a) Parameter: A string

Output: The position in the string of the left-most vowel

b) Parameter: A number

Output: The number with its digits in the reverse order

4. a) Develop and demonstrate, using Javascript script, a XHTML document that collects the USN (the valid format is: A digit from 1 to 4 followed by two upper-case characters followed by two digits followed by two upper-case characters followed by three digits; no embedded spaces allowed) of the user. Event handler must be included for the form element that collects this information to validate the input. Messages in the alert windows must be produced when errors are detected.

b) Modify the above program to get the current semester also (restricted to be a number from 1 to 8)

5. a) Develop and demonstrate, using Javascript script, a XHTML document that contains three short paragraphs of text, stacked on top of each other, with only enough of each showing so that the mouse cursor can be placed over some part of them. When the cursor is placed over the exposed part of any paragraph, it should rise to the top to become completely visible.

b) Modify the above document so that when a paragraph is moved from the top stacking position, it returns to its original position rather than to the bottom.

6. a) Design an XML document to store information about a student in an engineering college affiliated to VTU. The information must include USN, Name, Name of the College, Brach, Year of Joining, and e-mail id. Make up sample data for 3 students. Create a CSS style sheet and use it to display the document.

b) Create an XSLT style sheet for one student element of the above document and use it to create a display of that element.

7. a) Write a Perl program to display various Server Information like Server Name, Server Software, Server protocol, CGI Revision etc.

b) Write a Perl program to accept UNIX command from a HTML form and to display the output of the command executed.

8. a) Write a Perl program to accept the User Name and display a greeting message randomly chosen from a list of 4 greeting messages.

b) Write a Perl program to keep track of the number of visitors visiting the web page and to display this count of visitors, with proper headings.

9. Write a Perl program to display a digital clock which displays the current time of the server.

10. Write a Perl program to insert name and age information entered by the user into a table created using MySQL and to display the current contents of this table.
11. Write a PHP program to store current date-time in a COOKIE and display the 'Last visited on' date-time on the web page upon reopening of the same page.
12. Write a PHP program to store page views count in SESSION, to increment the count on each refresh, and to show the count on web page.
13. Create a XHTML form with Name, Address Line 1, Address Line 2, and E-mail text fields. On submitting, store the values in MySQL table. Retrieve and display the data based on Name.
14. Using PHP and MySQL, develop a program to accept book information viz. Accession number, title, authors, edition and publisher from a web page and store the information in a database and to search for a book with the title specified by the user and to display the search results with proper headings.

VIII SEMESTER

ADVANCED COMPUTER ARCHITECTURES

Subject Code	:	**06CS81**	IA Marks	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

FUNDAMENTALS OF COMPUTER DESIGN: Introduction; Classes of computers; Defining computer architecture; Trends in Technology, power in Integrated Circuits and cost; Dependability; Measuring, reporting and summarizing Performance; Quantitative Principles of computer design.

6 hours

UNIT - 2

PIPELINING: Introduction; Pipeline hazards; Implementation of pipeline; What makes pipelining hard to implement?

6 Hours

UNIT - 3

INSTRUCTION –LEVEL PARALLELISM – 1: ILP: Concepts and challenges; Basic Compiler Techniques for exposing ILP; Reducing Branch costs with prediction; Overcoming Data hazards with Dynamic scheduling; Hardware-based speculation.

7 Hours

UNIT - 4

INSTRUCTION –LEVEL PARALLELISM – 2: Exploiting ILP using multiple issue and static scheduling; Exploiting ILP using dynamic scheduling, multiple issue and speculation; Advanced Techniques for instruction delivery and Speculation; The Intel Pentium 4 as example.

7 Hours

PART - B

UNIT - 5

MULTIPROCESSORS AND THREAD –LEVEL PARALLELISM: Introduction; Symmetric shared-memory architectures; Performance of symmetric shared–memory multiprocessors; Distributed shared memory and directory-based coherence; Basics of synchronization; Models of Memory Consistency.

7 Hours

UNIT - 6

REVIEW OF MEMORY HIERARCHY: Introduction; Cache performance; Cache Optimizations, Virtual memory.

6 Hours

UNIT - 7

MEMORY HIERARCHY DESIGN: Introduction; Advanced optimizations of Cache performance; Memory technology and optimizations; Protection: Virtual memory and virtual machines.

6 Hours

UNIT - 8

HARDWARE AND SOFTWARE FOR VLIW AND EPIC: Introduction: Exploiting Instruction-Level Parallelism Statically; Detecting and Enhancing Loop-Level Parallelism; Scheduling and Structuring Code for Parallelism; Hardware Support for Exposing Parallelism: Predicated Instructions; Hardware Support for Compiler Speculation; The Intel IA-64 Architecture and Itanium Processor; Conclusions.

7 Hours

TEXT BOOK:

1. **Computer Architecture, A Quantitative Approach** – John L. Hennessey and David A. Patterson:, 4th Edition, Elsevier, 2007.

REFERENCE BOOKS:

1. **Advanced Computer Architecture Parallelism, Scalability** – Kai Hwang:, Programability**,** Tata Mc Grawhill, 2003.
2. **Parallel Computer Architecture, A Hardware / Software Approach** – David E. Culler, Jaswinder Pal Singh, Anoop Gupta:, Morgan Kaufman, 1999.

SYSTEM MODELING AND SIMULATION

Subject Code	:	**06CS82**	IA Marks	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

INTRODUCTION: When simulation is the appropriate tool and when it is not appropriate; Advantages and disadvantages of Simulation; Areas of application; Systems and system environment; Components of a system; Discrete and continuous systems; Model of a system; Types of Models; Discrete-Event System Simulation; Steps in a Simulation Study. Simulation

examples: Simulation of queuing systems; Simulation of inventory systems; Other examples of simulation.

8 Hours

UNIT - 2

GENERAL PRINCIPLES, SIMULATION SOFTWARE: Concepts in Discrete-Event Simulation: The Event-Scheduling / Time-Advance Algorithm, World Views, Manual simulation Using Event Scheduling; List processing. Simulation in Java; Simulation in GPSS.

6 Hours

UNIT - 3

STATISTICAL MODELS IN SIMULATION: Review of terminology and concepts; Useful statistical models; Discrete distributions; Continuous distributions; Poisson process; Empirical distributions.

6 Hours

UNIT - 4

QUEUING MODELS: Characteristics of queuing systems; Queuing notation; Long-run measures of performance of queuing systems; Steady-state behavior of M/G/1 queue; Networks of queues.

6 Hours

PART - B

UNIT - 5

RANDOM-NUMBER GENERATION, RANDOM-VARIATE GENERATION: Properties of random numbers; Generation of pseudo-random numbers; Techniques for generating random numbers; Tests for Random Numbers. Random-Variate Generation: Inverse transform technique; Acceptance-Rejection technique; Special properties.

8 Hours

UNIT - 6

INPUT MODELING: Data Collection; Identifying the distribution with data; Parameter estimation; Goodness of Fit Tests; Fitting a non-stationary Poisson process; Selecting input models without data; Multivariate and Time-Series input models

6 Hours.

UNIT - 7

OUTPUT ANALYSIS FOR A SINGLE MODEL: Types of simulations with respect to output analysis; Stochastic nature of output data; Measures of performance and their estimation; Output analysis for terminating simulations; Output analysis for steady-state simulations.

6 Hours

UNIT - 8

VERIFICATION AND VALIDATION OF SIMULATION MODELS, OPTIMIZATION: Model building, verification and validation; Verification of simulation models; Calibration and validation of models. Optimization via Simulation.

6Hours

TEXT BOOK:

1. **Discrete-Event System Simulation** – Jerry Banks, John S. Carson II, Barry L. Nelson, David M. Nicol, 4th Edition, Pearson Education, 2007.

REFERENCE BOOKS:

1. **Discrete – Event Simulation: A First Course** – Lawrence M. Leemis, Stephen K. Park, Pearson Education/ Prentice-Hall India, 2006.
2. **Simulation** – Sheldon M. Ross, 4th Edition, Elsevier, 2006.
3. **Simulation Modeling and Analysis** – Averill M. Law, 4th Edition, Tata McGraw-Hill, 2007.

MOBILE COMPUTING

Subject Code	:	**06CS831**	IA Marks	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

MOBILE DEVICES AND SYSTEMS, ARCHITECTURES: Mobile phones, Digital Music Players, Handheld Pocket Computers, Handheld Devices, Operating Systems, Smart Systems, Limitations of Mobile Devices, Automotive Systems. GSM – Services and System Architectures, Radio Interfaces, Protocols, Localization, Calling, Handover, General Packet Radio Service.

8 Hours

UNIT - 2

WIRELESS MEDIUM ACCESS CONTROL AND CDMA – BASED COMMUNICATION: Medium Access Control, Introduction to CDMA – based Systems, OFDM

6 Hours

UNIT - 3

MOBILE IP NETWORK LAYER, MOBILE TRANSPORT LAYER: IP and Mobile IP Network Layers Packet Delivery and Handover Management, Location Management, Registration, Tunneling and Encapsulation, Route Optimization, Dynamic Host Configuration Protocol.

Indirect TCP, Snooping TCP, Mobile TCP, Other Methods of TCP – layer Transmission for Mobile Networks.

7 Hours

UNIT - 4

DATABASES: Database Hoarding Techniques, Data Caching, Client – Server Computing and Adaptation, Transactional Models, Query Processing, Data Recovery Process, Issues relating to Quality of Service.

5 Hours

PART - B

UNIT - 5

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.

5 Hours

UNIT - 6

DATA SYNCHRONIZATION IN MOBILE COMPUTING SYSTEMS: Synchronization, Synchronization Protocols, SyncML – Synchronization Language for Mobile Computing, Synchronized Multimedia Markup Language (SMIL).

6 Hours

UNIT - 7

MOBILE DEVICES, SERVER AND MANAGEMENT, WIRELESS LAN, MOBILE INTERNET CONNECTIVITY AND PERSONAL AREA NETWORK: Mobile agent, Application Server, Gateways, Portals, Service Discovery, Device Management, Mobile File Systems.

Wireless LAN (WiFi) Architecture and Protocol Layers, WAP 1.1 and WAP 2.0 Architectures, Bluetooth – enabled Devices Network, Zigbee.

8 Hours

UNIT - 8

MOBILE APPLICATION LANGUAGES – XML, JAVA, J2ME AND JAVACARD, MOBILE OPERATING SYSTEMS: Introduction, XML, JAVA, Java 2 Micro Edition (J2ME), JavaCard. Operating System, PalmOS, Windows CE, Symbian OS, Linux for Mobile Devices.

7 Hours

TEXT BOOK:

1. **Mobile Computing** – Raj Kamal, Oxford University Press, 2007.

REFERENCE BOOKS:

1. **Mobile Computing: Technology, Applications and Service Creation,** Asoke K. Talkukder, Roopa R Yavaga, Tata McGraw Hill, 2005.
2. **Mobile Computing Principles: Designing and Developing Mobile Applications with UML and XML**, Reza B'Far, 5th Edition, Cambridge University press, 2006.
3. **Principles of Mobile Computing** – Uwe Hansmann, Lothat Merk, Martin S Nicklous and Thomas Stober, 2nd Edition, Springer International Edition, 2003.
4. **Mobile Communication** – Schiller, Pearson Education, 2004.

WEB 2.0 AND RICH INTERNET APPLICATIONS

Subject Code	:	**06CS832**	IA Marks	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

INTRODUCTION, WEB SERVICES: What is Web 2.0?, Folksonomies and Web 2.0, Software as a Service (SaaS), Data and Web 2.0, Convergence, Iterative development, Rich User experience, Multiple Delivery Channels, Social Networking. Web Services: SOAP, RPC Style SOAP, Document style SOAP, WSDL, REST services, JSON format, What is JSON?, Array literals, Object literals, Mixing literals, JSON Syntax, JSON Encoding and Decoding, JSON versus XML.

7 Hours

UNIT - 2

BUILDING RICH INTERNET APPLICATIONS WITH AJAX-1: Building Rich Internet Applications with AJAX: Limitations of Classic Web application model, AJAX principles, Technologies behind AJAX, Examples of usage of AJAX, Dynamic web applications through Hidden frames for both GET and POST methods.

7 Hours

UNIT - 3

BUILDING RICH INTERNET APPLICATIONS WITH AJAX-2: Frames, Asynchronous communication and AJAX application model,

XMLHTTP Object – properties and methods, handling different browser implementations of XMLHTTP, The same origin policy, Cache control, AJAX Patterns (Only algorithms – examples not required): Predictive fetch pattern, Submission throttling pattern, Periodic refresh, Multi stage download, Fall back patterns.

6 Hours

UNIT - 4

BUILDING RICH INTERNET APPLICATIONS WITH FLEX - 1: lash player, Flex framework, MXML and Actionscript, Working with Data services, Understanding differences between HTML and Flex applications, Understanding how Flex applications work, Understanding Flex and Flash authoring, MXML language, a simple example.

6 Hours

PART - B

UNIT - 5

BUILDING RICH INTERNET APPLICATIONS WITH FLEX - 2: Using Actionscript, MXML and Actionscript correlations. Understanding Actionscript 3.0 language syntax: Language overview, Objects and Classes, Packages and namespaces, Variables & scope of variables, case sensitivity and general syntax rules, Operators, Conditional, Looping, Functions, Nested functions, Functions as Objects, Function scope, OO Programming in Actionscript: Classes, Interfaces, Inheritance, Working with String objects, Working with Arrays, Error handling in Actionscript: Try/Catch, Working with XML

6 Hours

UNIT - 6

BUILDING RICH INTERNET APPLICATIONS WITH FLEX - 3: Framework fundamentals, Understanding application life cycle, Differentiating between Flash player and Framework, Bootstrapping Flex applications, Loading one flex application in to another, Understanding application domains, Understanding the preloader. Managing layout, Flex layout overview, Working with children, Container types, Layout rules, Padding, Borders and gaps, Nesting containers, Making fluid interfaces.

6 Hours

UNIT - 7

BUILDING RICH INTERNET APPLICATIONS WITH FLEX – 4: Working with UI components: Understanding UI Components, Creating component instances, Common UI Component properties, Handling events, Button, Value selectors, Text components, List based controls, Data models and Model View Controller, Creating collection objects, Setting the data provider, Using Data grids, Using Tree controls, Working with selected values and items, Pop up controls, Navigators, Control bars Working with

data: Using data models, Using XML, Using Actionscript classes, Data Binding.

6 Hours

UNIT - 8

BUILDING ADVANCED WEB 2.0 APPLICATIONS: Definition of mash up applications, Mash up Techniques, Building a simple mash up application with AJAX, Remote data communication, strategies for data communication, Simple HTTPServices, URLLoader in Flex, Web Services in Flex, Examples: Building an RSS reader with AJAX, Building an RSS reader with Flex.

8 Hours

TEXT BOOKS:

1. **Professional AJAX** – Nicholas C Zakas et al, Wrox publications, 2006.
2. **Programming Flex 2** – Chafic Kazoun, O'Reilly publications, 2007.
3. **Mashups** – Francis Shanahan, Wrox, 2007.

REFERENCE BOOKS:

1. **Ajax: The Complete Reference** – Thomas A. Powel, McGraw Hill, 2008.
2. **Unleashing Web 2.0: From Concepts to Creativity** – Gottfried Vossen, Stephan Hagemann, Elsevier, 2007.
3. **Essential Actionscript 3.0** – Colin Moock, O'Reilly Publications, 2007.
4. **Ajax Bible** - Steven Holzner, Wiley India, 2007.
5. **A Web 2.0 Primer Pragmatic Ajax** – Justin Gehtland et al, SPD Publications, 2006.
6. **Professional Web 2.0 Programming** – Eric Van derVlist et al, Wiley India, 2007.

STORAGE AREA NETWORKS

Subject Code	:	**06CS833**	IA Marks	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART- A

UNIT - 1

INTRODUCTION: Server Centric IT Architecture and its Limitations; Storage – Centric IT Architecture and its advantages; Case study: Replacing

a server with Storage Networks; The Data Storage and Data Access problem; The Battle for size and access.

6 Hours

UNIT - 2

INTELLIGENT DISK SUBSYSTEMS - 1: Architecture of Intelligent Disk Subsystems; Hard disks and Internal I/O Channels, JBOD, Storage virtualization using RAID and different RAID levels;

6 Hours

UNIT - 3

INTELLIGENT DISK SUBSYSTEMS – 1, I/O TECHNIQUES - 1: Caching: Acceleration of Hard Disk Access; Intelligent disk subsystems; Availability of disk subsystems. The Physical I/O path from the CPU to the Storage System; SCSI.

7 Hours

UNIT - 4

I/O TECHNIQUES – 2, NETWORK ATTACHED STORAGE: Fibre Channel Protocol Stack; Fibre Channel SAN; IP Storage. The NAS Architecture, The NAS hardware Architecture, The NAS Software Architecture, Network connectivity, NAS as a storage system.

7 Hours

PART- B

UNIT - 5

FILE SYSTEM AND NAS: Local File Systems; Network file Systems and file servers; Shared Disk file systems; Comparison of fibre Channel and NAS.

6 Hours

UNIT - 6

STORAGE VIRTUALIZATION: Definition of Storage virtualization; Implementation Considerations; Storage virtualization on Block or file level; Storage virtualization on various levels of the storage Network; Symmetric and Asymmetric storage virtualization in the Network

6 Hours

UNIT - 7

SAN ARCHITECTURE AND HARDWARE DEVICES: Overview, creating a Network for storage; SAN Hardware devices, The fibre channel switch, Host Bus adaptors; Putting the storage in SAN; Fabric operation from a Hardware perspective.

7 Hours

UNIT - 8

SOFTWARE COMPONENTS OF SAN: The switch's Operating system, Device Drivers, The Supporting the switch's components, Configuration options for SANs. Panning for business continuity.

7 Hours

TEXT BOOKS:

1. **Storage Networks Explained** – Ulf Troppens, Rainer Erkens and Wolfgang Muller, John Wiley & Sons, 2003.
2. **Storage Networks: The Complete Reference** – Robert Spalding, Tata McGraw Hill, 2003.

REFERENCE BOOKS:

1. **Storage Area Network Essentials: A Complete Guide to understanding and Implementing SANs** – Richard Barker and Paul Massiglia, John Wiley India, 2002.
2. **Storage Networking Fundamentals** Marc Farley, Cisco Press, 2005.

NETWORK MANAGEMENT SYSTEMS

Subject Code	:	**06CS834**	IA Marks	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

INTRODUCTION: Analogy of Telephone Network Management, Data and Telecommunication Network Distributed computing Environments, TCP/IP-Based Networks: The Internet and Intranets, Communications Protocols and Standards- Communication Architectures, Protocol Layers and Services; Case Histories of Networking and Management – The Importance of topology , Filtering Does Not Reduce Load on Node, Some Common Network Problems; Challenges of Information Technology Managers, Network Management: Goals, Organization, and Functions- Goal of Network Management, Network Provisioning, Network Operations and the NOC, Network Installation and Maintenance; Network and System Management, Network Management System platform, Current Status and Future of Network Management.

7 Hours

UNIT - 2

BASIC FOUNDATIONS: STANDARDS, MODELS, AND LANGUAGE: Network Management Standards, Network Management Model, Organization Model, Information Model – Management Information Trees, Managed Object Perspectives, Communication Model; ASN.1- Terminology, Symbols, and Conventions, Objects and Data Types, Object Names, An Example of ASN.1 from ISO 8824; Encoding Structure; Macros, Functional Model.

6 Hours

UNIT - 3

SNMPV1 NETWORK MANAGEMENT - 1: Managed Network: The History of SNMP Management, Internet Organizations and standards, Internet Documents, The SNMP Model, The Organization Model, System Overview.

6 Hours

UNIT - 4

SNMPV1 NETWORK MANAGEMENT – 2: The Information Model – Introduction, The Structure of Management Information, Managed Objects, Management Information Base. The SNMP Communication Model – The SNMP Architecture, Administrative Model, SNMP Specifications, SNMP Operations, SNMP MIB Group, Functional Model.

7 Hours

PART - B

UNIT - 5

SNMP MANAGEMENT – RMON: Remote Monitoring, RMON SMI and MIB, RMONI1- RMON1 Textual Conventions, RMON1 Groups and Functions, Relationship Between Control and Data Tables, RMON1 Common and Ethernet Groups, RMON Token Ring Extension Groups, RMON2 – The RMON2 Management Information Base, RMON2 Conformance Specifications; ATM Remote Monitoring, A Case Study of Internet Traffic Using RMON.

6 Hours

UNIT - 6

BROADBAND NETWORK MANAGEMENT: ATM NETWORKS: Broadband Networks and Services, ATM Technology – Virtual Path-Virtual Circuit, TM Packet Size, Integrated Service, SONET, ATM LAN Emulation, Virtual LAN; ATM Network Management – The ATM Network Reference Model, The Integrated Local Management Interface, The ATM Management Information Base, The Role of SNMP and ILMI in ATM Management, M1 Interface: Management of ATM Network Element, M2 Interface:

Management of Private Networks, M3 Interface: Customer Network Management of Public Networks, M4 Interface: Public Network Management, Management of LAN Emulation, ATM Digital Exchange Interface Management.

6 Hours

UNIT - 7

BROADBAND NETWORK MANAGEMENT: Broadband Access Networks and Technologies – Broadband Access Networks, roadband Access Technology; HFCT Technology – The Broadband LAN, The Cable Modem, The Cable Modem Termination System, The HFC Plant, The RF Spectrum for Cable Modem; Data Over Cable Reference Architecture; HFC Management – Cable Modem and CMTS Management, HFC Link Management, RF Spectrum Management, DSL Technology; Asymmetric Digital Subscriber Line Technology – Role of the ADSL Access Network in an Overall Network, ADSL Architecture, ADSL Channeling Schemes, ADSL Encoding Schemes; ADSL Management – ADSL Network Management Elements, ADSL Configuration Management, ADSL Fault Management, ADSL Performance Management, SNMP-Based ADSL Line MIB, MIB Integration with Interfaces Groups in MIB-2, ADSL Configuration Profiles.

6 Hours

UNIT - 8

NETWORK MANAGEMENT APPLICATIONS: Configuration Management- Network Provisioning, Inventory Management, Network Topology, Fault Management- Fault Detection, Fault Location and Isolation Techniques, Performance Management – Performance Metrics, Data Monitoring, Problem Isolation, Performance Statistics; Event Correlation Techniques – Rule-Based Reasoning, Model-Based Reasoning, Case-Based Reasoning, Codebook correlation Model, State Transition Graph Model, Finite State Machine Model, Security Management – Policies and Procedures, Security Breaches and the Resources Needed to Prevent Them, Firewalls, Cryptography, Authentication and Authorization, Client/Server Authentication Systems, Messages Transfer Security, Protection of Networks from Virus Attacks, Accounting Management, Report Management, Policy-Based Management, Service Level Management.

8 Hours

TEXT BOOK:

1. **Network Management: Principles and Practice** – Mani Subramanian, Pearson Education, 2003.

REFERENCE BOOK:

1. **Network Management Concepts and Practices** – J. Richard Burke, A Hands-On Approach, PHI, 2008.

INFORMATION AND NETWORK SECURITY

Subject Code	:	**06CS835**	IA Marks	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

PLANNING FOR SECURITY: Introduction; Information Security Policy, Standards, and Practices; The Information Security Blue Print; Contingency plan and a model for contingency plan.

6 Hours

UNIT - 2

SECURITY TECHNOLOGY-1: Introduction; Physical design; Firewalls; Protecting Remote Connections.

6 Hours

UNIT - 3

SECURITY TECHNOLOGY - 2: Introduction; Intrusion Detection Systems (IDS); Honey Pots, Honey Nets, and Padded cell systems; Scanning and Analysis Tools.

6 Hours

UNIT - 4

CRYPTOGRAPHY: Introduction; A short History of Cryptography; Principles of Cryptography; Cryptography Tools; Attacks on Cryptosystems.

8 Hours

PART - B

UNIT - 5

INTRODUCTION TO NETWORK SECURITY, AUTHENTICATION APPLICATIONS: Attacks , services, and Mechanisms; Security Attacks; Security Services; A model for Internetwork Security; Internet Standards and RFCs. Kerberos, X.509 Directory Authentication Service.

8 Hours

UNIT - 6

ELECTRONIC MAIL SECURITY: Pretty Good Privacy (PGP); S/MIME.

6 Hours

UNIT - 7

IP SECURITY: IP Security Overview; IP Security Architecture; Authentication Header; Encapsulating Security Payload; Combining Security Associations; Key Management.

6 Hours

UNIT - 8

WEB SECURITY: Web security requirements; Secure Socket layer (SSL) and Transport layer Security (TLS); Secure Electronic Transaction (SET).

6 Hours

TEXT BOOKS:

1. **Principles of Information Security** – Michael E. Whitman and Herbert J. Mattord, 2nd Edition, Thomson, 2005.
2. **Applications and Standards** – Network Security Essentials, William Stallings, Pearson Education, 2000.

REFERENCE BOOK:

1. **Cryptography and Network Security** – Behrouz A. Forouzan, Tata McGraw-Hill, 2007.

MICROCONTROLLER-BASED SYSTEMS

Subject Code	:	**06CS836**	IA Marks	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

INTRODUCTION, 8051 ASSEMBLY LANGUAGE PROGRAMMING – 1: Microcontrollers and embedded processors; Overview of the 8051 family. 8051 Assembly Language Programming (ALP) -1: Inside the 8051; Introduction to 8051 ALP; Assembling and running an 8051 program; The PC and ROM space in 8051; Data types, directives, flag bits, PSW register, register banks, and the stack.

7 Hours

UNIT - 2

ALP – 2: Jump and loop instructions; Call instructions; Time delay for various 8051 family members; I/O programming; I/O bit manipulation programming. Immediate and register addressing modes; Accessing memory using various addressing modes.

6 Hours

UNIT - 3

ALP – 3, PROGRAMMING IN C: Bit addresses for I/O and RAM; Extra 128 bytes of on-chip RAM in 8052. Arithmetic instructions; Signed numbers and arithmetic operations; Logic and compare instructions; rotate instruction

and serialization; BCD, ASCII, and other application programs. rogramming in C: Data types and time delays; I/O programming; Logic operations; Data conversion programs; Accessing code ROM space; Data serialization.

7 Hours

UNIT - 4

PIN DESCRIPTION, TIMER PROGRAMMING: Pin description of 8051; Intel Hex file; Programming the 8051 timers; Counter programming; rogramming Timers 0 and 1 in C.

6 Hours

PART - B

UNIT - 5

SERIAL PORT PROGRAMMING, INTERRUPT PROGRAMMING: basics of serial communications; 8051 connections to RS232; Serial port programming in assembly and in C. 8051 interrupts; Programming timer interrupts; Programming external hardware interrupts; Programming the serial communications interrupt; Interrupt priority in 8051 / 8052; Interrupt programming in C.

6 Hours

UNIT - 6

INTERFACING LCD, KEYBOARD, ADC, DAC AND SENSORS: LCE interfacing; Keyboard interfacing; Parallel and serial ADC; DAC interfacing; Sensor interfacing and signal conditioning.

7 Hours

UNIT - 7

INTERFACING TO EXTERNAL MEMORY, INTERFACING WITH 8255: Memory address decoding; Interfacing 8031 / 8051 with external ROM; 8051 data memory space; Accessing external data memory in C. Interfacing with 8255; Programming 8255 in C.

7 Hours

UNIT - 8

DS12887 RTC INTERFACING AND PROGRAMMING, APPLICATIONS: DS12887 RTC interfacing; DS12887 RTC programming in C; Alarm, SQW, and IRQ features of DS12886. Relays and opto-isolators; Stepper motor interfacing; DC motor interfacing and PWM.

6 Hours

TEXT BOOK:

1. **The 8051 Microcontroller and Embedded Systems using Assembly and C –** Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D. McKinlay, 2nd Edition, Pearson Education, 2008.

REFERENCE BOOKS:

1. **Microcontrollers Architecture, Programming, Interfacing and System Design** – Raj Kamal, Pearson Education, 2007.
2. **Microcontrollers and Applications –** Dr. Ramani Kalpathi, Ganesh Raja, 1st Revised Edition, Sanguine Technical Publishers, 2007.

ADHOC NETWORKS

Subject Code	:	**06CS841**	IA Marks	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

INTRODUCTION: Ad hoc Networks: Introduction, Issues in Ad hoc wireless networks, Ad hoc wireless internet.

6 Hours

UNIT - 2

MAC – 1: MAC Protocols for Ad hoc wireless Networks: Introduction, Issues in designing a MAC protocol for Ad hoc wireless Networks, Design goals of a MAC protocol for Ad hoc wireless Networks, Classification of MAC protocols, Contention based protocols with reservation mechanisms.

7 Hours

UNIT - 3

MAC – 2: Contention-based MAC protocols with scheduling mechanism, MAC protocols that use directional antennas, Other MAC protocols.

6 Hours

UNIT - 4

ROUTING – 1: Routing protocols for Ad hoc wireless Networks: Introduction, Issues in designing a routing protocol for Ad hoc wireless Networks, Classification of routing protocols, Table drive routing protocol, On-demand routing protocol.

7 Hours

PART-B

UNIT - 5

ROUTING – 2: Hybrid routing protocol, Routing protocols with effective flooding mechanisms, Hierarchical routing protocols, Power aware routing protocols.

6 Hours

UNIT - 6

TRANSPORT LAYER: Transport layer protocols for Ad hoc wireless Networks: Introduction, Issues in designing a transport layer protocol for Ad hoc wireless Networks, Design goals of a transport layer protocol for Ad hoc wireless Networks, Classification of transport layer solutions, TCP over Ad hoc wireless Networks, Other transport layer protocols for Ad hoc wireless Networks.

7 Hours

UNIT - 7

SECURITY: Security: Security in wireless Ad hoc wireless Networks, Network security requirements, Issues & challenges in security provisioning, Network security attacks, Key management, Secure routing in Ad hoc wireless Networks.

6 Hours

UNIT - 8

QoS: Quality of service in Ad hoc wireless Networks: Introduction, Issues and challenges in providing QoS in Ad hoc wireless Networks, Classification of QoS solutions, MAC layer solutions, network layer solutions.

7 Hours

TEXT BOOK:

1. **Ad hoc Wireless Networks** – C. Siva Ram Murthy & B. S. Manoj, 2nd Edition, Pearson Education, 2005.

REFERENCE BOOKS:

1. **Ad hoc Wireless Networks** – Ozan K. Tonguz and Gianguigi Ferrari, John Wiley, 2006.
2. **Ad hoc Wireless Networking –** Xiuzhen Cheng, Xiao Hung, Ding-Zhu Du, Kluwer Academic Publishers, 2004.
3. **Adhoc Mobile Wireless Networks -** C.K. Toh, Protocols and Systems, Prentice-Hall PTR, 2002.

SOFTWARE TESTING

Subject Code	:	**06CS842/IS81**	IA Marks	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

BASICS OF SOFTWARE TESTING – 1: Human Errors and Testing; Software Quality; Requirements, Behavior and Correctness; Correctness versus Reliability; Testing and Debugging; Test Metrics.

6 Hours

UNIT - 2

BASICS OF SOFTWARE TESTING – 2: Software and Hardware Testing; Testing and Verification; Defect Management; Execution History;Test-generation Strategies, Static Testing. Model-Based Testing and Model Checking; Control-Flow Graph; Types of Testing; The Saturation Effect.

6 Hours

UNIT - 3

TEST GENERATION FROM REQUIREMENTS – 1: Introduction; The Test-Selection Problem; Equivalence Partitioning; Boundary Value Analysis; Category-Partition Method.

7 Hours

UNIT - 4

TEST GENERATION FROM REQUIREMENTS – 2: Cause-Effect Graphing, Test Generation from Predicates.

7 Hours

PART - B

UNIT - 5

STRUCTURAL TESTING: Overview; Statement testing; Branch testing; Condition testing, Path testing; Procedure call testing; Comparing structural testing criteria; The infeasibility problem.

6 Hours

UNIT - 6

DEPENDENCE, DATA FLOW MODELS, AND DATA FLOW TESTING: Definition-Use pairs; Data flow analysis; Classic analyses; From execution to conservative flow analysis; Data flow analysis with arrays and pointers; Inter-procedural analysis; Overview of data flow testing; Definition-

Use associations; Data flow testing criteria; Data flow coverage with complex structures; The infeasibility problem.

6 Hours

UNIT - 7

TEST CASE SELECTION AND ADEQUACY, TEST EXECUTION: Overview; Test specification and cases; Adequacy criteria; Comparing criteria; Overview of test execution; From test case specification to test cases; Scaffolding; Generic versus specific scaffolding; Test oracles; Self-checks as oracles; Capture and replay.

6 Hours

UNIT - 8

PROCESS: Test and analysis activities within a software process: The quality process; Planning and monitoring; Quality goals; Dependability properties; Analysis; Testing; Improving the process; Organizational factors. Integration and component-based software testing: Overview; Integration testing strategies; Testing components and assemblies. System, Acceptance and Regression Testing: Overview; System testing; Acceptance testing; Usability; Regression testing; Regression test selection techniques; Test case prioritization and selective execution.

8 Hours

TEXT BOOKS:

1. **Foundations of Software Testing -** Aditya P Mathur, Pearson Education, 2008.
2. **Software Testing and Analysis: Process, Principles and Techniques** – Mauro Pezze, Michal Young, John Wiley & Sons, 2008.

REFERENCE BOOKS:

1. **Software testing Principles and Practices** – Gopalaswamy Ramesh, Srinivasan Desikan, 2nd Edition, Pearson, 2007.
2. **Software Testing** – Ron Patton, 2nd edition, Pearson Education, 2004.
3. **The Craft of Software Testing** – Brian Marrick, Pearson Education, 1995.

ARM BASED SYSTEM DESIGN

Subject Code	:	**06CS843**	IA Marks	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

INTRODUCTION: The RISC design philosophy; The ARN design philosophy; Embedded system hardware and software. ARM processor fundamentals: Registers; Current Program Status Register; Pipeline; Exceptions, interrupts and the Vector Table; Core extensions; Architecture revisions; ARM processor families.

6 Hours

UNIT - 2

ARM INSTRUCTION SET AND THUMB INSTRUCTION SET: ARM instruction set: Data processing instructions; Branch instructions; Load-store instructions; Software interrupt instruction; Program Status Register functions; Loading constants; ARMv5E extensions; Conditional execution. Thumb instruction set: Thumb register usage; ARM –Thumb interworking; Other branch instructions; Data processing instructions; Single-Register Load-Store instructions; Multiple-Register Load-Store instructions; Stack instructions; Software interrupt instruction.

7 Hours

UNIT - 3

WRITING AND OPTIMIZING ARM ASSEMBLY CODE: Writing assembly code; Profiling and cycle counting; Instruction scheduling; Register allocation; Conditional execution; Looping constructs; Bit manipulation; Efficient switches; Handling unaligned data.

6 Hours

UNIT - 4

OPTIMIZED PRIMITIVES: Double-precision integer multiplication; Integer normalization and count leading zeros; Division; Square roots; Transcendental functions; Endian reversal and bit operations; Saturated and rounded arithmetic; Random number generation.

7 Hours

PART - B

UNIT - 5

EXCEPTION AND INTERRUPT HANDLING: Exception handling; Interrupts and interrupt handling schemes.

7 Hours

UNIT - 6

CACHES: The memory hierarchy and the cache memory; Cache architecture; Cache policy; Coprocessor 15 and cache; Flusing and cleaning cache memory; Cache lockdown; Caches and software performance.

7 Hours

UNIT - 7

MEMORY – 1: Memory Protection Units: Protected regions; Initializing the MPU, cache and write buffer; Demonstration of an MPU system. Memory Management Units: Moving from MPU to an MMU; How virtual memory works; Details of the ARM MMU.

6 Hours

UNIT - 8

MEMORY – 2: Page tables; The translation look aside buffer; Domains and memory access permission; The caches and write buffer; Coprocessor 15 and MMU configuration; The fast context switch extension.

6 Hours

TEXT BOOK:

1. **ARM System Developer's Guide – Designing and Optimizing System Software** – Andrew N. Sloss, Dominic Symes, Chris Wright, Elsevier, 2004.

REFERENCE BOOKS:

1. **ARM Architecture Reference Manual** – David Seal (Editor), 2nd Edition, Addison-Wesley, 2001.
2. **ARM System-on-Chip Architecture –** Steve Furber, 2nd Edition, Addison-Wesley, 2000.

SERVICES ORIENTED ARCHITECTURE

Subject Code	:	**06CS844**	IA Marks	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

INTRODUCTION TO SOA, EVOLUTION OF SOA: Fundamental SOA; Common Characteristics of contemporary SOA; Common tangible benefits of SOA; An SOA timeline (from XML to Web services to SOA); The continuing evolution of SOA (Standards organizations and Contributing vendors); The roots of SOA (comparing SOA to Past architectures).

7 Hours

UNIT - 2

WEB SERVICES AND PRIMITIVE SOA: The Web services framework; Services (as Web services); Service descriptions (with WSDL); Messaging (with SOAP).

6 Hours

UNIT - 3

WEB SERVICES AND CONTEMPORARY SOA – 1: Message exchange patterns; Service activity; Coordination; Atomic Transactions; Business activities; Orchestration; Choreography.

6 Hours

UNIT - 4

WEB SERVICES AND CONTEMPORARY SOA – 2: Addressing; Reliable messaging; Correlation; Polices; Metadata exchange; Security; Notification and eventing.

7 Hours

PART - B

UNIT - 5

PRINCIPLES OF SERVICE – ORIENTATION: Services-orientation and the enterprise; Anatomy of a service-oriented architecture; Common Principles of Service-orientation; How service orientation principles inter-relate; Service-orientation and object-orientation; Native Web service support for service-orientation principles.

7 Hours

UNIT - 6

SERVICE LAYERS: Service-orientation and contemporary SOA; Service layer abstraction; Application service layer, Business service layer, Orchestration service layer; Agnostic services; Service layer configuration scenarios.

6 Hours

UNIT - 7

BUSINESS PROCESS DESIGN: WS-BPEL language basics; WS-Coordination overview; Service-oriented business process design; WS-addresing language basics; WS-Reliable Messaging language basics.

7 Hours

UNIT - 8

SOA PLATFORMS: SOA platform basics; SOA support in J2EE; SOA support in .NET; Integration considerations.

6 Hours

TEXT BOOK:

1. **Service-Oriented Architecture – Concepts, Technology, and Design -**Thomas Erl, Pearson Education, 2005.

REFERENCE BOOK:

1. **Understanding SOA with Web Services** – Eric Newcomer, Greg Lomow, Pearson Education, 2005.

GRID COMPUTING

Subject Code	:	**06CS845**	IA Marks	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

INTRODUCTION, GRID COMPUTING ORGANIZATIONS AND THEIR ROLES: Early Grid Activities, Current Grid Activities, An Overview of Grid Business Areas, Grid Applications, Grid Infrastructure. Organizations Developing Grid Standards and Best Practice Guidelines, Organizations Developing Grid Computing Toolkits and the Framework, Organizations Building and Using Grid-Based Solutions to Solve Computing, Data and Network Requirements, Commercial Organizations Building and Using Grid-Based Solutions

6 Hours

UNIT - 2

THE GRID COMPUTING ANATOMY, ROAD MAP: The Grid Problem. Anatomy Computing, Business on Demand and Infrastructure Virtualization, Service-Oriented Architecture and Grid, Semantic Grids.

6 Hours

UNIT - 3

ARCHITECTURES – 1: Service-Oriented Architecture, Web Services Architecture, XML, Related Technologies and Their Relevance to Web Services, XML Messages and Enveloping, Service Message Description Mechanisms.

7 Hours

UNIT - 4

ARCHITECTURES – 2: Relationship between Web Service and Grid Service, Web Service Interoperability and the Role of the WS-I

Organization, OGSA Architecture and Goals, Commercial Data Center (CDC), National Fusion Collaborator (NFS), Online Media and Entertainment

7 Hours

PART - B

UNIT - 5

THE OGSA PLATFORM COMPONENTS, OGSI – 1: Native Platform Services and Transport Mechanisms, OGSA Hosting Environment, Core Networking Services Transport and Security, OGSA Infrastructure, OGSA Basic Services. Grid Services, A High-Level Introduction to OGSI (Open Grid Services Infrastructure).

6 Hours

UNIT - 6

OGSI – 2: Technical Details of OGSI Specification, Introduction to Service Data Concepts, Grid Service: Naming and Change Management Recommendations

7 Hours

UNIT - 7

OGSA BASIC SERVICES – 1: Common Management Model (CMM), Service Domains, Policy Architecture, Security Architecture, Metering and Accounting.

7 Hours

UNIT - 8

OGSA BASIC SERVICES - 2, TOOLKIT: Common Distributed Logging, Distributed Data Access and Replication. GLOBUS GT3 Toolkit Architecture.

6 Hours

TEXT BOOK:

1. **Craig Fellenstein: Grid Computing** – Joshy Joseph, IBM Press, 2007.

REFERENCE BOOK:

1. **Grid and Cluster Computing, Prentice** – Prabhu, Prentice Hall of India, 2007.

PROGRAMMING LANGUAGES

Subject Code	:	**06CS846**	IA Marks	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

INTRODUCTION; NAMES, SCOPE, AND BINDINGS – 1: Language design; Programming language spectrum; Why study programming languages? Compilation and interpretation; Programming environments. Names, scope, and bindings: Concept of binding time; Object lifetime and storage management; Scope rules and implementing scope.

7 Hours

UNIT - 2

NAMES, SCOPE, AND BINDINGS – 1; CONTROL FLOW – 1: The binding of reference environments; Binding within a scope; Separate compilation. Control Flow – 1: Expression evaluation.

7 Hours

UNIT - 3

CONTROL FLOW – 2: Structured and unstructured flow; Sequencing; Selection; Iteration; Recursion; Non-determinacy.

6 Hours

UNIT - 4

DATA TYPES – 1: Type systems; Type checking; Records and variants; Arrays**.**

6 Hours

PART - B

UNIT - 5

DATA TYPES - 2: Strings; Sets; Pointers and recursive types; Lists; Files and Input/Output; Equality testing and assignment.

7 Hours

UNIT - 6

Subroutines and Control Abstraction - 1: Review of stack layout; Calling sequences; Parameter passing; Generic subroutines and modules; Exception handling.

6 Hours

UNIT - 7

CONTROL ABSTRACTION – 2; DATA ABSTRACTION, OBJECT ORIENTATION: Control abstraction – 2: Coroutines. Data Abstraction, Object Orientation: Object oriented programming; Encapsulation and Inheritance; Dynamic method binding; Multiple inheritance; Object oriented programming revisited.

6 Hours

UNIT - 8

FUNCTIONAL LANGUAGES, LOGIC LANGUAGES, SCRIPTING LANGUAGES : Functional Labguages: Origins; Concepts; An overview of scheme; Evaluation order revisited; Higher-order functions; Functional programming in perspective. Logic Languages: Concepts; Prolog; Logic programming in perspective. Scripting Languages: Common characteristics.

7 Hours

TEXT BOOK:

1. **Programming Language Pragmatics** – Michael L. Scott, 2nd Edition, Elsevier, 2006.

REFERENCE BOOKS:

1. **Programming Languages Concepts and Constructs** – Ravi Sethi, 2nd Edition, Pearson Education, 1996.
2. **Programming Languages** – Allen Tucker, Robert Nonan, Tata McGraw-Hill, 2002.

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