

Department of Computer Science and Engineering
Scheme of Syllabus for Fifth Semester B.E. Computer science & Engg.
(2007-08)

Sl. No	Subject Code	Subjects	Hrs/Week			C	CIE	*SEE	Total
			L	T	P				
1	UCS501C	Operating System	4	0	0	4	50	50	100
2	UCS502C	System Software	3	0	0	3	50	50	100
3	UCS503C	Database Management System	4	0	0	4	50	50	100
4	UCS504C	Unix System Programming	3	0	0	3	50	50	100
5		Dept Elective -1	3	0	0	3	50	50	100
6		Other Elective -1	3	0	0	3	50	50	100
7	UCS505L	System Software Lab	0	0	2	1	50	50	100
8	UCS506L	Database and Visual Programming Lab	0	1	3	2	50	50	100
9	UCS507L	Operating System Lab	0	0	3	1.5	50	50	100
			20	1	8	24.5	450	450	900

L: Lecturer Hours per Week

P: Practical Hours per Week

***CIE: Continuous Internal Evaluation**

T: Tutorial hours per week

C: Credit points

***SEE: Semester End Examination conducted for 100 Marks and reduced to 50 marks (Theory)**

Department of Computer Science and Engineering
Scheme of Syllabus for Sixth Semester B.E. Computer Science &Engg.
(2007-08)

Sl.No	Subject Code	Subjects	Hrs/Week			C	CIE	*SEE	Total
			L	T	P				
1	UCS601C	Computer Networks	4	0	0	4	50	50	100
2	UCS602C	Software Engineering	4	0	0	4	50	50	100
3	UCS603C	Computer Graphics and Visualization	4	0	0	4	50	50	100
4	UCS604H	Business Communication and Technical Writing	3	0	0	3	50	50	100
5		Dept Elective – 2	3	0	0	3	50	50	100
6		Dept Elective - 3	3	0	0	3	50	50	100
7		Other Elective – 2	3	0	0	3	50	50	100
8	UCS605L	Computer Graphics Lab	0	0	3	1.5	50	50	100
9	UCS606L	Computer Networks Lab	0	0	3	1.5	50	50	100
			24	0	6	27	450	450	900

L: Lecturer Hours per Week

P: Practical Hours per Week

***CIE: Continuous Internal Evaluation**

T: Tutorial hours per week

C: Credit points

***SEE: Semester End Examination conducted for 100 Marks and reduced to 50 marks (Theory)**

Department of Computer Science and Engineering
Scheme of Syllabus for Seventh Sem B.E. CS&E
(2007-08)

Sl.No	Subject Code	Subjects	Hrs/Week			C	CIE	*SEE	Total
			L	T	P				
1	UCS701C	Object Oriented Analysis and Design	3	0	0	3	50	50	100
2	UCS702C	Web Programming	3	0	0	3	50	50	100
3	UCS703C	Distributed Computing System	4	0	0	4	50	50	100
4		Dept Elective - 4	3	0	0	3	50	50	100
5		Dept Elective - 5	3	0	0	3	50	50	100
6		Other Elective - 3	3	0	0	3	50	50	100
7	UCS704L	Web Programming Lab	0	0	3	1.5	50	50	100
8	UCS705L	Object Oriented Analysis and Design Lab	0	0	2	1	50	50	100
9	UCS706P	Project Phase-I and term paper	0	0	4	4	50+50	-	100
			19	0	9	25.5	500	400	900

L: Lecturer Hours per Week

P: Practical Hours per Week

***CIE: Continuous Internal Evaluation**

T: Tutorial hours per week

C: Credit points

***SEE: Semester End Examination conducted for 100 Marks and reduced to 50 marks (Theory)**

Department of Computer Science and Engineering
Scheme of Syllabus for Eighth Sem B.E. CS&E
(2007-08)

Sl.No	Subject Code	Subjects	Hrs/Week			C	CIE	*SEE	Total
			L	T	P				
1	UCS801C	Advanced Computer Architecture	3	0	0	3	50	50	100
2		Dept elective - 6	3	0	0	3	50	50	100
3		Dept elective - 7	3	0	0	3	50	50	100
4	UCS802P	Project Phase-II	0	5	10	15	50	50	100
5	UCS803S	Seminar	0	2	0	1	50	50	100
			9	7	10	25	250	250	500

L: Lecturer Hours per Week

P: Practical Hours per Week

***CIE: Continuous Internal Evaluation**

T: Tutorial hours per week

C: Credit points

***SEE: Semester End Examination conducted for 100
Marks and reduced to 50 marks (Theory)**

UCS501C

OPERATING SYTEMS

4 CREDITS

Hours/Week: 04

Total Hours: 48

CIE MARKS: 50

SEE Marks: 50

UNIT I

12 Hrs

Introduction to Operating Systems, System structures

Jobs of operating systems; 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.

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.

UNIT II

12 hrs

Process Synchronization

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

Deadlocks

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

UNIT III

12 hrs

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.

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.

UNIT IV

12 hrs

Secondary Storage Structures

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,

System Security: Security problem, programs threats, system and networks threats, user authentication, Firewall to protect systems

Case Study: Windows xp : history, Design principles, system components

Text Books:

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

(Chapters: 1, 2, 3.1 to 3.4 , 4.1 to 4.4, 5.1 to 5.5, 6.1 to 6.7, 7, 8.1 to 8.6, 9.1 to 9.6, 10, 11.1 to 11.5, 12.1 to 12.6, 17.1 to 17.8, 21.1 to 21.9)

Reference Books:

1. D.M Dhamdhare: 2002, **Operating systems - A concept based Approach**, 2nd Edition, Tata McGraw- Hill,.

2. P.C.P. Bhatt: 2006, **Operating Systems**, 2nd Edition, PHI, 3. Harvey M Deital: 1990, **Operating systems**, 3rd Edition, Addison Wesley.

UCS502C

SYSTEMS SOFTWARE

3-CREDITS

Hours/Week: 03

CIE MARKS: 50

Total Hours: 40

SEE Marks:50

UNIT I

10 hrs

Machine Architecture: Introduction, System Software and Machine Architecture, Simplified Instructional Computer (SIC) - SIC Machine Architecture, SIC/XE Machine Architecture, SIC Programming Examples, Traditional (CISC) Machines - VAX Architecture, RISC Machines - Ultra SP ARC Architecture. **Assemblers:** Basic Assembler Function - A Simple SIC Assembler, Assembler Algorithm and Data Structures, Machine Dependent Assembler Features - Instruction Formats & Addressing Modes, Program Relocation, Machine Independent Assembler Features - Literals, Symbol-Definition Statements, Expression, Program Blocks, Control Sections and Programming Linking.

UNIT II

10 hrs

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.

UNIT III

10 hrs

Compilers: Basic Compiler Function - Grammars, Lexical Analysis, Syntactic Analysis, Code Generation, Machine Dependent Compiler Features Intermediate Form Of The Program. Machine-Dependent Code Optimization, Machine Independent Compiler Features - Structured Variables, Machine Independent Code Optimization, Storage Allocation, Block Structured Languages.

UNIT IV

10 hrs

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. **Lex And Yacc:** Lex and Yacc - The Simplest Lex Program, Recognizing Words with LEX, Symbol Tables, Grammars, Parser-Lexer Communication, The Parts of Speech Lexer, A Y ACC Parser, The Rules Section, Running LEX and Y ACC, LEX and Hand- Written Lexers, Using LEX - Regular Expression, Examples of Regular Expressions, A Word Counting Program, Parsing a Command Line, Using Y ACC - Grammars, Recursive Rules, Shift/Reduce Parsing, Y ACC Cannot Parse, A Y ACC 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.

TEXT BOOKS:

1. Leland.L.Beck, 1997, System Software, 3rd Edition, Addison-Wesley,.
2. John.R.Levine, 1999, Tony Mason and Doug Brown, Lex and Yacc, O'Reilly, SPD,

REFERENCE BOOK:

- 1.D.M.Dhamdhere, 1999, System Programming and Operating Systems, 2nd Edition, TMH,.

UCS503C DATABASE MANAGEMENT SYSTEMS 4 CREDITS

Hours/Week: 04

CIE MARKS: 50

Total Hours: 48

SEE Marks:50

UNIT-I

Introduction and Entity-Relationship Model

12 Hrs

Introduction; An example; Characteristics of Database approach; People who work with databases; Advantages of using DBMS approach; 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; Classification of Database Management systems.

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 for COMPANY database; ER Diagrams, Naming Conventions and Design Issues; Relationship types of degree higher than two.

UNIT-II

Relational Model and Relational Algebra

12Hrs

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.

SQL-The Relational Database Standard:

SQL Data Definition and Data. Types, Specifying Basic Constraints in SQL, Schema Change Statements in SQL; Basic Queries in SQL; More Complex SQL Queries; Additional Features of SQL; Views (Virtual Tables) in SQL;

UNIT-III

12Hrs

Database Design: 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; Properties of Relational Decompositions; Algorithms for Relational Database Schema Design; Multivalued Dependencies and Fourth Normal Form; Join Dependencies and Fifth Normal Form;

UNIT-IV

Transaction Management and Recovery Techniques

12 Hrs

Introduction to transaction processing; Transaction and System concepts; The ACID Properties; Characterizing Schedules Based on Recoverability; Two-Phase Locking Technique for concurrency Control(2PL); Recovery Concepts; Recovery Techniques Based on Deferred Update and Immediate Update; Shadow Paging; ARIES Recovery Algorithm; Database Backup and Recovery from Catastrophic Failures.

Text Book:

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

Reference Book:

1. Silberschatz, Korth and Sudharshan: 2006, Data base System Concepts, 5th Edition, Mc-GrawHill.

UCS504C UNIX SYSTEMS PROGRAMMING 3 CREDITS

Hours/Week: 03
Total Hours: 40

CIE MARKS: 50
SEE Marks:50

UNIT-I

10 Hrs

Introduction

UNIX and POSIX APIs: The POSIX APIs, The UNIX and POSIX Development Environment, API Common Characteristics.

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.

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

UNIT-II

10 Hrs

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.

Process Control:

Introduction, Process Identifiers, fork, vfork, exit, wait, waitpid, wait3, wait4 Functions, Race Conditions, exec Functions, Changing User IDs and Group IDs, Interpreter Files, system Function, Process Accounting, User Identification, Process Times, I/O Redirection.

UNIT-III

10 hrs

Process Relationships:

Introduction, Terminal Logins, Network Logins, Process Groups, Sessions, Controlling Terminal, tcgetpgrp and tcsetpgrp Functions, Job Control, Shell Execution of Programs, Orphaned Process Groups.

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.

UNIT-IV

10 Hrs

Interprocess Communication: Overview of IPC Methods, Pipes, popen, pclose Functions, Coprocesses, FIFOs, System V IPC, Message Queues, Semaphores, Shared Memory, Client-Server Properties, Stream Pipes, Passing File Descriptors, An Open Server-Version 1, Client-Server Connection Functions.

TEXT BOOKS:

- 1 Terrence Chan:** 1999., Unix System Programming Using C++, Prentice Hall India,
[Chapters: 1,5,6, 7, 8,9, 10]
- 2 W.Richard Stevens:** Advanced Programming in the UNIX Environment,
Addison- Wesley/PHI.
[Chapters: 7, 8,9, 13, 14, 15]

REFERENCE BOOKS:

- 1. MauriceJ.Bach:** The Design of the UNIX Operating System, Pearson Education/Prentice Hall of India.
- 2. Uresh Vahalia:** Unix Internals, Pearson Education, ASIA, 2001.

PART A

Execution of the following programs using LEX:

- 1) Program to count the number of vowels and consonants in a given string.
- 2) Program to count the number of characters, words, spaces and lines in a given input file.
- 3) Program to count number of
 - a) Positive and negative integers
 - b) Positive negative fractions
- 4) Program to count the numbers of comment lines in a given C program. Also eliminate them and copy that program into separate file.
- 5) Program to count the number of 'scanf' and 'printf' statements in a C program. Replace them with 'readf' and 'writef' statements respectively.
- 6) Program to recognize a valid arithmetic expression and identify the identifiers and operators present. Print them separately.
- 7) Program to recognize whether a given sentence is simple or compound.
- 8) Program to recognize and count the number of identifiers in a given input file.

PART B

Execution of the following programs using YACC:

- 1) Program to test the validity of a simple expression involving operators +, -, * and /.
- 2) Program to recognize nested IF control statements and display the number of levels of nesting.
- 3) Program to recognize a valid arithmetic expression that uses +, -, * and /.
- 4) Program to recognize a valid variable, which starts with a letter, followed by any number of letters or digits.
- 5) Program to evaluate an arithmetic expression involving operators +, -, * and /.
- 6) Program to recognize the grammar ($a^n b$, $n \geq 10$).

Instructions:

In the examination, a combination of one LEX and one YACC problem has to be asked from Part A and Part B for a total of 50 marks.

UCS506L DATABASE AND VISUAL PROGRAMMING
LABORATORY
2 CREDITS

Hours/Week: 03

CIE MARKS: 50
SEE Marks: 50

I. Consider the COMPANY database given below. The primary Keys are underlined.
EMPLOYEE(Fname : String, Minit: char, Lname: String, Address : String, SSN : int, Sex : char, Salary : int, Superssn : int, bdate : date, Dno : int)
DEPARTMENT(Dname : String, Dnumber : int, Mgr_ssn : int, Mgr_start_date : date)
DEPT_LOCATION(Dnumber : int, Dlocation: String)
PROJECT(Pname : string, Pnumber : int, Plocation : String, Dnum : int)
WORKS_ON(Essn : int, Pno: int, Hours : Decimal(3,1))
DEPENDENT(Essn : int, Dependent_name : String, Sex: Char, Bdate : Date, Relationship : String)

- (i) Retrieve the names of employees whose salary is greater than the salary of all the employees in dept_no 5.
- (ii) Retrieve the name of each employee who has a dependent with the same first name and same sex as the employee.
- (iii) Retrieve the name of each employee who work on all the projects controlled by department no 5
- (iv) Find the sum of all salaries of all employees of the 'Research' dept as well as maximum salary, minimum salary and average salary in this department.
- (vi) Generate suitable reports.

II. 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.

III. 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.

IV. 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.

V. 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, customercity: 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 all account tuples at every branch located in a specific city.
- (vi) Generate suitable reports.

VI TUTORIAL

- Embedded SQL; Dynamic SQL; Database stored procedures, Functions and packages;

Note: i. Assignments are to be implemented in Linux Environment

ii. Instructor is expected to supply needed case instances parameters for Implementations.

1. Writing a C Code in Linux environment to create single and multiple processes each processes is of print function and will print some message and PID. Invoke these processes to print the messages in required sequence.

Note: Use Fork function of Linux Environment to create processes

2. Exercise on thread (single and Multiple) creation.

3. Simulation of CPU Scheduler.

i. Selects from among the processes in memory that are ready to execute, and allocates the CPU to one of them

ii. CPU scheduling decisions may take place when a process:

Switches from running to waiting state

Switches from running to ready state

Switches from waiting to ready

Terminates.

1. Write a C Code to simulate scheduling algorithms and computing different time parameters.

i .Non preemptive (FCFS,SRN)

ii. Preemptive (Round robin, one defined by instructor)

5. C program for Producer consumer problem.

Producer Publisher program reads the messages from the user input *stdin* and writes them into a message queue. The input by the user can be assumed to be a ninteger always. There can be **n** number of publishers running in the system at a time.

Consumer

Consumer process reads the messages from the message queue to which the publisher processes write. It then identifies the message and invokes the particular subscriber to that message

6. Implementation of solutions to critical section problem

i. Peterson's solution.

ii. Using semaphores.

7. Simulation of solutions to classic problems of Synchronization.

i. The Bounded buffer problem

ii. The dining philosopher's problem.

8. Exercises on Deadlock handling

i. Simulation of resource allocation graph

ii. Banker's algorithm.

9. Simulation of Memory allocation schemes.

10. Illustration of page replacement algorithms with given instance.

PART B

(Not included for SEE)

Implement a file system on top of a file of 100KB called "xyzFS". (replace xyz by your Name). You have to develop a library of following functions. **myfopen**("filename"); - opens for read,write
- **int myfread** (void *out, int howmanybytes, filehandler fh)

- **int myfwrite** (void *in, int howmanybytes, filehandler fh); --> Writes in to file
- **int myfseek** (int pos, filehandler fh); --> current pointer placed at pos
- **void myfclose** (filehandler fh); copy these 5 functions into a .h file, and develop a .c implementation of them.

Assume that there are no subdirectories, Write a xyzFSformat.c program that creates your file system of 100KB size and formats it. Test your file system library by using the calls in a separate test program.

UCS601C

COMPUTER NETWORKS

4 CREDITS

Hours/Week: 04

CIE MARKS: 50

Total Hours: 48

SEE Marks:50

UNIT – I

12 Hours

Network Layer: Logical Addressing: IPv4 Addresses, IPv6 Addresses. Internet Protocol: Internetworking, IPv4, IPv6, Transition from IPv4 to IPv6. Address Mapping, Error Reporting & Multicasting: Address Mapping, ICMP, IGMP. Delivery, Forwarding & Routing: Delivery, Forwarding, Unicast and Multicast Routing Protocols.

UNIT – II

12 Hours

Transport Layer: Process-to-Process Delivery: UDP, TCP, SCTP. Congestion Control and Quality of Service: Data traffic, Congestion, Congestion Control, Two Examples, Quality of Service, Techniques to improve QoS, Integrated Services, Differentiated Services, QoS in Switched Networks.

UNIT – III

12 Hours

Application Layer: Domain Name System: Name Space, Domain Name Space, Distribution of Name Space, DNS In The Internet, Resolution, DNS Messages, Types of records, Registrars, Dynamic Domain Name System, Encapsulation. Remote Logging, Electronic Mail, File Transfer. WWW and HTTP: Architecture, Web Documents, HTTP.

UNIT – IV

12 Hours

Network Management: Network Management System, SNMP. **Multimedia:** Digitizing Audio and Video, Audio and Video Compression, Streaming Stored Audio/Video, Streaming Live Audio/Video, Real-Time Interactive Audio/Video, RTP, RTCP, Voice Over IP. **Cryptography:** Introduction, Symmetric-Key Cryptography, Asymmetric-key Cryptography, Network Security services.

TEXT BOOK:

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

REFERENCE BOOKS:

1. James F. Kurose, Keith W. Ross, Third Edition, Pearson Education, 2008, **Computer Networking-A top-down approach featuring the Internet.**
2. William Stallings, 8th Edition, Pearson Education, 2007, **Data and Computer Communication.**
3. Larry L. Peterson and Bruce S. David – 4th Edition, Elsevier, 2007, **Computer Networks A Systems Approach.**
4. Wayne Tomasi, Pearson Education, 2005, **Introduction to Data Communications and Networking.**

UCS602C

SOFTWARE ENGINEERING

4 CREDITS

Hours/Week: 04

Total Hours: 48

CIE MARKS: 50

SEE Marks:50

UNIT – I

12 Hours

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.

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.

UNIT – II

12 Hours

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.

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.

UNIT – III

12 Hours

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.

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

UNIT – IV

12 Hours

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.

MANAGEMENT: Managing People: Selecting staff; Motivating people; Managing people; The People Capability Maturity Model. Software Cost Estimation: Productivity;

DESIGNING AND DOCUMENTING SOFTWARE ARCHITECTURE: Architecture in the life cycle; Designing the architecture; Forming the team structure; Creating a skeletal system.

TEXT BOOK:

1. Ian Somerville, 8th Edition, Pearson Education, 2007, **Software Engineering**.
2. Len Bass, Paul Clements, Rick Kazman, Pearson Education, 2003. **Software Architecture in Practice** , 2nd Edition,

REFERENCE BOOKS:

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

**UCS603C COMPUTER GRAPHICS AND VISUALIZATION
4 CREDITS**

Hours/Week: 04
Total Hours: 48

CIE MARKS: 50
SEE Marks:50

UNIT I

12 Hours

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.

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.

UNIT – II

12 Hours

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

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.

UNIT – III

12 Hours

GEOMETRIC OBJECTS AND TRANSFORMATIONS – 2:

Transformations in homogeneous coordinates; Concatenation of transformations; OpenGL transformation matrices; Interfaces to three dimensional applications;

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.

UNIT – IV

12 Hours

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.

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.

TEXT BOOK:

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

REFERENCE BOOKS:

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

**UCS604H BUSINESS COMMUNICATION AND TECHNICAL WRITING
3 CREDITS**

Hours/Week: 03
Total Hours: 40

CIE MARKS: 50
SEE Marks:50

UNIT I

10 Hours

Communication In The Workplace

Role of Communication in Business, Process of Human Communication. Feedback, elements, objectives, principles of communication, Importance of communication, barriers in communication

Communication In Organization

Formal & informal communication, verbal & non-verbal communication, oral & written communication, horizontal and vertical communication, internal & external communication, Using Telephone.

UNIT II

10 Hours

Writing For The Effect

Business Etiquette and need for effect, Conversational Style, You-view Point, Positive Language, Courtesy

Listening

Introduction, meaning of listening, poor listening habits, types of listening, Effective and ineffective listening skills, Strategies for effective listening, payoffs of effective listening, barriers of effective listening, role of listening in leadership style.

Public Speaking And Oral Reporting :Making Formal Speeches, seminar presentation.

UNIT III

10 Hours

Constituents of Effective writing:

Sentence Construction, Paragraph development, the art of condensation,

Written forms of communication:

Letters: Business letters, memos, E-mails, Reports: Objectives, Characteristics of a report, types of reports, importance of reports, Formats, Prewriting, Structure of reports, Writing the reports, Writing the report, Revising, editing and proof reading. Technical proposals: Definition, Purposes, types, Characteristics, Elements of structure, Evaluation

UNIT IV

10 Hours

Research paper, Dissertation

Instruction manuals and technical description: Instruction manuals, types of instructions, writing instructions, user's manuals, Technical description, Process description

Correctness of communication

Common Errors in Usage, Punctuation and capitalization, words commonly mis-spelt.

Text Books:

1. Lesikar and Fatley , Basics Business communication Skills for Empowering the Internet Generation 10th edition, Tata McGraw Hill edition,ISBN: 978-0-07-059975-8.
2. Meenakshi Raman and Sangeeta Sharma “Technical Communication Principles and practices”, Oxford University Press, ISBN-13 978-0-19-566804-9.
3. Meenakshi Raman and Prakash Singh “Business Communication”, Oxford University Press, ISBN-13: 978-0-19-567695-2.

Reference Books

1. M Ashraf Rizvi “ Effective Technical Communication”, Tata McGraw Hill Company Limited, ISBN: 978-0-07-059952-9.
2. P.D.Chaturvedi Mukesh Chaturvedi “ Business Communication- Concepts, Cases and Application”, Pearson Education, ISBN: 81-317-0172-7.
3. Rajendra Pal and J S Khorahalli , Essential of Business Communication-, S Chand and Sons Publications.
4. Urmita Rai nad S,M Rai ,Business Communication-, Himalaya Publishing House.
5. Krishna Mohan and Meera Banerjee , “Developing Communication Skills”, McMillan India Ltd.
6. Asha Kaul , “Business Communication”, Prentice Hall India Pvt Ltd.

UCS605L COMPUTER GRAPHICS LABORATORY 1.5-CREDITS

Hours/Week: 03

CIE MARKS: 50

SEE Marks: 50

PART - A

IMPLEMENT THE FOLLOWING PROGRAMS IN C / C++

1. Program to recursively subdivide a tetrahedron to form 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 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.

Note:

- In the examination questions must be given on lots
- Each student must be given one full question

Lab Assessment:

1. Each Laboratory subject is evaluated for 100 marks(50 CIE and 50 SEE)
2. Allocation of 50 marks for CIE
 - Marks for each experiment = 20 marks/No. of proposed experiments

UCS606L NETWORKS LABORATORY 1.5 CREDITS

Hours/Week: 03

CIE MARKS: 50

SEE Marks: 50

PART - A

Simulation Exercises

The following experiments shall be conducted using NS2 / NCTUns / 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 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 Hamming code generation for error detection and correction.
3. Write a program for even / odd parity checking on binary data.
4. Write a program to perform stuffing and destuffing on given information.
5. Write a program for distance vector algorithm to find suitable path for transmission.
6. Write a program for congestion control using leaky bucket algorithm
7. 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.
8. Implement the above program using the following IPC channels:
 - i. message queues,
 - ii. pipes and
 - iii. FIFO.
9. Write a program to implement Sliding window protocol.
10. Write a program for simple RSA algorithm to encrypt and decrypt the data.

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.

UCS701C OBJECT ORIENTED ANALYSIS AND DESIGN 3 CREDITS

Hours/Week: 03

CIE Marks: 50

Total Hours: 40

SEE Marks:50

UNIT-I

10 hrs

Introduction, Modeling Concepts

Definitions of Object Orientation, OO development, OO themes; Evidence for usefulness of OO development; OO modeling history. Modeling as Design Technique: Modeling; abstraction; Three Models

Class Modeling

Class Modeling: Object and class concepts; Link and associations concepts; Generalization and inheritance; A sample class model; Navigation of class models. Advanced object and class concepts; Association ends; N-ary associations; Aggregation; Abstract classes; Multiple inheritance; Metadata; Reification; Constraints; Derived data; Packages.

UNIT-II

10 hrs

State Modeling

State Modeling: Events, States, Transitions and Conditions; State diagrams; State diagram behavior; Practical tips. 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

Interaction Modeling: Use case models; Sequence models; Activity models; Use case relationships; Procedural sequence models; Special constructs for activity models.

UNIT-III

10 hrs

Process Overview, System Conception,

Process Overview: Development stages; Development life cycle. System Conception: Devising a system concept; Elaborating a concept; Preparing a problem statement.

Domain Analysis, Application Analysis

Domain Analysis: Overview of analysis; Domain class model; Domain state model; Domain interaction model; Iterating the analysis. Application Analysis: Application interaction model; Application class model; Application state model; Adding operations.

UNIT-IV

10 hrs

System Design :

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.

Class Design, Implementation Modeling

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.

TEXT BOOKS:

1. Michael Blaha, James Rumbaugh, 2005, “**Object-Oriented Modeling and Design with UML**”, 2nd Edition, Pearson Education

REFERENCE BOOKS:

1. Grady Booch et al, 2007, “**Object-Oriented Analysis and Design with Applications**”, 3rd Edition, Pearson
2. Mark Priestley, 2003, “**Practical Object-Oriented Design with UML**”, 2nd Edition, Tata McGraw-Hill
3. K. Barclay, J. Savage, 2008, “**Object-Oriented Design with UML and JAVA**”, Elsevier,.

UCS702C

WEB PROGRAMMING

3 CREDITS

Hours/Week: 03

CIE Marks: 50

Total Hours: 40

SEE Marks:50

UNIT - I

10 hrs

Fundamentals of Web, XHTML : 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. XHTML : Images; Hypertext Links; Lists; Tables; Forms; Frames; Syntactic differences between HTML and XHTML. CSS: Introduction; Levels of style sheets; Style specification formats; Selector forms; Property value forms;

UNIT – II

10 hrs

CSS: Font properties; List properties; Color; Alignment of text; The Box model; Background images; The and <div> tags; Conflict resolution. **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.

UNIT – III

10 hrs

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. **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.

UNIT – IV

10 hrs

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. **PERL, CGI PROGRAMMING**: Origins and uses of Perl; **Servlets**: Introduction, comparison servlet & CGI, Servlet Basics, Servlet API Basics, example, cookies, state and session management, Database Access with JDBC: JDBC architecture, accessing database, JDBC servlet **ASP.NET**: Advantages of ASP.NET, ASP.NET Namespaces, creating ASP.NET web application, ASP.NET compilation cycle

TEXT BOOK:

1. Programming the World Wide Web – Robert W. Sebesta, 4th Edition, Pearson Education, 2008.
2. Inside Servlets server-side programming for java platform- Dustin R. Callaway, Pearson Education, 2001

REFERENCE BOOKS:

1. Andrew Trolsen, 2007, “**C# and the .NET platform**”, Second Edition, Dream tech Press,
2. M. Deitel, P.J. Deitel, A. B. Goldberg, “2004, **India Internet & World Wide Web How to H program** “, 3rd Edition, Pearson Education / PHI
3. Chris Bates, 2006, “**Web Programming Building Internet Applications**”,3rd edition, Wiley India
4. Xue Bai et al, Thomson, 2003,“**The Web Warrior Guide to Web Programming**”

UCS703C DISTRIBUTED COMPUTING SYSTEMS 4 CREDITS

Hrs/Week: 4
Total Hrs.: 48

CIE Marks: 50
SEE Marks:50

UNIT-I

12 Hours

Introduction: Characteristics of Distributed Systems: Examples of Distributed Systems: Resource sharing and the web; Challenges; System Models: Architectural Models, Internet Protocols; Networking & Communication.

Inter-process Communication The APIs for the Internet Protocols; Client-Server Communication, group Communication.

UNIT-II

12 Hours

Distributed Objects & Remote Invocation: Communication between Distributed Object, Remote Procedure Calling, Events and Notifications, Java RMI Case Study.

Operating System Support and Security: Introduction, Operating System layer, Protection, Processes and Threads, Overview of security techniques, Cryptographic algorithms, Digital signature, Cryptographic Pragmatics.

UNIT-III

12 Hours

Distributed File Servers and Name Services: Introduction, File Service Architecture, Recent Advances, Name Services and Domain Name Systems, Directory and Discovery Services.

Time and Global states: Introduction, Clock events and Process states, synchronizing Physical Clocks, Logical Time and Logical Clocks, Global States, Distributed debugging.

UNIT-IV

12 Hours

Coordination and Agreement, Transactions and Concurrency Control .Introduction, Distributed Mutual Exclusion, Election, Transactions, Nested transactions, Locks, Optimistic Concurrency Control, Timestamp Ordering, Comparison of methods for Concurrency Control.

Distributed Transactions & Multimedia Systems: Introduction, Flat and Nested Distributed Transactions, Atomic Commit Protocols, Concurrency Control in Distributed Transactions, Distributed Deadlocks, Transaction Recovery, Characteristics of Multimedia data, Quality of service management, Resource management, Stream adaptation.

TEXT BOOKS:

1. George Coulouris, Jean Dollimore, Tim Kindberg, “**Distributed Systems - Concept & Design**”, 3rd Edition, Pearson Education.
2. Andrew S. Tanenbaum & Maarten van Steen, 2008, “**Distributed Systems – Principles and Paradigms**”, PHI.

UCS704L WEB PROGRAMMING LABORATORY

1.5 CREDITS

Hrs/Week: 3
CIE Marks: 50

Exam Hours: 3
SEE Marks: 50

1. Develop a XHTML document to create biodata using external style sheet, ordered list, table, borders, padding, color and the tag
2. Develop a XHTML file that includes javascript for the following problems
Input: user name
Output: user name with greeting message
3. Develop a XHTML file that includes javascript for the following problems:
Input : percentage marks of the student
Output: Display result
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. The information must include USN, Name, Name of the College, Branch, 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 Java servlet program to request server information.
b) Write a java servlet program to accept username and display a greeting message
8. Write a java servlet program to change the background color of the page based on the color selected by the user.
9. a) Write a java servlet program to display a digital clock, which displays the current time of the server.
b) Write a java servlet program to display a greeting based on the access time of the server.
10. Write a java servlet program to create a cookie and store information into cookie. Display contents of cookie.
11. Write a java servlet program to create a session and display session information.
12. Create a form with Name, Address Line 1, Address Line 2, and E-mail text fields. On submitting, store the values in database table. Retrieve and display the data based on Name. (using java servlet)

13. Create a form with Name, Address Line 1, Address Line 2, and E-mail text fields. On submitting, store the values in database table. Retrieve and display the data based on Name. (using java servlet)
14. Develop web program to display the greeting message using Perl and PHP

UCS705L OBJECT ORIENTED ANALYSIS AND DESIGN
LABORATORY
1 CREDIT

Hrs/Week: 2

CIE Marks: 50
SEE Marks: 50

1. Simple JAVA/C Programs
Identify the various classes and attributes and bring out the UML class/ class diagram, and a sequence diagram.
 - a. Triangle of binary numbers.
 - b. Triangle of numbers.
 - c. Sum of series.
 - d. Sorting strings: Command line input.
 - e. Sorting strings: Keyboard input.
 - f. Average of “n” numbers.
 - g. Prime number checking.
 - h. Factorial – recursion.
 - i. Fibonacci numbers – recursion.
 - j. Choosing maximum – recursion.

2. **GRID LINES**

Specification: Grid with two sets of horizontal vertical lines (Rumbhaugh approach)

Write a program to create a window and draw horizontal and vertical lines to form a grid.

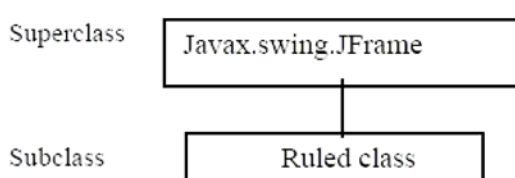
High level Design:

Define a subclass of JFrame class and draw horizontal parallel lines and vertical parallel lines to form the grid. Create an object of this class and display it.

Detail level design:

User Interface Specification:

The window contains a grid of horizontal and vertical lines. For this we define a GUI class called Ruled derived from JFrame class of javax.swing library.



Name of the GUI component: Ruled class Hierarchy: Sub class of JFrame class of Javax.swing library.

Title of the window: None

Background color: None

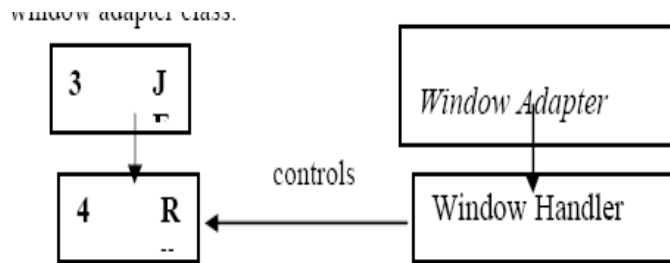
Background Design: None

Content of window

Parallel horizontal and vertical lines are drawn inside the window to form a grid.

Control classes:

We define a class called window Handler to handle the window. This is derived from window adapter class.



Print() method : Using this method we draw the grid.

- Identify the various use cases and actors involved and represent the user view of the system.
- Identify the various classes and attributes and bring out a class diagram, and a sequence diagram.

3. GRID WITH TWO SETS OF DIAGONAL LINES

Write a program to create a window and draw two sets of diagonal parallel lines crossing each other. Design the following and then implement.

- High level design
- Detail level design
- User interface specification

4. OOA AND OOD USING UML -I

In the employee referral process, the HR head of the region where a vacancy exists informs employees of that region and other regional HR heads. The other regional HR heads inform employees by putting up a notice informing them about the vacancy. The employees send on their recommendations to the regional HR head of the region where a vacancy exists. The regional HR head then matches the skills of these candidates with the skills required for the vacant position and short lists them. An interview schedule is drawn up and the short listed candidates are informed. Based on the interview proceedings, interview details are updated and all the selected candidates are given offer letter. The candidate informs the HR (head where the vacancy exists) either by accepting or declining the offer letter. When a candidate referred by an employee joins the organization, the employee who has referred the candidate is paid a bonus.

- Identify the various use cases and actors involved and represent the user view of the system.
- Identify the various classes and attributes and bring out a class diagram, and a sequence diagram.

5. OOA AND OOD USING UML-II

UML class representation: Design and implement a student class with the following attributes: i) Reg no ii) Name of a student iii) marks in subject-1 iv) marks in subject marks subject-2 v) marks in subject-3 vi) Total marks. The total of 3 subject marks must be calculated only when the student passes in all the 3 subjects. The pass marks for each subject is 50. If a candidate fails in any one of the subjects his total marks must be declared as 0. Using these conditions write a constructor for this class. Write a method display Student () to display the details of student object. In the main method create an array of 3 student objects and display the object details.

- Identify the various use cases and actors involved and represent the user view of the

system.

b) Identify the various classes and attributes and bring out a class diagram, and a Sequence diagram.

6. OOA AND OOD USING UML-III

Consider the student class defined in the problem 2. Assume that a student studies 6 subjects.

Each subject has a title, passing minimum marks, and maximum marks. Design the class representation using UML notations and write a java program to define student class including the subject as attribute. Design specifications : A student studies 6 subjects. Each subject has a subject code, title, passing minimum marks, maximum marks. The following table shows the sample data:

a) Identify the various use cases and actors involved and represent the user view of the

Subject code	Title	Passing Min	Max. Marks
CS401	java prog.	50	100
CS406	ASW lab	18	50
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-----	-----	---	---

system

b) Identify the various classes and attributes and bring out a class diagram, and a sequence diagram.

7. OOA AND OOD USING UML V

Bank interest computation

Consider the following attributes

P=Principle

R=Rate of interest

N=Number of years

SI= Simple interest

A=Amount

Design UML class called Deposit with the above five attributes. In the constructor, calculate interest (SI) and amount. Implement the above specification using Java programming Language.

8. OOA AND OOD USING RAUMBHAG AND UML VI

In a bank the customer opens an account and in that account he/she deposits money. So the entities are:



A customer can have several accounts and an account can be spent as a joint account by several customers. In the customer class, the address of the customer is constructed as an object of a class called Address. Write the UML class diagram consisting Customer class and Address class. In the Account class, there is an attribute called users. This is an integer attribute. It tells no. of users of the account. If the account is a joint account by 5 persons, the value of the account. If the account is a joint account by 5 persons, the value of users=5. If it is a single user account, users=1.

Write the UML class diagrams for account

The Account number is long type. Cust() is an array of length= users. If the users = 5, Cust() is of length 5. Another attribute of the Account is an object of Deposit class. Write the UML class diagram for Deposit

Test case:

Object Name	User ID	Fname	Lname	DOB	Add	PhoneNo

Address:

Object Name	Street	City	State	Country	Pin code

Deposit:
Principle P=
No. of years n=
Rate of interest=

Account:
Account object: a1
A/C No:
Customer object:

No. of users:
Deposit Object: d1

Sample Output
A/C No:

Customer ID:
First Name:
Last Name:
DOD:
Address:

Phones:

Customer ID:
First Name:
Last Name:
DOD:
Address:
Phones:

No of users:
Deposit:
Principle:
Rate of interest:
No of years:
Simple interest:
Amount:

10. OOA AND OOD USING BOOCH AND UML – VII :

Consider the object COLLEGE of mini project. For the entire given specification in the problem construct the following UML diagrams.

Specifications:

In a college of Computer Science there are computer laboratories and equipments. Develop a system to

create the college as an object and display the contents.

- (1) Class diagram
- (2) Object diagram
- (3) Interaction diagrams
 - a. Sequence
 - b. Collaboration
- (4) Deployment diagram

11. OOA AND OOD USING UML VIII

C library information system:

A library lends books and magazines to members, who are registered in the system. Also, it handles the purchase of new titles for the Libran. Popular titles are bought in multiple copies. Old books and magazines are removed when they are out of date or in poor condition. A member can reserve a book or magazine that is not currently available in the library, so that when it is returned or purchased by the library, that person is notified. The library can easily create, replace and delete information about the titles, members, loans and reservations in the system.

For the above problem specification devise the following UML diagrams:

- 1) Use case diagram
- 2) Class diagrams
- 3) State transition diagram
- 4) Sequence diagram
- 5) Collaboration diagram
- 6) Activity diagram
- 7) Component diagram
- 8) Deployment diagram

12. OOA AND OOD USING UML IX

Develop the product using java-programming language. Write UML diagrams for railway Reservation System. Develop the product using java programs.

Lab Assessment:

1. Each Laboratory subject is evaluated for 100 marks (50 CIE and 50 SEE).
2. Allocation of 50 marks for CIE
 - Marks for each experiment = 30marks/No. of proposed experiments,
 - One practical test for 20 marks (Write-up 5 marks, conduction, calculation, Results: 10 marks, viva-voce:5 marks)
- 3 Allocation of 50 marks for SEE
 - 25% write-up, 50% conduction, calculation, results 25% viva-voce

PROJECT PHASE –I and Term paper

Students are expected to submit the list of group members for the project work. With Consent of the guide. The students who are submitting the list without guide consent for them department will allocate guides. The Phase I include

1. Deciding the broad area for project work
2. Sufficient literature Survey (includes Research papers, technical reports, white papers, manuals and survey reports).
3. Identification of Issues and defining problem.
4. A report containing summary of survey made covering issues and problem definition with print outs of all literature documents.
5. Submission and presentation of term paper by project team.

A **term paper** is a research paper written by [students](#) over an [academic term](#) or semester which accounts for a large amount of a grade and makes up much of the course. Term papers are generally intended to describe an event or concept or argue a point. There is much overlap between the terms "research paper" and "term paper". The phrase "term paper" was originally used to describe a paper (usually a research based paper) that was due at the end of the "term" - either a semester or quarter, depending on which unit of measure a school used. Common usage has "term paper" and "research paper" as interchangeable, but this is not completely accurate. Not all term papers involve academic research, and not all research papers are term papers.

Project Phase I Evaluation

Survey Report Evaluation : 50 Marks (By Guide)

Term Paper Evaluation : 50 Marks(By Departmental Project Evaluation Committee
(DPEC) including Guide)

UCS801C ADVANCED COMPUTER ARCHITECTURE 3 CREDITS

Hours/Week: 03

Total Hours: 40

CIE Marks: 50

SEE Marks:50

UNIT – I

10 hrs

Parallel Computer Models : The State of Computing, Computer Development Milestones, Elements of Modern Computers, Evolution of Computer Architecture, System Attributes to Performance, Multiprocessors and Multicomputers, Shared -Memory Multiprocessors, Distributed -Memory Multiprocessors, A Taxonomy of MIMD Computers, Multivector and SIMD computers, Vector Supercomputers, SIMD Supercomputers, Program and Network Properties, Conditions of Parallelism, Data and Resource Dependences, Hardware and Software Parallelism, The Role of Compilers, Program Partitioning and Scheduling, Grain Sizes and Latency, Grain Packing and Scheduling, Program flow Mechanisms, Control Flow Versus Data Flow , Demand-Driven Mechanisms, Comparisons of Flow Mechanisms

UNIT - II

10 hrs

System Interconnect Architecture: Network properties and Routing , Static Connection Networks, Dynamic Connection Networks, Processor and Memory Technologies, Advanced Processor Technology, Instruction Pipelines, Processors and Co-processors, Instruction-Set Architectures,CISC Scalar Processor (exclude CISC Microprocessor Families), RISC Scalar Processor (exclude Sun Microsystems SPARC Architecture), Superscalar and Vector Processor, Superscalar Processors (exclude IBM RS/6000 Architecture), VLIW Architecture
Backplane Bus System, Backplane Bus Specification, Addressing and Timing Protocols Arbitration, Transaction and Interrupt, IEEE Futurebus+ Standards, Shared-Memory, Organizations, Interleaved Memory Organization, Bandwidth and fault Tolerance, Memory Allocation Schemes (exclude swapping in Unix, Demand Paging system and Hybrid Paging system)

UNIT - III

10 hrs

Pipelining and Superscalar Techniques: Linear Pipeline Processors, Asynchronous and Synchronous Models, Clocking and Timing control, Speed up, Efficiency and Throughput, Non-linear Pipeline Processors, Reservation and Latency Analysis, Collision-Free Scheduling, Instruction Pipeline Design, Instruction Execution Phases, Mechanism for Instruction, Pipelining ,Dynamic Instruction Scheduling, Branch Handling Techniques, Arithmetic, Pipeline Design, Computer Arithmetic Principles, Static Arithmetic Pipeline, Multifunctional Arithmetic Pipeline (exclude IBM360 Floating Point Unit)

UNIT - IV

10 hrs

Multiprocessors and Multi-computers: Multiprocessor System Interconnects, Hierarchical Bus Systems: Crossbar Switch and Multiport Memory, Multistage and Combining Networks, Cache Coherence and Synchronization Mechanisms, The Cache Coherence Problem, Snoopy Bus Protocol, Directory-based protocols, Hardware Synchronization Mechanisms, Message Passing Schemes, Message Routing Schemes, Deadlock and Virtual Channels, Flow Control Strategy

TEXT BOOKS:

1. Kai Hwang, 1993, “**Advanced Computer Architecture- Parallelism, Scalability, Programmability**”, McGraw Hill (Chapter 1.1-1.3, 2.1-204, 4. 1 (only specified topics), 4.2.1, 4.2.2, 5.1, 5.3, 6.1, 604, 7.1, 7.2, 704.1, 704.2, 704.3)

REFERENCE BOOKS:

1. David E Culler, J P Singh, Anoop Gupta, Harcourt Asia and Morgan Kaufmann 1999, “**Parallel Computer Architecture**”,
2. John P Hayes, 1998, “**Computer Architecture and Organization**”, 3rd Edition, McGraw-Hill
3. V Rajaraman, C Siva Ram Murthy, 2000, “**Parallel Computers - Architecture and Programming**“, PHI

PROJECT PHASE II

Credits : 16

CIE : 50 Marks

SEE:50 Marks

Continuous Evaluation Scheme: Mid Semester Presentation /Demonstration : 15 Marks

Final Internal Presentation /Demonstration :20 Marks

Report Writing: 15 Marks

SEE Evaluation: Presentation and Demonstration: 30 Marks

Report Evaluation: 20 Marks

Note: i. Demonstration/Presentations are evaluated by Departmental Project Evaluation committee (DPEC)including Guide and the Report is evaluated by Guide.

ii. In Semester End Examination (SEE) Project Work is evaluated jointly by Internal and External Examiners

LIST OF ELECTIVES UNDER DIFFERENT STREAMS

1. Mobile Communication Computer Networks	
UCS001E	Network Management
UCS002E	Multicast Communication
UCS003E	Cryptography and Network Security
UCS004E	Mobile Computing
UCS005E	Information and Network Security
UCS006E	Storage Area Networks
UCS007E	Data Communications
2. Computing systems	
UCS008E	Client Server Computing
UCS009E	Grid and Cluster Computing
UCS0010E	Wireless and Mobile Communications
UCS011E	Pervasive Computing
UCS012E	Embedded Computing Systems
UCS013E	Multimedia Computing and Data Compression
UCS014E	Information Storage and Retrieval
3. Computer Architecture	
UCS015E	Advanced Microprocessors and Peripherals
UCS016E	Parallel Computing
UCS017E	Microcontroller Based Systems
UCS018E	Multi Core Architecture
4. Operating Systems and System Software	
UCS019E	Distributed Operating Systems
UCS020E	Compiler Design
UCS021E	Real Time Systems

5. Electronics and Semiconductor Technology	
UCS022E	Semiconductor Technology
UCS023E	VLSI Design
6. Signals and Image Processing	
UCS024E	Digital Signal Processing
UCS025E	Digital image processing
UCS026E	Signals and Systems
UCS027E	Speech and Audio Processing
UCS028E	Digital Video Processing
7. Soft Computing	
UCS029E	Fuzzy Logic
UCS030E	Genetic Algorithms
UCS031E	Neural Networks
8. Theoretical Computer Science	
UCS032E	Graph Theory
UCS033E	Numerical Techniques
UCS034E	Discrete Mathematical Structure
UCS035E	Advanced Algorithms
9. Object Oriented Technology	
UCS037E	C# Programming and .NET
UCS038E	Java and J2EE
10. Software Engineering	
UCS039E	Software Testing
UCS040E	Advanced Software Engineering

11. Artificial Intelligence and Expert Systems	
UCS041E	Artificial Intelligence and Expert Systems
UCS042E	Introduction to Robotics
UCS043E	Data Mining
UCS044E	Machine Learning
UCS045E	Pattern Recognition
12. DataBase Management Systems	
UCS046E	File Structures
UCS047E	Distributed Databases and DataBase Warehousing
UCS048E	Advanced DataBase Management System
13. Applications	
UCS049E	An Algorithmic Approach to Bioinformatics
14. Engineering Technology and Management	
UCS050E	Operations Research
UCS058E	System Modeling And Simulation
15. Humanities and Social Studies	
UCS051E	Ethics in Computing Profession and Legal Issues
UCS052E	Financial Management and Accounting
16. Programming Languages	
UCS053E	Functional Programming
UCS054E	Principles of Programming Languages
17. Web Technology	
UCS055E	Services Oriented Architecture
18. Computer Graphics and Visualization	
UCS056E	Computer Animation
UCS057E	Virtual Reality

UCS001E NETWORK MANAGEMENT 3 CREDITS

Hours/Week : 03
Total Hours:40

CIE Marks: 50
SEE Marks: 50

UNIT - I

10 Hours

Network Management: An Overview Defining Network Management The Importance of Network Management: Many Reasons to Care The Players: Different Parties with an Interest in Network Management Network Management Complexities: . On the Job with a Network Manager A Day in the Life of a Network Manager The Network Operator's Arsenal: Management Tools The Network Device The Management System The Management Network The Management Support Organization: NOC, NOC.

UNIT - II

10 Hours

Management Perspectives The Dimensions of Management Lost in (Management) Space: Charting Your Course Along Network Management Dimensions Management Interoperability: Management Life Cycle: Managing Networks from Cradle to Grave Management Layer: Management Function: Management Process and Organization: . Management Functions and Reference Models: Getting Organized Of Pyramids and Layered Cakes ,FCAPS: The ABCs of Management OAM&P: The Other FCAPS .

UNIT - III

10 Hours

Management Building Blocks Management Information: What Management Conversations Are All About .Establishing a Common Terminology Between Manager and Agent MIBs MIB Definitions Anatomy of a MIB Modeling Management Information Management Communication Patterns: Rules of Conversation Layers of Management Interactions Manager-Initiated Interactions—Request and Response Agent-Initiated Interactions: Events and Event-Based Management Common Management Protocols: Languages of Management SNMP: CLI: syslog: The CLI Notification Sidekick Netconf: A Management Protocol for a New Generation Netflow and IPFIX: "Check, Please," or, All the Data, All the Time

UNIT - IV

10 Hours

Applied Network Management Remote Network Monitoring RMON 1 Remote Network Monitoring RMON 2 Monitoring Network Protocol Traffic Application-Layer Visibility Management Tools, Systems and Applications Test and Monitoring Tools Integrating Tools Development Tools. Web-based Enterprise Management Management Metrics: Assessing Management Impact and effectiveness Network Management Business Impact Factors that Determine Management Effectiveness Assessing Network Management Effectiveness

Text Books:

1. Xander Clemm, “**Network Management Fundamentals** “Cisco Press
2. Subramanian, M., “**Network Management: Principles and Practice**”.

UCS002E MULTICAST COMMUNICATION 3 CREDITS

Hours/Week: 03

CIE Marks: 50

Total Hours: 40

SEE Marks: 50

UNIT - I

10 Hours

Introduction: The Basic of Group Communication: Types of Communication; Multicast vs. Unicast; Scalability; Applications of Group Communication; Characteristics of Groups; Special Aspects of Group Communication; Support within the Communication System. Multicast Routing: Basic Routing Algorithms; Group Dynamics; Scoping and Multicast Address Allocation; Concepts for Multicast Routing; Multicast routing on the Internet.

UNIT -II

10 Hours

Quality of Service: Integrated Services; Differentiated Services; Differences and Integration Options. Multicast in A TM Networks: The Switching Technology ATM; ATM Multicast.

UNIT - III

10 Hours

Transport Protocols:UDP; XTP; MTP; RMP; LBRM; SRM; RMTP; PGM; MFTP.

UNIT - IV

10 Hours

MBone - The Multicast Backbone of the Internet, bone Architecture; MBone Applications; MBone Tools; Outlook: Multicast Routing and Mobile Systems; Multicast and DiffiServ; Active Networks for Supporting Group Communication; Group Management for Large Dynamic Groups.

TEXT BOOK:

1. Ralph Wittmann and Martina Zitterbart, “ **Multicast Communication Protocols and Applications** “, Morgan Kaufmann Publishers,

UCS003E CRYPTOGRAPHY AND NETWORK SECURITY
3 CREDITS

Hours/Week : 03
Total Hours:40

CIE Marks: 50
SEE Marks: 50

UNIT- I

10 Hours

Symmetric Ciphers: Overview: Services, Mechanisms and Attacks, The OSI Security Architecture, A Model of Network Security. Classical Encryption Techniques: Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Rotor Machines, Steganography. Block Cipher and the Data Encryption Standard: Simplified DES, Block Cipher Principles,

UNIT- II

10 Hours

The Data Encryption Standard: The Strength of DES, Differential and Linear Cryptanalysis. Symmetric Ciphers: Triple DES, Blowfish. Confidentiality Using Conventional Encryption: Placement of Encryption Function, Traffic Confidentiality, Key Distribution, Random Number Generation. Public-Key Encryption, Digital signatures and Authentication Protocols: Number Theory: Prime Numbers, Fermat's and Euler's Theorems, Testing for Primality. Public-Key Cryptography and RSA: Principles of Public Key Cryptosystems, The RSA Algorithm, Key Management, Diffie Hellman Key Exchange.

UNIT- III

10 Hours

Message Authentication: Authentication Requirements, Authentication Functions, Message Authentication Codes, MD5 Message Digest Algorithm. Digital Signatures and Authentication Protocols: Digital Signatures, Authentication Protocols, Digital Signature Standard. Network Security: Authentication Applications: Kerberos, X.509 Directory Authentication Service. Electronic Mail Security: Pretty Good Privacy.

UNIT -IV

10 Hours

IP Security: Overview, IP Security Architecture, Authentication Header, Encapsulation Security Payload. Web Security: Web Security Requirements, Secure Sockets Layer and Transport Layer Security, Secure Electronic Transaction.

Text book: 1. William Stallings, Cryptography and Network Security

UCS004E MOBILE COMPUTING 03 CREDITS

Hours/Week : 03

Total Hours:40

CIE Marks: 50

SEE Marks: 50

UNIT -I

10 Hours

Introduction: Applications: A short history of wireless communication Wireless Transmission: Frequency for radio transmission, Signals, Antennas, Signal propagation, Multiplexing, Modulation, Spread spectrum, Cellular systems. Medium Access Control: Motivation for a specialized MAC: Hidden and Exposed terminals. Near and Far terminals; SOMA, FOMA, TOMA: Fixed TOM, Classical Aloha, Slotted Aloha, Carrier sense multiple access, Demand assigned multiple access, PRMA packet reservation multiple access, PRMA packet reservation multiple access, reservation TOMA, Multiple access with collision avoidance, Polling, Inhibit sense multiple access; CDMA: Spread Aloha multiple access.

UNIT - II

10 Hours

GSM and Similar Architectures GSM – Services and System Architectures, Radio Interfaces, Protocols, Localization, Calling, Handover, General Packet Radio Service, High-speed circuit-switched data, DECT. Wireless Medium Access Control and CDMA – based Communication Medium Access Control, Introduction to CDMA – based Systems, OFDM Mobile IP Network Layer IP and Mobile IP Network Layers Packet Delivery and Handover Management, Registration, Tunneling and Encapsulation, Route Optimization, Dynamic Host Configuration Protocol. Mobile Transport Layer Indirect TCP, Snooping TCP, Mobile TCP, Other Methods of TCP – layer Transmission for Mobile Networks

UNIT -III

10 Hours

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

UNIT - IV

10 Hours

Mobile Devices, Server and Management: Mobile agent, Application Server, Gateways, Portals, Service Discovery, Device Management, Mobile File Systems, Security

Wireless LAN, Mobile Internet Connectivity and Personal Area Network : Wireless LAN (WiFi) Architecture and Protocol Layers, WAP 1.1 and WAP 2.0 Architectures, Bluetooth – enabled Devices Network, Zigbee. **Mobile Operating Systems :** Operating System, PalmOS, Windows CE, Symbian OS, Linux for Mobile Devices.

Text Books:

1. Raj Kamal, 2007, “**Mobile Computing**”, Oxford University Press
2. Asoke Talkukder, Roopa R Yavagal, 2007, “**Mobile Computing Technology, Applications and Service Creation**”, Tata McGraw Hill
3. Schiller, 2004, “**Mobile Communication**”, Pearson Publication

UCS005E INFORMATION AND NETWORK SECURITY

3 CREDITS

Hours/Week: 03
Total Hours: 40

CIE Marks: 50
SEE Marks: 50

UNIT - I

10 Hours

Introduction to Information Security: Introduction; What is security? Critical characteristics of information; NSTISSC security model; Approaches to information security implementation; The Security System Development Life Cycle; Information Security Terminology. Planning for Security Introduction; Information Security Policy, Standards, and Practices; The Information Security Blue Print Security Technology Firewalls and VPNs: Introduction, Physical design, Firewalls, Protecting Remote Connections. Intrusion Detection, Access control and Other Security Tools: Introduction; Intrusion Detection Systems (IDS); Honey Pots, Honey Nets, and Padded cell systems; Scanning and Analysis Tools; Access Control Devices.

UNIT - II

10 Hours

Information Security maintenance: Introduction; Security Management Models; The Maintenance Model. Introduction to Network Security : Attacks , Services, and Mechanisms; Security Attacks; Security Services; A model for Internetwork Security; Internet Standards and RFCs. Cryptography Conventional Encryption Principles and Algorithms; Cipher Block Modes of Operation; Location of encryption devices; Key distribution; Approaches to message authentication; Secure Hash functions and HMAC; Public Key Cryptography Principles and Algorithms; Digital Signatures; Key management.

UNIT - III

10 Hours

Authentication Applications Kerberos, X.509 Directory Authentication Service Electronic Mail Security: Pretty Good Privacy (PGP), S/MIME IP Security IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations, Key Management.

UNIT - IV

10 Hours

Web Security Web security requirements, Secure Socket layer (SSL) and Transport layer Security (TLS), Secure Electronic Transaction (SET) **Network Management Security** Basic concepts of SNMP, SNMPv1 community facility, SNMPv3

TEXT BOOKS:

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

REFERENCE BOOKS:

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

UCS006E STORAGE AREA NETWORKS 3 CREDITS

Hours/Week : 03

Total Hours:40

CIE Marks: 50

SEE Marks: 50

UNIT - I

10 Hours

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 Intelligent Disk Subsystems : Architecture of Intelligent Disk Subsystems; Hard disks and Internal I/O Channels; JBOD, Storage virtualization using RAID and different RAID levels; Caching: Acceleration of Hard Disk Access; Intelligent disk subsystems, Availability of disk subsystems.

UNIT - II

10 Hours

I/O Techniques: The Physical I/O path from the CPU to the Storage System; SCSI; Fibre Channel protocol Stack; Fibre Channel SAN; IP Storage **Network Attached Storage:** The NAS Architecture, The NAS hardware Architecture, The NAS Software Architecture, Network connectivity, NAS as a storage system. **File System and NAS :** Local File Systems; Network file Systems and file servers; Shared Disk file systems; Comparison of fibre Channel and NAS.

UNIT - III

10 Hours

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 **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.

UNIT - IV

10 Hours

Software Components of SAN : The switch's Operating system; Device Drivers; Supporting the switch's

Components; Configuration options for SANs. **Management :** Planning Business Continuity; Managing availability; Managing Serviceability; Capacity planning; Security considerations.

TEXT BOOKS:

1. Ulf Troppens, Rainer Erkens and Wolfgang Muller, 2007, “**Storage Networks Explained**”, Wiley India
2. Robert Spalding, 2003, “**Storage Networks The Complete Reference**”, Tata McGraw-Hill

REFERENCE BOOK:

1. Richard Barker and Paul Massiglia, 2002: “**Storage Area Network Essentials A Complete Guide to understanding and Implementing SANs**”, John Wiley India

UCS007E

DATA COMMUNICATIONS

3 CREDITS

Hrs/Week: 3
Total Hrs.: 40

CIE Marks: 50
SEE Marks: 100

UNIT – I

10 Hours

Introduction: Data Communications; Networks; the Internet; Protocols and Standards; **Network Models:** Layered tasks; The OSI Model, Layers in the OSI model; TCP / IP Protocol Suite, Addressing.

Data and Signals: Analog and digital signals; Periodic Analog Signals, Digital Signals, Transmission impairment; Data rate limits; Performance.

UNIT – II

10 Hours

Digital Transmission, Analog Transmission and Multiplexing: Digital-to-Digital conversion; Analog-to-Digital conversion: PCM; Transmission modes, Digital - to - Analog conversion; Analog - to - Analog conversion; Multiplexing.

Transmission

Media, Error Detection and Correction: Guided media, unguided media: Wireless. Introduction to Error detection and Correction; Block Coding; Linear Block Codes; Cyclic codes, Checksum.

UNIT – III

10 Hours

Data Link Control: Framing; Flow and Error control; Protocols; Noiseless channels; Noisy channels; HDLC; Point-to-point Protocol.

Multiple Accesses: Random Access; Controlled Access; Channelization.

UNIT – IV

10 Hours

Ethernet: IEEE standards; Standard Ethernet and changes in the standard; Fast Ethernet; Gigabit Ethernet.

Wireless LANs and Connection of LANs: IEEE 802.11; Bluetooth. Connecting devices; Backbone Networks; Virtual LANs.

TEXT BOOK:

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.

UCS008E CLIENT SERVER COMPUTING 3 CREDITS

Hrs/Week: 3
Total Hrs.: 40

CIE Marks: 50
SEE Marks: 100

UNIT- I

10 Hours

Introduction: to client/server computing, advantages of client/server computing. **Architecture:** Data access architecture, Execution architecture Vertical slice-two-tiered client/server, stored procedure, three-tiered architecture.

Role of the client, client services, Remote procedure call, print. Services, Remote services, Utility services, Message services, Network services, Application services, Database services,

UNIT-II

10 Hours

Server functionality, Request processing, File services, Database services, Communication services, Security services, Network operating system, platforms, Server operating system.

Connectivity - Open systems interconnect, communications interface technology, interprocess communication.

UNIT- III

10 Hours

Application development management issues-- platform and productivity, environment definition, productivity measures, performance, support, organization and management, task allocation server and client side.

UNIT- IV

10 Hours

Distributed objects and components - CORBA, compound documents, Opendoc component model.

TEXT BOOKS:

1. Patrick Smith and Steve Guengerich, “**Client/Server computing**”, II Edition, Prentice Hall.
2. Robert Orfali, Dan Harkey, “**The Essential client/server survival Guide**”, Jeri Edwards, II edition, Galgotia Publications.

REFERENCE BOOKS:

1. C Larry T Vaughn , “**Client/Server System Design and implementation**”, McGraw-Hill international Edition.
2. Alan Pope, “**The CORBA Reference Guide**”, Addison Wesley

UCS009E

GRID AND CLUSTER COMPUTING

3 CREDITS

Hrs/Week: 3
Total Hrs. 40

CIE Marks: 50
SEE Marks: 100

UNIT-I

10 Hours

Introduction: the data center, the grid and the distributed/high performance computing, cluster computing and grid computing, Metacomputing-the precursor of grid computing, scientific, business and e-governance grids, web services and grid computing, business computing and the grid-a potential win-win situation.

Technologies and architecture for grid computing: clustering and grid computing, issues in data grids, key functional requirements in grid computing, standards for grid computing, recent technological trends in large data grids.

World wide grid computing activities and organizations and projects: organizations developing grid computing toolkit, framework and middleware, grid projects and organizations building and using grid based solutions

UNIT-II

10 Hours

Web services and the service oriented architecture: History and background, service oriented architecture, how a web service works, SOAP and WSDL, description, creating web services, server side.

Globus tool kit: history of globus toolkit, version of globus tool kit, application of GT4-cases, GT4-approaches and benefits, infrastructure management, monitoring and discovery, security, data, choreography and coordination, main features of Gt4-functionality, GT4 architecture, GT4 containers.

The grid and the data bases : issues in database integration with the grid, the requirement of grid enabled data base, storage request broker, how to integrate database with the grid?.

UNIT-III

10 Hours

What is cluster computing?: approaches to parallel computing, how to achieve low cost parallel computing through clusters, definition and architecture of a cluster, what is the functionality a cluster can offer?, categories of clusters. **Cluster middleware an introduction,** levels and layers of single system image, cluster middleware design and objectives, resource management and scheduling, cluster programming environment and tools. **Early Cluster architectures and high throughput computing clusters:** Early cluster architectures, High throughput computing clusters, condor. **Networking, protocols & I/O for clusters:** networks and interconnection switching devices, design issues in interconnection networking /switching, design architecture-general principal and trade offs, HiPPI, ATM, myrinet, gigabit Ethernet.

UNIT-IV

10 Hours

Performance models and simulation: performance measures and metrics, profit effectiveness of parallel computing through clusters. **Process scheduling:** Job Management systems, resource management systems, ques, hosts, resources, jobs and policies, policies of resource utilization, scheduling policies. **Load sharing and load balancing:** Load sharing and load balancing, strategies for load balancing, modeling parameters, recent work.

TEXT BOOK:

1. C.S.R Prabhu, " **Grid and cluster computing**", 2008, PHI publication.

UCS010E WIRELESS AND MOBILE COMMUNICATIONS

3 CREDITS

Hrs/Week: 3
Total Hrs.: 40

CIE Marks: 50
SEE Marks: 100

UNIT-I

10 Hours

Introduction: Applications: A short history of wireless communication, **Wireless Transmission:** Frequency for radio transmission, Signals, Antennas, Signal propagation, Multiplexing, Modulation, Spread spectrum, Cellular systems. **Medium Access Control:** Motivation for a specialized MAC: Hidden and Exposed terminals. Near and Far terminals; SOMA, FOMA, TOMA: Fixed TOM, Classical Aloha, Slotted Aloha, Carrier sense multiple access, Demand assigned multiple access, PRMA packet reservation multiple access, PRMA packet reservation multiple access, reservation TOMA, Multiple access with collision avoidance, Polling, Inhibit sense multiple access; CDMA: Spread Aloha multiple access

UNIT- II

10 Hours

Telecommunication Systems: GSM: Mobile Services, System Architecture, radio interface, Protocols, Localization and Calling, Handover, Security, New Data Services; DECT; Systems Architecture; Protocol Architecture: TETRA, I UMTS and IMT-2000; UMTS Basic Architecture, UTRA FDD mode, UTRA TDD mode. **Wireless LAN:** Infrared vs. Radio Transmission, Infrastructure and Ad Hoc networks, IEEE 802.11: System Architecture, Protocol Architecture, Physical Layer, Medium Access Control Layer, MAC management, Future development; HIPERLAN: Protocol architecture, Physical Layer Channel access control. Sublayer, Medium Access control sublayer, Information bases and networking; Bluetooth: User Scenarios, Physical Layer, MAC layer, Networking, Security, Link management.

UNIT-III

10 Hours

Wireless ATM: Motivation for WATM, Wireless ATM working group, WATM services, Reference model: Example configurations, Generic reference model; Functions: Wireless mobile terminal side, Mobility supporting network side; Radio access layer: Requirements, BRAN; Handover: Handover reference model, Handover requirements, Types of handover, Handover scenarios, Backward handover, Forward handover; Location management: Requirements for location management, Procedures and Entities; Addressing, Mobile quality of service, Access point control protocol. **Mobile Network Layer:** Mobile IP: Goals, assumptions and requirements, Entities and Terminology, IP packet delivery, Agent advertisement and discovery, Registration, Tunneling and Encapsulation, Optimizations, Reverse tunneling, Ipv6; Dynamic host configuration protocol, Ad hoc networks: Routing, Destination sequence distance vector, Dynamic source routing

UNIT-IV

10 Hours

Mobile Transport Layer: Traditional TCP: Congestion control, Slow start, Fast retransmit/fast recovery, Implications on mobility; Indirect TCP, Snooping TCP, Mobile rcp, Fast retransmit/fast recovery, Transmission/time-out freezing, Selective retransmission, Transaction oriented TCP. **Support for Mobility:** File systems: Consistency, Examples; World Wide Web: Hypertext transfer protocol, Hypertext markup language, Some approaches

that might help wireless access, System architectures; Wireless application protocol: Architecture, Wireless datagram protocol, Wireless transport layer security, Wireless transaction protocol, Wireless session protocol, Wireless application environment, Wireless markup language; WML script,.

TEXT BOOKS :

1. Jochen Schiller, "**Mobile Communications** ", 2nd Edition, Addison Wesley, Pearson Education
2. William Stallings, 2005, "**Wireless Communications and Networks**", Prentice Hall.

Reference Books:

1. Rappaport, "**Wireless Communications Principles and Practices**", 2nd Edition, Prentice Hall
2. YI Bing Un, "**Wireless and Mobile Network Architectures**", John Wiley
3. P. Nicopqlitidis, "**Wireless Networks**", John Wiley
4. M. Richharia, "**Mobile Satellite Communication: Principles and Trends**", Pearson Education

UCS011E PERVASIVE COMPUTING 3 CREDITS

Hrs/Week: 3
Total Hrs.: 40

CIE Marks: 50
SEE Marks: 100

UNIT-I

10 Hours

Past, Present, future: The vine and fig tree dream, pervasive computing, pervasive computing market, m-bussiness, conclusions and challenges. **Application Examples:** Retail, Airline check-in and booking, sales for automation, Healthcare, Tracking, Car Information systems, Email access via WAP and voice. **Device Technology:** Hardware, Human machine interfaces, biometrics, operating systems, Java for pervasive devices.

UNIT -II

10 Hours

Device Connectivity: Protocols, security, Device management. **Web application concepts:** History of world wide web, world wide web architecture, protocols, transcoding, client authentication via the internet.

UNIT -III

10 Hours

WAP and beyond: Introduction, components of the WAP architecture, WAP infrastructure, WAP security issues, wireless markup language, WAP push, products, i-Mode, outlook. **Voice technology:** basics of speech recognition, voice standards, speech applications, speech and pervasive computing, security. **Personal digital assistants:** History, device categories, personal digital assistant operating systems, device characteristics, software components, standards, mobile applications, personal digital assistant browsers.

UNIT -IV

10 Hours

Pervasive web application architecture: Background, scalability and availability, development of pervasive computing web applications, pervasive application architecture. **Example application:** introduction, user interface overview, architecture, implementation. **Access from PCs:** smart card based authentication via the internet, ordering goods. **Access via WAP:** WAP functionality, implementation.

TEXT BOOK:

1. Jochen Burkhardt et al , 2008, “**Pervasive Computing: Technology and architecture of mobile internet applications**”, Pearson education.

UCS012E EMBEDDED COMPUTING SYSTEMS 4 CREDITS

Hrs/Week: 3
Total Hrs.: 40

CIE Marks: 50
SEE Marks: 100

UNIT – 1

10 hrs

Introduction to embedded systems: 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. **Devices:** 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.

UNIT – II

10 hrs

Embedded Microcontroller Cores and Architecture 8051 micro controller; Architecture; Instruction sets; Assembly language programming; I/O port programming; Timer / counter programming; Serial Communication; Interrupts programming.

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.

UNIT-III

10 hrs

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.

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.

UNIT- IV

10 hrs

Real-time operating systems :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.

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 codesign; Testing on host machine; Simulators; Laboratory tools.

TEXT BOOK:

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

REFERENCE BOOKS:

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

UCS013E MULTIMEDIA COMPUTING AND DATA COMPRESSION 3 CREDITS

Hrs/Week: 3
Total Hrs.: 40

CIE Marks: 50
SEE Marks: 100

UNIT-I

10 Hours

Introduction

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 and Data Streams

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.

UNIT-II

10 Hours

Audio Technology

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.. **Graphics and Images** Capturing Graphics and Images, Computer Assisted Graphics and Image Processing;

Video Technology & Computer-Based Animation

Basics; Television Systems; Digitalization of Video Signals; Digital Television; **Data Compression** Storage Space; Coding Requirements; Source, Entropy, and Hybrid Coding;

UNIT -III

10 Hours

Continued.....,

Basic Compression Techniques; JPEG : Image Preparation, Lossy Sequential DCT -based Mode, Expanded Lossy DCT -based Mode, Lossless Mode, Hierarchical Mode; 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.

Content Analysis

imple Vs. Complex Features; Analysis of Individual Images; Analysis of Image Sequences; Audio Analysis; Applications.

UNIT-IV

10 Hours

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; A VI Indeo File Format; MPEG Standards; TWAIN. Multimedia Application Classes; Types of Multimedia Systems;

TEXT BOOKS:

1. Ralf Steinmetz, Klara Narstedt, "**Multimedia Fundamentals: Vol I-Media Coding and Content Processing**", 2003, Pearson Education JPHI, 2nd Edition.(Chapters 2,3,4,5,6,7,8,9)
2. Prabhat K Andleigh, Kiran Thakrar, 2003, "**Multimedia Systems Design**", PHI,

(Chapters 1,3,7)

REFERENCE BOOKS:

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

UCS014E INFORMATION STORAGE AND RETRIEVAL 3 CREDITS

Hrs/Week: 3
Total Hrs.: 40

CIE Marks: 50
SEE Marks: 100

UNIT-I

10 Hours

Overview: Abstraction, information system, measures, from data to wisdom, toward effective information retrieval systems. **Document and query forms:** Concept, data structures, document surrogates, vocabulary control, the fine structure of data, data compression, text documents, images and sound. **Query structures:** matching criteria, Boolean queries, vector queries, extended Boolean queries, fuzzy queries, probabilistic queries, natural language queries, information retrieval and data base systems.

UNIT –II

10 Hours

The matching process: relevance and similarity measures, Boolean based matching, vector based matching, missing terms and relationships, probabilistic matching, proximity matching, effects of waiting, effects of scaling, data fusion, the user centered view. **Text analysis:** indexing, matrix representation, term extraction and analysis, term association, lexical measures of term significance, other methods of document analysis, document similarity, stop lists, stemming, multilingual retrieval systems, thesauri.

UNIT –III

10 Hours

Retrieval effectiveness measures: binary versus N-ary measures, precision and recall and related measures, user oriented measures, average precision and recall, operating curves and single measures, expected search length, satisfaction and frustration and related measures. **Effectiveness improvement technologies:** Information the user may find helpful, relevance feedback, genetic algorithms, genetic algorithms for relevance feedback, genetic algorithms in a realistic situation, the trec experiments.

UNIT –IV

10 Hours

Alternate retrieval techniques: Natural language processing, citation processing, hypertext links, information filtering and passage retrieval, image and sound processing.

Output Presentation: Reference versus surrogate versus document, grouping and ranking, quantity versus quality issues, media, criteria, VIRI. **Document Access:** Electronic access, processing scanned documents, processing electronically generated documents, distributed document systems, internet and web access.

TEXT BOOK:

1. Robert R. Korfhage, **Information Storage And Retrieval**, Student edition, Wiley India Edition.

UCS015E
ADVANCED MICROPROCESSORS AND PERIPHERALS
3 CREDITS

Hrs/Week: 3
Total Hrs.: 40

CIE Marks: 50
SEE Marks: 100

UNIT- I

10 Hours

80286-80287 - A Microprocessor with Memory Management and Protection- Salient Features of 80286, Internal Architecture of 80286, Signal Description, Real Addressing Mode, Protected Virtual Address Mode, Privilege, protection, Special Operations, 80286 Bus interface, Basic Bus operations, Fetch Cycles of 80286, 80286 Minimum system Configurations, Interfacing Memory and I/O devices with 80286, Priority of Bus Use by 80286, Bus HOLD and HLDA sequence, Interrupt Acknowledge Sequence, Instruction Set Features, 80287 Math Coprocessor .

UNIT – II

10 Hours

80386- 80387 and 80486 the 32 –Bit Processors- Salient Features of 80386, Architecture and Signal Description of 80386, Register organization of 80386, Addressing Modes, Data types of 80386, Real address mode of 80386, protected mode of 80386, Segmentation, paging , Virtual 8086 Mode, Enhanced Instruction set of 80386, The Coprocessor 80387, The CPU with a Numeric Coprocessor – 80486DX

UNIT - III

10 Hours

Recent Advances in Microprocessor Architectures- A Journey from Pentium Onwards Salient Features of 80586, A few Relevant Concepts of Computer Architecture, System Architecture, Branch Prediction, Enhanced Instruction set of Pentium , What is MMX? , Intel MMX architecture, MMX data Types, Wraparound and Saturation Arithmetic, MMX Instruction Set, Salient points about Multimedia application programming, Journey to Pentium –Pro, Pentium- II, Pentium- III

Pentium – 4 – Genesis of Birth of Pentium-4, salient Features, NetBurst Microarchitecture for P-4, Instruction Translation Lookaside Buffer (ITLB) and Branch Prediction, Why out of order Execution, Rapid Execution module, Memory Subsystem, Hyperthreading Technology, Hyperthreading in Pentium, Extended Instruction set in Advanced Pentium Processors,.

RISC Architecture- An overview-- A short History of RISC processors, Hybrid Architecture- RISC and CISC Convergence, The Advantages of RISC, Basic Features of RISC processors, Design issues of RISC processors, Performance Issues in Pipelined systems, Architecture of some RISC Processors.

UNIT – IV

10 Hours

Special Purpose Programmable Peripheral Devices and Their Interfacing- Programmable Interval Timer- 8253, Keyboard and Display controller- Architecture and Signal Description of 8279, Modes of operation.

DMA controller- 8257 - Internal Architecture, Data bus buffer, Read/write logic , Control unit and Priority resolver, Signal Description, DMA transfers and operations, Priorities of DMS Requests, Programming and reading, Interfacing 8257.

TEXT BOOKS:

1. Ajoy Kumar Ray & Kishor M Bhurchandi,2002 **Advanced Microprocessors and Peripherals Architecture**, Programming and Interlacing.

REFERENCE BOOKS:

1. Barry B Brey,2003, **The INTEL Microprocessors, 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium and Pentium pro processors** , 6th Edition, Pearson Education/PHI.
2. Daniel Tabak ,1995, **Advanced Microprocessors**, 2nd Edition, Mc-GrawHill .

UCS016E

PARALLEL COMPUTING

3 CREDITS

Hrs/Week: 3

Total Hrs.: 40

CIE Marks: 50

SEE Marks: 100

UNIT- I

10 Hours

Introduction- Computational Demands of Modern Science, Advent of Practical Parallel Processing.

PRAM Algorithms- The PRAM Model of Parallel Computation, PRAM algorithms- Parallel Reduction, Prefix sums, List ranking, Preorder Tree Traversal, Merging Two sorted Lists, Graph Coloring.

Parallel Programming Languages- Programming Parallel Processes- An Illustrative example, A sample Application.

UNIT –II

10 Hours

Matrix Multiplication - Algorithms for processor arrays – Matrix multiplication on The 2D – Mesh SIMD model and Shuffle-Exchange SIMD model, Algorithms for Multiprocessors, Algorithm for Multicomputers – Row- column Oriented Algorithms.

Solving Linear systems- Gaussian Elimination.

Sorting- Enumeration sort, Lower Bounds on Parallel Sorting, Odd-Even Transposition Sort, Quicksort-Based Algorithms – Parallel Quicksort, Hyperquicksort.

UNIT-III

10 Hours

Dictionary Operations- Complexity of Parallel Search, Searching on Multiprocessors- Ellis’s Algorithm, Manber and Ladner’s Algorithm.

Graph Algorithms - Searching a Graph- P-Depth search, Breadth-Depth search, Breadth-First Search, Connected Components, All-Pairs Shortest Path, Single source shortest path.

UNIT-IV

10 Hours

Combinatorial Search- Introduction, Divide and conquer, Parallel branch and Bound Algorithms- Multiprocessor algorithms, Multicomputers Algorithms,

Introduction to Parallel Programming with MPI and OpenMP

TEXT BOOK:

1. Michael j Quinn, 2002 ,‘**Parallel Computing - Theory and Practice**’, TMH
2. Michael J. Quinn., 2003 , **Parallel Programming in C with MPI and OpenMP**”, McGraw Hill, ISBN 0-07-282256-2

REFERENCE BOOKS:

- 1 Gregory V. Wilson , 2001 ‘**Practical Parallel Programming** ‘ PHI
2. Barry Wilkinson and Michael Allen. **Parallel Programming: Techniques and Applications Using Networked Workstations and Parallel Computers**_(2nd Edition), Prentice Hall PTR (2005), ISBN 0-13-140563-2
3. A. Grama, A. Gupta, G. Karypis and V. Kumar.” **Introduction to Parallel Computing** “(2nd edition), Addison Wesley (2002), ISBN 0-201-64865-2.
4. H. El-Rewini and T.G. Lewis. “ **Distributed and Parallel Computing**” Manning

(1997), ISBN 0-13-795592-8.

5. I. Foster. “**Designing and Building Parallel Programs**”, Addison Wesley (1995), ISBN 0-201-57594-9.
6. Kai Hwang and Zhiwei Xu. “**Scalable Parallel Computing**”, McGraw Hill (1998), ISBN 0-07-031798-

UCS017E MICROCONTROLLER-BASED SYSTEMS 3 CREDITS

Hrs/Week: 3
Total Hrs.: 40

CIE Marks: 50
SEE Marks: 100

UNIT – I

10 Hours

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.

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.

UNIT – II

10 Hours

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 program Programming in C: Data types and time delays; I/O programming; Logic operations; Data conversion programs; Accessing code ROM space; Data serialization.

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

UNIT – III

10 Hours

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.

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

UNIT – IV

10 Hours

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.

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.

TEXT BOOK:

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

REFERENCE BOOKS:

1. Raj Kamal , 2007, **Microcontrollers Architecture Programming, Interfacing and System Design** - Pearson Education,.

2. Dr. Ramani Kalpathi, Ganesh Raja, 2007, **Microcontrollers and Applications** -, 1st Revised Edition, Sanguine Technical Publishers..

UCS018E MULTI-CORE ARCHITECTURE

3 CREDITS

Hrs/Week: 3
Total Hrs.: 40

CIE Marks: 50
SEE Marks: 100

UNIT I

10 Hours

Introduction to Multi-core Architecture: Motivation for Concurrency in Software, Parallel Computing Platforms, Differentiate Multi-Core Architecture from Hyper-Threading Technology, Multi-threading on Single-Core versus Multi-Core Platforms
Understanding Performance, Amdahl's Law, Growing Returns: Gustafson's Law

System Overview of Threading: Defining Threads, System View of Threads, Threading above the Operating System, Threads inside the OS, Threads inside the Hardware
What Happens When a Thread Is Created,

UNIT II

10 Hours

Application Programming Models and Threading: Virtual Environment: VMs and Platforms. Runtime Virtualization, System Virtualization

Fundamental Concepts of Parallel Programming

Designing for Threads. Task Decomposition, Data Decomposition, Data Flow composition
Implications of Different Decompositions Challenges You'll Face, Parallel Programming Patterns.
A Motivating Problem: Error Diffusion Analysis of Error: Diffusion Algorithm. An Alternate Approach: parallel Error Diffusion. Other Alternatives

UNIT III

10 Hours

Threading and Parallel Programming Constructs: Synchronization, Critical Sections
Deadlock, Synchronization Primitives, Semaphores, Locks, Condition Variables, Messages, Flow Control-Based Concepts. Fence Barrier
Implementation-Dependent threading Features

Single-Core Processor Fundamentals

Processor Architecture Fundamentals Comparing Superscalar and EPIC Architecture

UNIT IV

10 Hours

Threading on Intel Multi-Core Processor : Hardware-Based Threading, Threading form Intel Hyper-Threading Technology, Difference between Multiprocessor and Hyper-Threading Technology. Hyper-Threading Technology Architecture

Multi-Core Processors Architectural Details, Comparison between Multiprocessor and Multi-Core Processors, Multi-Core for Itanium Architecture, Multiple Processor Interaction Inter-Processor Communication and Multi-Threaded Programming. Power Consumption, Power Metrics Reducing Power Consumption Beyond Multi-Core Processor Architecture.

TEXT BOOK:

1. Shameem akhtar and Jason Roberts, 2006 , **"Multicore programming"** Intel press april

UCS019E DISTRIBUTED OPERATING SYSTEMS 3 CREDITS

Hrs/Week: 3
Total Hrs.: 40

CIE Marks: 50
SEE Marks: 100

UNIT-I

10 Hours

Fundamentals

What is Distributed Computing Systems? Distributed Computing System Models, What is Distributed Operating System? Issues in Designing a Distributed Operating System. Introduction to Distributed Computing Environment (DCE).

Message Passing: Desirable Issues of s Good" Message Passing, Issues in IPC by Message Passing, Synchronization, Buffering, Multidatagram Messages, Encoding and Decoding of Message Data, Process Addressing, Failure Handling, Group Communication.

UNIT-II

10 Hours

Remote Procedure Calls: The RPC Model, Transparency of RPC, Implementing RPC Mechanism, Stub Generation, RPC Messages, Marshaling Arguments and Results, Server Management, Parameter - Passing Semantics, Call semantics, Communication Protocols for RPCs.

Distributed Shared Memory: General Architecture of DSM Systems, Design and Implementation Issues of DSM, Granularity, Structure of Shared Memory Space.

UNIT-III

10 Hours

Distributed Shared Memory: contd: Consistency Models, Replacement Strategy, Thrashing.

Synchronization: Clock Synchronization, Event Ordering," Mutual Exclusion, Dead Lock, Election Algorithms.

UNIT -IV

10 Hours

Resource Management: Desirable Features of a Good Global Scheduling Algorithm, Task Assignment Approach

Process Management: Process Migration, Threads.

Distributed File Systems: Desirable Features of a Good Distributed File system, file system, file models, file accessing models, file sharing semantics

TEXT BOOK:

1. Pradeep. K. Sinha, 1997, '**Distributed Operating System: Concepts and Design**', PHI. [Chapter 1: 1.1, 1.3,1.5-1.7, Chapter 3: 3.2-3.10, Chapter 4: 4.2-4.11, Chapter 5: 5.2-5.8, Chapter 6: 6.2-6.6, Chapter 7: 7.2- 7.3, Chapter 8: 8.2-8.3, Chapter 9: 9.1- 9.5].

REFERENCE BOOK:

1. Andrew S. Tanenbaum , 2002, '**Distributed Operating System**', Pearson Education.

UCS020E

COMPILER DESIGN

3 CREDITS

Hrs/Week: 3
Total Hrs.: 40

CIE Marks: 50
SEE Marks: 100

UNIT – I

10 Hours

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; Lexical analysis: The Role of Lexical Analyzer; Input Buffering; Specifications of Tokens; Recognition of Tokens. **SYNTAX ANALYSIS – 1:** Introduction; Context-free Grammars; Writing a Grammar; Top-down Parsing.

UNIT – II

10 Hours

SYNTAX ANALYSIS – 2: Bottom-up Parsing; Introduction to LR Parsing: Simple LR.,Parser Generators.**SYNTAX-DIRECTED TRANSLATION:** Syntax-Directed definitions; Evaluation order for SDDs; Applications of Syntax-directed translation; Syntax-directed translation schemes.

UNIT – III

10 Hours

INTERMEDIATE CODE GENERATION: Variants of syntax trees; Three-address code; Types and declarations; Translation of expressions; Type checking; Control flow; Back patching.**RUN-TIME ENVIRONMENTS:** Storage Organization; Stack allocation of space.

UNIT - IV

10 Hours

RUN-TIME ENVIRONMENTS: contd. : Access to non-local data on the stack; Heap management; Introduction to garbage collection. **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.

TEXT BOOK:

1. Alfred V Aho, Monica S. Lam, Ravi Sethi, Jeffrey D Ullman, 2007,**Compilers-Principles, Techniques and Tools** — 2nd Edition, Addison-Wesley. (chapter 1:1.1 - 1.5,chapter 3:3.1 to 3.4,Chapter 4:4.1-4.6.4,Chapter 5:5.1-5.4.4,Chapter 6:6.1 -6.5.2,6.7-6.7.3,Chapter 7:7.1-7.5,Chapter 8:8.1-8.6)

REFERENCE BOOKS:

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

UCS021E

REAL TIME SYSTEMS

3 CREDITS

Hrs/Week: 3
Total Hrs.: 40

CIE Marks: 50
SEE Marks: 100

UNIT-I

10 Hours

Basic Real-Time Concepts:

Basic Computer Architecture-Bus Transfer Mechanism, Input and Output, Memory, CPU Operation; Some Terminology- Software Concepts, System Concepts, Real-Time Definitions, Events and Determinism, Synchronous and Asynchronous Events, Determinism, Time-Loading; Real-Time Design Issues;

Real- Time Specification And Design Techniques

Natural Languages; Mathematical Specification; Flowcharts; Structure Charts; Pseudocode and Programming Design Languages; Finite State Automata; Data Flow Diagrams- DeMarco's Rules, Hatley and Pribhai's Extensions; Petri Nets; Warnier-Orr Notation- Indexed Loop; Statecharts- Depth, Orthogonality, Broadcast Communication; Sanity in Using Graphical Techniques.

UNIT -II

10 Hours

Real- Time Kernels

Polled Loop System- Polled Loop with Interrupts; Phase/State- Driven Code; Coroutines; Interrupt-Driven Systems- Context Switching, Round-Robin Systems, Preemptive Priority Systems, Major and Minor Cycles, Hybrid Systems; Foreground/Background Systems- Background Processing, Initialization, Real- Time operation; Full-Featured Real Time Operating Systems- Task- Control Block Model; Build or Buy? POSIT.

Intertask Communication And Synchronization

Buffering Data- Time-Relative Buffering, Ring Buffers; Mailboxes Mailbox Implementation, Other Operations on Mailboxes, Queues; Critical Regions; Semaphores- Mailboxes and Semaphores, Counting

Semaphores, Problems with Semaphores, The Test- and- Set Instruction; Event Flags and Signals; Deadlock- Avoidance, Detect and Recover.

UNIT-III

10 Hours

System Performance Analysis And Optimization

Response-Time Calculation- Polled Loops, Coroutines / Phase- Driven Code, Interrupt Systems; Interrupt Latency- Propagation Delay, Macroinstruction Execution Times, Interrupts Disabled, Preemption, Low Priority Interrupts High; Time-Loading and Its Measurement Using a Logic Analyzer, Instruction Counting, Instruction Execution Time Simulators, Deterministic Performance; Reducing Response Times and Time Loading- Compute at Slowest Cycle, Scaled Arithmetic, Other Optimization Techniques,

Reliability, Testing, And Fault Tolerance

"Faults, Failures, Bugs and Effects; Reliability- Formal Definition, Calculating System Reliability; Testing- Unit Level Testing, System Level Testing,,Fault Tolerance-General Problems Handling, N-version Programming, Built-In-Test Software,CPU Testing.

UNIT – IV

10 Hours

Multiprocessing Systems

Classification of Architectures; Distributed Systems- Embedded, Organic, System Specification, Reliability in Distributed Systems, Calculation of Reliability in Distributed Systems, Increased Reliability in Distributed Systems; Non-Von Neuman Architectures- Data Flow Architectures, Systolic Processors, Wavefront Processors, Transputers.

Hardware! Software Integration

Goals of Real-Time System Integration- System Unification, System Validation; Tools- Millimeters, Oscilloscope, Logic Analyzer, In-Circuit Emulator, Software Simulators, Hardware Prototypes/ Simulators, Debuggers; Methodology- Establishing a Baseline, Backoff Method, Patching; The Software Heisenberg Uncertainty Principle- Real-World Analogies, The Software Heisenberg Uncertainty Principle, Testing of Software, Time- and Memory-Loading, Other Implications.

REAL-TIME APPLICATIONS

Real-Time Systems as Complex Systems; The First Real-Time Application; Real-Time Databases; Real-Time Image Processing- Virtual Reality, Multimedia; Real-Time UNIX; Building Real-Time Applications with Real-Time Programming Languages.

TEXT BOOK:

1. Phillip A. Laplante, 2005, ' **Real- Time Systems Design and Analysis- An Engineer's Handbook**, ' PHI Publications, Second Edition. (Chapters 1,5; 6,7,9(excluding 9.3.3,9.4-9.9),11(excluding 11.3.3-11.3.5,11.4.5-11.4.7), 12,13,14)

REFERENCES:

1. Jane Liu, **Real Time Systems**, PHI publication

UCS022E SEMICONDUCTOR TECHNOLOGY 03 CREDITS

Hrs/Week: 3
Total Hrs.: 40

CIE Marks: 50
SEE Marks: 100

UNIT- I

10 Hours

Introduction ,Brief History, First Transistor, First Integrated Circuit, Moore's Law, Feature Size and Wafer Size .Manufacture Materials, Process Equipment, Metrology Tools, Wafer Manufacturing, Circuit .Design Mask Making, Wafer Processing, Testing. Packaging and Test.

Introduction of IC Fabrication: Definition of Yield, Clean room Basics, Basic Structure of IC Fab, Wafer Process Area, Fabrication bays, Equipment Area, Facility Area, Test and Packaging

Semiconductor Basics: What is a Semiconductor, Basis Devices , IC Chips-Memory DRAM ,SRAM,EPROM, EEPROM , Microprocessor, ASIC, Basis IC Processes, Conventional Bipolar Process, PMOS Process NMOS Process, CMOS circuit, CMOS Process.

UNIT -II

10 Hours

Wafer Manufacturing: Introduction ,Why silicon,Crystal structure and Defects, From sand to Wafer ,Epitaxial deposition. Thermal Processes Thermal Process Hardware . Oxidation Process Diffusion, Annealing. High temperature CVD.Rapid thermal process (RTP)

Photolithography:Introduction,Photoresist, Photolithography process.Alignment and exposure Lithography Technology Trends. Safety.

Plasma Basics : Introduction , Definition, Components , Collisions in Plasma, Plasma Parameters. Advantages of Plasma Processes.PECVD and Plasma Etch Chambers.Remote Plasma Processes.High Density Plasma

UNIT III

10 Hours

Ion Implantation: Introduction,Ion Implantation Basics. Ion Implantation Hardware. Ion Implantation Processes,Process Evaluation,Hazards and Safety .

Etch :Introduction, Etch Basic , Wet Etch Process, Plasma (Dry) Etch, Plasma Etch Processes Safety.

CVD and Dielectric Thin Film: Chemical Vapor Deposition, CVD Reactor Types,CVDbasics CVD Kinetics. Applications of Dielectric Thin Film. Dielectric Thin Film Characteristics. Dielectric CVD Processes. PECVD TEOS Processes, Dielectric Etchback Processes.

O₃-TEOS PSG and BPSG Processes : Spin-on Glass, High Density Plasma CVD, Dielectric CVD Chamber Clean, Process Trends and Troubleshooting.

UNIT IV

10 Hours

Metallization: Objectives, Introduction, Conducting Thin Films, Metal Thin Film Characteristics , Metal CVD, Physical Vapor Deposition. Copper Metallization.

CMP : Objectives,Introduction, CMP Slurries.CMP Basics- Polish Rate, Selectivity , Uniformity Defects. **CMP Processes:** Process Integration Objectives , Transistors Making,Interconnections , Passivation **CMOS Processes :** Objectives , Isolation, Well Formation, Making Transistors, Interconnections Advanced CMOS Process Flow, State-of-art CMOS Process Flow .

Reference Book

Introduction to Semiconductor Manufacturing Technology

Hong Xiao, Ph. D. Published by Prentice Hall

UCS023E

VLSI DESIGN

03 CREDITS

Hrs/Week: 3
Total Hrs.: 40

CIE Marks: 50
SEE Marks: 100

UNIT I

10 Hours

Review of digital design :MUX based digital design . Design using ROM, Programmable Logic Arrays (PLA) and Programmable Array Logic (PAL) , Sequential circuits and timing - Setup and hold times, Sequential circuit design - design of Moore and Mealy circuits . Design of a pattern sequence detector using MUX, ROM and PAL , and Design of a vending machine controller using PAL.

Introduction to Verilog, Realization of Combinational and sequential circuits, RTL coding guidelines, Coding organization and writing a test bench .

UNIT II

10 Hours

Simulation, Synthesis, Place and Route, and Back Annotation Design flow , Simulation using Modelsim , Synthesis using Synplify , Place and Route, and Back Annotation using Xilinx

UNIT III

10 Hours

Design using Algorithmic State Machine Charts:Derivation of ASM charts Design examples such as dice game, etc. using ASM charts Implementation of ASM charts using microprogramming and Verilog design of bus arbitrator **Design of memories** Verilog realization of Read Only Memory (ROM) Verilog realization of Random Access Memory (RAM) , and Verilog coding of controller for accessing external memory

Design of Arithmetic functions Pipelining concept, Verilog design of a pipelined adder/subtractor Design of Multipliers and Verilog design of a pipelined multiplier .

UNIT-IV

10 Hours

Design for testability :Testing combinational and sequential logic , Boundary scan testing, and Built-in self test .**Design Applications** Design of a traffic light controller using Verilog , and Design of discrete cosine transform and quantization processor for video compression using Verilog .**Hardware implementation using FPGA board** :Features of FPGA board and demonstration of traffic light controller design , and Universal, asynchronous, receiver-transmitter design using FPGA board .

TEXT BOOKS :

- Principles of CMOS VLSI Design: A Systems Perspective - Watse follow Informity and Eshroghian K, Adison-Wesley, 1985.
- Introduction to VLSI Systems - Mead C.A and Canway L.A, Adison-wesley, 1980.

UCS024E DIGITAL SIGNAL PROCESSING**3 CREDITS****Hrs/Week: 3**
Total Hrs.: 40**CIE Marks: 50**
SEE Marks: 100

UNIT I**10 Hours**

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.

UNIT II**10 Hours**

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.

UNIT III**10 Hours**

Implementation of Discrete- Time Systems: Structures for the Realization of Discrete-Time Systems. Structures for FIR Systems: Direct-Form Structures, Cascade-Form Structures, Frequency-Sampling Structures, and 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. 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.

UNIT IV**10 Hours**

Design of Digital Filters :General Considerations: Causality and its Implications, Characteristics of Practical Frequency-Selective Filters. Design of FIR Filters: Symmetric And Antisymmetric 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.

TEXT BOOK:

1. John G. Proakis and Dimitris G. Manolakis , Digital Signal Processing, Pearson Education/PHI, Third Edition 2003.

REFERENCE BOOKS:

1. Paulo S. R. Diniz, Eduardo A. B. da Silva And Sergio L. Netto, Digital Signal Processing: System Analysis and Design, Cambridge University Press, 2002.

2. Sanjit K.Mitra , Digital Signal Processing: A Computer Based Approach, Tata McGraw-Hill Edition 2001.

3. Alan V.Oppenheim and Ronald W.Schafer, Digital Signal Processing, Pearson education/PHI, 2003

Hrs/Week: 3
Total Hrs.: 40

CIE Marks: 50
SEE Marks: 100

UNIT I

10 Hours

Introduction; Background, what is digital image processing, background on MATLAB and image processing Toolbox, Areas of image processing, MATLAB working environment. **Digital image representation;** Reading, displaying and writing images, data classes, image types, converting between data classes and image types, array indexing, some important standard arrays, introduction to M-function programming.

Intensity transformations and spatial filtering; background, intensity transformation functions, histogram processing and function plotting, spatial filtering, image processing toolbox standard spatial filters.

UNIT II

10 Hours

Frequency domain filtering; 2-D DFT, computing DFT in matlab, filtering in the frequency domain, obtaining frequency domain filters from spatial filters, generating filters directly in the frequency domain. **Image restoration;** a model of the image degradation/restoration process, noise models, restoration in the presence of noise only spatial filtering, modeling the degradation function, direct inverse filtering, weiner filtering, constrained least squares filtering. **Color image processing;** color image representation in MATLAB, converting to other color spaces, basics of color image processing, color transformations, spatial filtering of color images, working directly in RGB vector space.

UNIT III

10 Hours

Wavelets; Background, fast wavelet transform, working with wavelet decomposition structures, the inverse fast wavelet transform, wavelets in image processing. **Image processing;** background, coding redundancy, interpixel redundancy, psychovisual redundancy, JPEG compression. **Morphological image processing;** preliminaries, dilation and erosion, combining dilation and erosion, labeling connected components, morphological reconstruction.

UNIT IV

10 Hours

Image segmentation; point, line and edge detection, line detection using the Hough transform, thresholding, region based segmentation, segmentation using watershed transform. **Representation and Description;** Background, Representation, boundary description, regional descriptors. **Object recognition;** background, computing distance measures in MATLAB, recognition based on decision theoretic methods, structural recognition.

Text book:

1. Rafael C. Gonzalez, Richard E. wooda et al.,*Digital Image Processing Using MATLAB*, Pearson Education Publisher, 2007.

Reference books:

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

UCS026E

SIGNALS AND SYSTEMS

3 CREDITS

Hrs/Week: 3

Total Hrs.: 40

CIE Marks: 50

SEE Marks: 100

UNIT I

10 Hours

Introduction: Definitions of a signal and a system, classification of signals, basic operations on signals, elementary signals, systems viewed as interconnections of operations, properties of systems.

UNIT II

10 Hours

Time-domain representations for LTI systems: Convolution, impulse response representation, properties of impulse response representation, differential and difference equation representations, block diagram representations.

UNIT III

10 Hours

Fourier representation for signals: Introduction, Fourier representations for four signal classes, orthogonality of complex sinusoidal signals, DTFS representations, continuous-time-Fourier-series representations, DTFT and FT representations, properties of Fourier representations.

UNIT IV

10 Hours

Application of Fourier representations: Frequency response of LTI systems, solution of differential and difference equations using system function, Fourier transform representations for periodic signals, sampling of continuous time signals and signal reconstruction.

TEXT BOOKS:

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

REFERENCE BOOKS:

1. **Alan V. Oppenheim, Alan S. Willsky and S. Hamid Nawab**, "Signals and Systems", Pearson Education Asia, 2nd edition, 1997, Indian reprint 2002.

2. **Dr. D.ganesh Rao and Satish Tunga**, "Signals and Systems – A Simplified Approach", Sanguine Technical Publishers, 2003-04

UCS027E SPEECH AND AUDIO PROCESSING 3 CREDITS

Hrs/Week: 3
Total Hrs.: 40

CIE Marks: 50
SEE Marks: 100

UNIT I

10 Hours

Digital models for the speech signal: Process of speech production, Acoustic theory of speech production, Lossless tube models, and Digital models for speech signals.

Time domain models for speech processing: Time dependent processing of speech, Short time energy and average magnitude, Short time average zero crossing rate, Speech vs silence discrimination using energy & zero crossings, Pitch period estimation, Short time autocorrelation function, Short time average magnitude difference function, Pitch period estimation using autocorrelation function, Median smoothing.

UNIT II

10 Hours

Digital representations of the speech waveform: Sampling speech signals, Instantaneous quantization, Adaptive quantization, Differential quantization, Delta Modulation, Differential PCM, Comparison of systems, direct digital code conversion.

Short time Fourier analysis: Linear Filtering interpretation, Filter bank summation method, Overlap addition method, Design of digital filter banks, Implementation using FFT, Spectrographic displays, Pitch detection, Analysis by synthesis, Analysis synthesis systems.

Homomorphic speech processing: Homomorphic systems for convolution, Complex cepstrum, Pitch detection, Formant estimation, Homomorphic vocoder.

UNIT III

10 Hours

Linear predictive coding of speech: Basic principles of linear predictive analysis, Solution of LPC equations, Prediction error signal, Frequency domain interpretation, Relation between the various speech parameters, Synthesis of speech from linear predictive parameters, Applications.

Speech Enhancement: Spectral subtraction & filtering, Harmonic filtering, parametric resynthesis, Adaptive noise cancellation.

Speech Synthesis: Principles of speech synthesis, Synthesizer methods, Synthesis of intonation, Speech synthesis for different speakers, Speech synthesis in other languages, Evaluation, Practical speech synthesis.

UNIT IV

10 Hours

Automatic Speech Recognition: Introduction, Speech recognition vs. Speaker recognition, Signal processing and analysis methods,

Audio Processing: Auditory perception and psychoacoustics - Masking, frequency and loudness perception, spatial perception, Digital Audio, Audio Coding - High quality, low-bitrate audio coding standards, MPEG, AC-3, Multichannel audio - Stereo, 3D binaural and Multichannel surround sound.

TEXT BOOKS:

1. L. R. Rabiner and R. W. Schafer, "Digital Processing of Speech Signals," Pearson Education (Asia) Pte. Ltd., 2004.
2. D. O'Shaughnessy, "Speech Communications: Human and Machine," Universities Press, 2001.
3. L. R. Rabiner and B. Juang, "Fundamentals of Speech Recognition," Pearson Education (Asia) Pte. Ltd., 2004.
4. Z. Li and M.S. Drew, "Fundamentals of Multimedia," Pearson Education (Asia) Pte. Ltd.,

UCS028E DIGITAL VIDEO PROCESSING 3 CREDITS

Hrs/Week: 3
Total Hrs.: 40

CIE Marks: 50
SEE Marks: 100

UNIT- I

10 Hours

Video Acquisition and Representation - Spatio Temporal Sampling - Sampling Structure Conversion - Interpolation - Color spaces - Video formats.

Motion analysis - 2D and 3D Motion Estimation and Compensation - Optical Flow methods - Block based - Point correspondences - Gradient based - Intensity matching - Feature matching - Frequency domain motion estimation - Depth from motion

UNIT-II

10 Hours

Reconstruction - Motion analysis Applications: Video Summarization, Video Surveillance, Video Watermarking, Video Mosaicing.

Video Object Tracking and segmentation - 2D and 3D motion tracking - blob tracking - kernel based - Contour tracking - Feature matching - Filtering - mosaicing - Video Segmentation - Mean Shift based - Active shape model - Video shot boundary detection.

UNIT-III

10 Hours

Video Filtering: Motion Compensation - Noise Filtering - Enhancement and Restoration - Video Stabilization and Super Resolution.

Video coding, representation - Video Standards: MPEG 1, 2, MPEG-4, MPEG-7, H.261, H.263, H.264. Video compression - Interframe Compression - 3D Waveform based - Motion Compensation.

UNIT -IV

10 Hours

Content based Video retrieval - Object based coding - Content based representation - Feature extraction - MPEG 7 Visual descriptors - Low to high level representation (CSS, Poly, B-Splines etc.) - Video Indexing and retrieval - search engines.

Video based Rendering - Generation of mosaics from video; Detection of Video object alpha-matte and Video cut&paste for Virtual Reality applications.

Text Books:

1. Handbook of Image and Video processing - Al Bovik (Alan C Bovik), Academic Press, Second Edition, 2005.
2. Digital Image Sequence Processing, Compression, and Analysis - Todd R. Reed, CRC Press, 2004.
3. H.264 and MPEG-4 Video Compression: Video Coding for Next Generation Multimedia - Iain E.G. Richardson, Wiley, 2003
4. Digital Video Processing - A. Murat Tekalp, Prentice Hall, 1995

Hrs/Week: 3
Total Hrs.: 40

CIE Marks: 50
SEE Marks: 100

UNIT – I**10 Hours**

Introduction: Background, Uncertainty and Imprecision, Statistics and Random Information, Fuzzy Sets and Membership, Processes, Uncertainty in Chance versus Ambiguity. **Classical Sets and Fuzzy Sets:** 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. **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.

UNIT – II**10 Hours**

Membership Functions: Features of the Membership Function, Standard Forms and Boundaries, Fuzzification, Membership Value Assignments - Intuition, Inference. **Fuzzy-to-Crisp Conversions:** Lambda-Cuts for Fuzzy Sets, Lambda-Cuts for Fuzzy Relations, Defuzzification Methods. **Fuzzy Arithmetic, Numbers, Vectors and the Extension Principle:** 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.

UNIT – III**10 Hours**

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. **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.

UNIT – IV**10 Hours**

Fuzzy Decision Making: Fuzzy Synthetic Evaluation, Fuzzy Ordering, Preference and consensus, Multi objective Decision Making, Fuzzy Bayesian Decision Method, Decision Making under Fuzzy States and Fuzzy Actions. **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.

TEXT BOOK:

1. Timothy J. Ross, 1997, "Fuzzy Logic with Engineering Applications", McGrawHill.

REFERENCE BOOK:

1. B Kosko. ,1991 "Nural Networks and Fuzzy systems: A Dynamical System approach", Prentice Hall.

UCS030E

GENETIC ALGORITHMS

3 CREDITS

Hrs/Week: 3

Total Hrs.: 40

CIE Marks: 50

SEE Marks: 100

UNIT I

10 Hours

A Gentle Introduction to genetic algorithms:

What Are Genetic Algorithms? , Robustness of Traditional Optimization and Search Methods, The Goals of Optimization, How Are Genetic Algorithms Different from Traditional Methods?, A Simple Genetic Algorithm, Genetic Algorithms at Work-a Simulation by hand, Grist for the Search Mill-Important Similarities, Similarity Templates (Schemata), learning the Lingo.

Genetic Algorithms Revisited :mathematical Foundations:

Who Shall Live and Who Shall Die? The Fundamental Theorem, Schema Processing at Work: An Example by Hand Revisited, The Two-armed and k-armed Bandit Problem, How Many Schemata Are Processed Usefully, The Building Block Hypothesis, Another Perspective: The Minimal Deceptive Problem, Schemata Revisited: Similarity Templates as Hyper planes.

UNIT II

10 Hours

Computer Implementation of a Genetic Algorithm:

Data Structures ,Reproduction, Crossover, and Mutation , A Time to Reproduce, a Time to Cross , Get with the Main Program, How Well Does it Work?, Mapping Objective Functions to Fitness :form Fitness Scaling , Codings, A Multiparameter, Mapped, Fixed-Point Coding Discretization ,Constraints. **Applications of Genetic Algorithms:** The Rise of Genetic Algorithms, Genetic Algorithm Applications of Historical Interest, De Jong and Function Optimization,

UNIT III

10 Hours

Continued....,

Improvements in Basic Technique, Current Applications of Genetic Algorithms.

Advanced Operators and Techniques in Genetic Search

Dominance, Diploidy, and Abeyance, Inversion and Other Reordering Operators, Other Micro-operators, Niche and Speciation, Multiobjective Optimization, Knowledge-Based Techniques.

UNIT IV

10 Hours

Introduction to Genetics Based Machine learning

Genetics-Based Machine Learning: Whence It Came, What is a Classifier System? , Rule and Message System, Apportionment of Credit: The Bucket Brigade, Genetic Algorithm, a Simple Classifier System in Pascal, Results Using the Simple Classifier System.

Applications of Genetics Based Learning

The Rise of GBML ,Development of CS-I, the First classifier System ,Smith's Poker Player, Other Early GBML Efforts ,A Potpourri of Current Applications.

TEXTBOOK:

1. David E.Goldberg , **Genetic Algorithms** , Pearson Education.

REFERENCE BOOK:

1. Pinaki Majumdar & Elizabeth M. , **Genetic algorithms for VLSI Design, Layout & Test automation.**

UCS031E

NEURAL NETWORKS

3 CREDITS

Hrs/Week: 3
Total Hrs.: 40

CIE Marks: 50
SEE Marks: 100

UNIT I

10 Hours

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. **Learning Processes:** Introduction, Error-correction learning, Learning with a Teacher, Learning without a Teacher, Learning tasks, Statistical nature of the learning process, statistical learning theory, Probably approximately correct model of learning.

UNIT II

10 Hours

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. **Multilayer Perceptrons:** Introduction, Some preliminaries, Back-propagation Algorithm, Summary of back-propagation algorithm, XOR problem.

UNIT III

10 Hours

Heuristics for making the back propagation algorithm perform better, Output representation and decision rule, Computer experiment, Feature detection, Back-propagation and differentiation, 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.

UNIT IV

10 Hours

Radial-Basic Function Networks: 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, 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.

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Systems Jacck M. Zurada, **Introduction to Artificial Neural**, Jaico Publishing
2. B.Yegnanarayana, 2001, **Artificial Neural Networks** by PHI.

UCS032E

GRAPY THEORY

3 CREDITS

Hrs/Week: 3
Total Hrs.: 40

CIE Marks: 50
SEE Marks: 100

UNIT – I

10 Hours

Introduction to Graphs and Trees: Graph, Finite and Infinite Graphs, Incidence and degree, Isolated Vertex, Pendant Vertex and Null graph, Isomorphism, Subgraphs, Walks, Paths and Circuits, Connected graphs, Disconnected graphs and Components, Euler graphs, Operations on graphs, Hamiltonian Paths and Circuits, Trees, Properties of Trees, Pendant vertices in trees, Distance and centers in trees, Rooted and Binary trees, Counting trees, Spanning trees, Fundamental circuits, Finding all Spanning trees of a graph, Spanning trees in weighted graph.

Cut-sets and Cut-Vertices: Cut-Sets, Properties of Cut-sets, All Cut-sets in a Graph, Fundamental Circuits and Cut-Sets, Connectivity and Separability, Network flows, 1-isomorphism, 2-isomorphism.

UNIT – II

10 Hours

Planar and Dual Graphs: Combinatorial Vs. Geometric Graphs, Planar Graphs, Kuratowski's Two Graphs, Different Representations of a Planar Graph, detection of planarity, Geometric Dual, Combinatorial Dual.

Matrix Representation of Graphs: Incident matrix, Submatrices of $A(G)$. Circuit matrix, Fundamental circuit matrix and Rank of B , An application to Switching Network, Cut-set matrix, Relationships among A_f , B_f , and C_f , Path matrix, Adjacency Matrix.

UNIT – III

10 Hours

Coloring, Covering and Partitioning: Chromatic Number, Chromatic Partitioning, Chromatic Polynomial, Matchings, Coverings, The Four Color Problem. **Directed Graphs:** What is a Directed Graph? Types of Directed graphs, Directed and binary relations, Directed Paths and Connectedness, Euler Digraphs, Trees with Directed edges, Fundamental Circuits in directed Graphs, Matrices A , B , and C of Digraphs, Adjacency Matrix of Digraphs

UNIT – IV

10 Hours

Enumeration of Graphs: Types of Enumeration, Counting Labeled Trees, Counting Unlabeled Trees, Polya's Counting Theorem, Graph Enumeration with Polya's Theorem.

Graph Theoretic Algorithms and Computer Programs: Algorithms, Input: Computer Representation of a Graph, The Output, Some Basic Algorithms, Shortest-path Algorithms, Depth First Search on a Graph, Isomorphism, Performance of Graph-Theoretic Algorithms, Graph-Theoretic Computer Languages, Graphs in Coding Theory.

TEXT BOOKS:

1. **Graph Theory with Applications to Engineering and Computer Science**, Narasingh Deo, PHI.

REFERENCE BOOKS:

1. **Graph Theory and Combinatoics**, Dr. D.S. Chandrasekharaiah, Prism, 2005.
2. **Introduction to Graph Theory**, Chartrand Zhang, TMH, 2006.
3. **Graph Theory Modeling, Applications, and Algorithms**, Geir Agnarsson & Raymond Geenlaw, Pearson Prentice Hall, 2007.

UCS033E

NUMERICAL TECHNIQUES

3 CREDITS

Hrs/Week: 3

Total Hrs.: 40

CIE Marks: 50

SEE Marks: 100

UNIT – I

10 Hour

Approximations And Round-Off Errors: Significant figures, Accuracy and precision, Error Definitions, Round off errors.

Truncation Errors And The Taylor Series: The Taylor Series, Error Propagation, Total Numerical Error, Simple problems.

Roots of Equations: Bracketing methods - Graphical methods, The Bisection method, False-position method and Modified False-position method.

UNIT – II

10 Hours

Roots of Equations: Open methods - Simple Fixed-Point Iteration, The Newton - Raphson method, Secant method and multiple roots, Simple problems.

Linear Algebraic Equations: Gauss elimination – Solving Small Numbers of Equations, Naïve Gauss Elimination, Pitfalls of Elimination Methods, Techniques for Improving Solutions, Gauss-Jordan. **LU Decomposition And Matrix Inversion:** LU Decomposition, The Matrix Inverse, Special matrices, Gauss - Siedel method.

UNIT – III

10 Hour

Curve Fitting: Least-Squares Regression - Linear regression, Polynomial Regression, Multiple Linear Regression, General Linear Least Squares, Nonlinear Regression.

Interpolation: Newton's Divided-Difference Interpolating Polynomials, Lagrange's interpolating Polynomials, Coefficients of an Interpolating Polynomial, Inverse Interpolation, and Spline interpolation.

UNIT – IV

10 Hours

Numerical Differentiation and Integration: Numerical differentiation: High-Accuracy differentiation formulas, Richardson Extrapolation, Derivatives of unequally spaced data.

Newton-Cotes Integration Formulas: Trapezoidal rule, Simpson's rules, Integration with unequal segments.

Ordinary Differential Equations: Runge-kutta methods – Euler's method, Improvements of Euler's Method, Runge-Kutta methods, Systems of equations, Adaptive Runge-Kutta methods.

TEXT BOOK:

1. **Numerical Methods for engineers**, S. C. Chapra, R. P. Canale, McGraw Hill International edition, 1990.

REFERENCE BOOKS:

1. **Computer Oriented Numerical Methods**, V. Rajaraman, PHI, 1999.
2. **Numerical Methods**, E. Balaguruswamy, Tata McGraw Hill, 1999.
3. **Numerical Methods for Scientist and Engineers**, R. K. Jain, P. K. Iyengar et.all,
4. **Higher Engineering Mathematics**, Dr. B. S. Grewal, Khanna publishers, 35th or 39th edition.

UCS034E DISCRETE MATHEMATICAL STRUCTURE
3 CREDITS

Hrs/Week: 3
Total Hrs.: 40

CIE Marks: 50
SEE Marks: 100

UNIT – I

10 Hours

Fundamental Principles of Counting: The Rules of Sum and Product, Permutations, Combinations – The Binomial Theorem, Combinations with Repetition, The Catalan Numbers **Set Theory:** Sets and Subsets, Set Operations and the Laws of Set Theory, Counting and Venn Diagrams, A First Word on Probability, Countable and Uncountable Sets.

UNIT – II

10 Hours

Properties of the Integers: Mathematical Induction, The Well Ordering Principle – Mathematical Induction, Recursive Definitions

The Principle of Inclusion and Exclusion: The Principle of Inclusion and Exclusion, Generalizations of the Principle, Derangements – Nothing is in its Right Place, Rook Polynomials

UNIT – III

10 Hours

Generating Functions: Introductory Examples, Definition and Examples – Computational Techniques, Partitions of Integers, The Exponential Generating Function, The Summation Operator

Recurrence

Relations: First Order Linear Recurrence Relation, The Second Order Linear Homogeneous Recurrence Relation with Constant Coefficients, The Non-homogeneous Recurrence Relation, The Method of Generating Functions

UNIT – IV

10 Hours

Coding Theory: Elements of Coding Theory, The Hamming Metric, The Parity Check, and Generator Matrices, Group Codes: Decoding with Coset Leaders, Hamming Matrices.

Rings and Modular Arithmetic: The Ring Structure-Definition & Examples, Ring Properties, and substructures, The Integers Modulo n . Ring Homomorphism & Isomorphism.

TEXT BOOK:

1. **Discrete and Combinatorial Mathematics**, Ralph P. Grimaldi, 5th Edition, PHI/Pearson Education, 2004.

REFERENCE BOOKS:

1. **Discrete Mathematics and its Applications**, Kenneth H. Rosen, 6th Edition, McGraw Hill, 2007.
2. **Discrete Mathematical Structures: Theory and Applications**, D.S. Malik and M.K. Sen, Thomson, 2004.
3. **Discrete Mathematics with Applications**, Thomas Koshy, Elsevier, 2005.
4. **A Treatise on Discrete Mathematical Structures**, Jayant Ganguly, Sanguine Technical Publishers, 2006.

UCS035E

ADVANCED ALGORITHMS

3 CREDITS

Hrs/Week: 3
Total Hrs.: 40

CIE Marks: 50
SEE Marks: 100

UNIT – I

10 Hours

Analysis Techniques: Growth of Functions: Asymptotic notations; Standard notations and common functions; Recurrences and Solution of Recurrence equations- The substitution method, The recurrence – tree method, The master method; Amortized Analysis: Aggregate, Accounting and Potential Methods.

UNIT – II

10 Hours

Graph Algorithms: Bellman - Ford Algorithm; Single source shortest paths in a DAG; Johnson's Algorithm for sparse graphs; Flow networks and Ford-Fulkerson method; Maximum bipartite matching.

UNIT – III

10 Hours

Polynomials and the FFT: Representation of polynomials; The DFT and FFT; Efficient implementation of FFT.

Number -Theoretic Algorithms: Elementary notions; GCD; Modular Arithmetic; Solving modular linear equations; The Chinese remainder theorem; Powers of an element; RSA cryptosystem; Primality testing; Integer factorization.

UNIT – IV

10 Hours

String-Matching Algorithms: Naïve string Matching; Rabin - Karp algorithm; String matching with finite automata; Knuth-Morris-Pratt algorithm Boyer – Moore algorithms.

Approximation Algorithms: The vertex-cover problem; The traveling-sales-person problem; The setcovering problem; The subset-sum problem.

TEXT BOOKS:

1. H Cormen, C E Leiserson, R L Rivest and C Stein, 2002, “**Introduction to Algorithms**”, 2nd Edition, Prentice-Hall of India

REFERENCE BOOKS:

1. Ellis Horowitz, Sartaj Sahni, S.Rajasekharan, 2007, “**Fundamentals of Computer Algorithms**”, 2nd Edition, University Press,
2. Alfred V. Aho,John E. Hopcroft, J.D.Ullman, 1974, “**The Design and Analysis of Computer Algorithms**”, Addison-Wesley

UCS037E

C# PROGRAMMING AND .NET

3 CREDITS

Hrs/Week: 3

CIE Marks: 50

Total Hrs.: 40

SEE Marks: 100

UNIT – I

10 Hours

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 Manifest, Compiling CIL to Platform – Specific Instructions, Understanding the Common Type System, Intrinsic CTS Data Types, Understanding the Common Language Specification, Understanding the Common Language Runtime A tour of the .NET Namespaces, Increasing Your Namespace Nomenclature, Deploying the .NET Runtime.

BUILDING C# APPLICATIONS: The Role of the Command Line Compiler (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)

UNIT – II

10 Hours

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.

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.

UNIT – III

10 Hours

EXCEPTIONS AND OBJECT LIFETIME: Ode to Errors, Bugs, and Exceptions, The Role of .NET Exception Handling, 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.

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 (IComparable), Exploring the system. Collections Namespace, Building a Custom Container (Retrofitting the Cars Type).

UNIT – IV

10 Hours

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

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,.

TEXT BOOKS:

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

REFERENCE BOOKS:

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

UCS038E

JAVA AND J2EE

3 CREDITS

Hrs/Week: 3
Total Hrs.: 40

CIE Marks: 50
SEE Marks: 100

UNIT – I

10 Hours

INTRODUCTION TO JAVA: Java and Java applications; Java Development Kit (JDK); Java is interpreted, Byte Code, JVM; Object oriented programming; Simple Java programs. Operators and expressions: Arithmetic Operators, Relational operators, The? Operator; Logical expression; Type casting; Strings, Control Statements: Selection statements, iteration statements, Jump Statements.

CLASSES, PACKAGES, EXCEPTIONS

Classes: Defining Class, Constructors, Inheritance, Overriding, Final classes, Interfaces, Implementing Interfaces, Packages: Creating Packages, Adding a class to a Package, Hiding classes, Exceptions: Types of Errors, Syntax of Exception handling, Multiple Catch Statement.

UNIT – II

10 Hours

MULTI THREADED PROGRAMMING:

Creating Threads, Extending Thread Class, Stopping and blocking thread, Thread exceptions, Thread priority, Synchronization, Implementing runnable interface

Managing I/O Files in java

Stream classes, Character stream classes, other I/o Classes, Input/output Exceptions, Reading/writing characters, Reading/writing Bytes, Random access files

UNIT – III

10 Hours

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;

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.

UNIT – IV

10 Hours

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.

ENTERPRISE JAVA BEANS: Enterprise java Beans; Deployment Descriptors; Session Java Bean.

TEXT BOOKS:

1. E. Balaguruswamy, 2007, **Programming with Java** ,3rd Edition, Tata McGraw Hill.
2. Jim Keogh , 2007, **J2EE - The Complete Reference** , Tata McGraw Hill.

REFERENCE BOOKS:

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

UCS039E

SOFTWARE TESTING

3 CREDITS

Hrs/Week: 3
Total Hrs.: 40

CIE Marks: 50
SEE Marks: 100

UNIT – I

10 Hours

BASICS OF SOFTWARE TESTING

Human Errors and Testing; Software Quality; Requirements, Behavior and Correctness; Correctness versus Reliability; Testing and Debugging; Test Metrics.

Software and Hardware Testing; Testing and Verification; Defect Management; Execution History; Testgeneration Strategies, Static Testing. Model-Based Testing and Model Checking; Control-Flow Graph; Types of Testing;

UNIT – II

10 Hours

TEST GENERATION FROM REQUIREMENTS – 1:

Introduction; The Test-Selection Problem; Equivalence Partitioning; Boundary Value Analysis; Category-Partition Method.Cause-Effect Graphing, Test Generation from Predicates.

UNIT – III

10 Hours

STRUCTURAL TESTING:

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

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.

UNIT – IV

10 Hours

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.

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;

TEXT BOOKS:

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

REFERENCE BOOKS:

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

UCS040E ADVANCED SOFTWARE ENGINEERING 3 CREDITS

Hrs/Week: 3
Total Hrs.: 40

CIE Marks: 50
SEE Marks: 100

UNIT-I

10 Hours

QUALITY MANAGEMENT:

Quality Concepts: Quality, Software quality; The software quality dilemma; Achieving software quality. Review techniques: Cost impact of Software defects; Defect amplification and removal; Review metrics and their use; Reviews: A formal spectrum; Informal reviews; Formal technical reviews. Software Quality Assurance: Background issues, Elements of SQA; SQA tasks, goals and metrics; Formal approaches to SQA; Statistical software quality assurance; Software reliability;

FORMAL MODELING AND VERIFICATION:

The Cleanroom Strategy; Functional specification; Cleanroom design; Cleanroom testing; Formal methods concepts; Applying mathematical notation for formal specification; Formal specification languages.

UNIT – II

10 Hours

PROCESS IMPROVEMENT, CONFIGURATION MANAGEMENT:

Process and product quality; Process classification; Process measurement; Process analysis and modeling; Process change; The CMMI process improvement framework.

Configuration management planning; Change management; Version and release management; System building; CASE tools for configuration management.

SOFTWARE PROCESS AND PROJECT METRICS: Metrics in the Process and Project Domains; Software Measurement; Metrics for software quality; Integrating metrics within the software process; Metrics for small organizations;

UNIT – III

10 Hours

SOFTWARE REUSE, CBSE: The reuse landscape; Design patterns; Generator-based reuse; Application frameworks; Application system reuse. Components and component models; The CBSE process; Component composition.

CRITICAL SYSTEMS DEVELOPMENT AND VALIDATION:

Dependable processes; Dependable programming; Fault tolerance; Fault tolerant architectures.

UNIT – III

10 Hours

Reliability validation; Safety assurance; Security assessment; Safety and dependability cases.

USER INTERFACE DESIGN, MAINTENANCE AND REENGINEERING:

User interface design issues; The UI design process; User analysis; User interface prototyping; Interface evaluation. Software maintenance; Reengineering; Business process reengineering; Software reengineering; Reverse engineering; Restructuring; Forward engineering; The economics of reengineering.

TEXT BOOKS:

1. Roger S Pressman, 2007, **Software Engineering: A Practitioner's Approach** - 7th Edition, McGraw-Hill..
2. Sommerville, **Software Engineering** , 2007, 8th Edition, Addison-Wesley,.

REFERENCE BOOKS:

1. Pfleeger, 2001, **Software Engineering Theory and Practice** , 2nd Edition, Pearson Education.
2. Waman S Jawadekar , 2004, **Software Engineering Principles and Practice**- Tata McGraw Hill..

UCS041E ARTIFICIAL INTELLIGENCE & EXPERT SYSTEMS
3 CREDITS

Hrs/Week: 3
Total Hrs.: 40

CIE Marks: 50
SEE Marks: 100

UNIT I

10 Hours

Problems and Search : Introduction, Concepts and definition of AI, AI Problems, The Underlying assumption, What is an AI technique?, AI characteristics, AI versus Natural Intelligence, Applications of AI. **Problems, Problem Spaces, and Search:** Defining the Problem as State Space Search, Production Systems, Problem Characteristics, Production Systems Characteristics, Advantages and Disadvantages of DFS & BFS Techniques. **Heuristic Search Techniques:** What is heuristic?, Heuristic Function, Importance of Heuristic Function, Examples, Search Techniques: Generate – and – Test, Hill Climbing, Best-First Search.

UNIT II

10 Hours

Knowledge Representation: Representations and Mappings, Approaches to Knowledge Representation, Issues in Knowledge Representation. Procedural versus Declarative Knowledge, Logic Programming, Forward versus Backward reasoning, Matching. Approaches: Propositional Logic, Predicate Logic, Representing Simple Facts in Logic, Representing Instance and Isa Relationships, Computable Functions and Predicates, Resolution, Natural Deduction>**Structured Representation:** Approaches: Semantic Networks, Frames, Conceptual Dependency, Scripts, Etc.

UNIT III

10 Hours

Reasoning under Uncertainty: Introduction to Nonmonotonic Reasoning, Logics for Nonmonotonic Reasoning, Augmenting a Problem Solver, Statistical Reasoning, Probability and Bay's Theorem, Certainty Factors and Rule-based Systems, Bayesian Networks, Dempster-Shafer Theory. **Game Playing:** Overview, The Minima Search Procedure, Adding Alpha-Beta Cutoffs, Additional Refinements, Examples.

Expert Systems: Basic Concepts of Expert System, Structure of Expert Systems, The Human Element in Expert Systems, How Expert Systems Work, Example of an Expert System Consultation, Problem Areas Addressed by Expert Systems, Benefits of Expert Systems, Problems and Limitations of Expert Systems, Expert System Success Factors, Type of Expert Systems.

UNIT IV

10 Hours

Learning: What is Learning?, Rote Learning, Learning by taking Advice, Learning in Problem Solving, Learning from Examples: Induction, Explanation-based Learning, Discovery Analogy, Formal Learning Theory, Neural Net Learning and Genetic Learning. **Planning:** Overview, An Example Domain: The Blocks world, Components of a Planning System, Goal Stack Planning, Nonlinear Planning using Constraint Posting, Hierarchical Planning, Other Planning Techniques. **Natural Languages Processing & Understanding:** What is Understanding?, What makes Understanding Hard?, Understanding as Constraint satisfaction, Introduction to NLP, Syntactic Processing, Semantic Analysis, Discourse and Pragmatic Processing.

Text Books

1. Elaine Rich, Kevin Knight, **Artificial Intelligence**, Second Edition, Tata McGraw Hill.
2. Efraim Turban and Jay E. Aronson, **Decision Support Systems and Intelligent Systems**, Sixth Edition 2002, Pearson Education Asia.

UCS042E

INTRODUCTION TO ROBOTICS 3 CREDITS

Hrs/Week: 3
Total Hrs.: 40

CIE Marks: 50
SEE Marks: 100

UNIT I

10 Hours

Introduction: Historical development-classification of robots-applications-robots kinematics-joints and links-degree of freedom-description of position, orientation, frames-mapping from one frame to another-compound transformations-inverse of transform matrix-transform equations-kinematics of three degree of freedom manipulators-Description of links-intermediate links in chain-First and last links in chain -Link parameters-affixing frames to links-derivation of link transformation matrix-Description of an industrial robot.

UNIT II

10 Hours

Inverse manipulator kinematics - Workspace-solvability-multiple solutions- Algebraic solution. Drive and control systems for robots: hydraulic systems and DC servomotors.Position control for robots-simple position control system-position control along a trajectory.

UNIT III

10 Hours

Robot end- effectors: Classification of end-effectors-drive System for grippersmechanical grippers magnetic grippers-vacuum grippers-gripper force analysis and gripper design.
Trajectory planning for Robots: Joint space schemes-cubic polynomials with via points-Blending schemes - interfacing to microprocessors and computers.

UNIT IV

10 Hours

Sensors and intelligent robots: need for sensing systems- sensing devices piezoelectric sensors-linear position and displacement sensing absolute optical encoding-incremental optical encoder-position and direction measurement velocity measurement—force and torque sensors-proximity sensors-range sensorsrobot vision systems

TEXT BOOK:

1. Saeed B. Nikku ,**Introduction to Robotics- Analysis, Systems and Applications;**, Pearson Education Asia, LPE

REFERENCES

1. PA Janakiraman, **Robotics and Image Processing.**
2. S R Deb, **Robotic Technology and flexible Automation.**
3. Yoram Koren, **Robotics for engineers.**

UCS043E

DATA MINING

3 CREDITS

Hrs/Week: 3
Total Hrs.: 40

CIE Marks: 50
SEE Marks: 100

UNIT – I

10 Hours

INTRODUCTION, DATA – 1: What is Data Mining? Motivating Challenges; The origins of data mining; Data Mining Tasks. Types of Data; Data Quality.
DATA – 2: Data Preprocessing; Measures of Similarity and Dissimilarity

UNIT – II

10 Hours

CLASSIFICATION: Preliminaries; General approach to solving a classification problem; Decision tree induction; Rule-based classifier; Nearest-neighbor classifier.
ASSOCIATION ANALYSIS – 1: Problem Definition; Frequent Itemset generation; Rule Generation; Compact representation of frequent itemsets; Alternative methods for generating frequent itemsets.

UNIT – III

10 Hours

ASSOCIATION ANALYSIS – 2: FP-Growth algorithm, Evaluation of association patterns; Effect of skewed support distribution; Sequential patterns.
CLUSTER ANALYSIS: Overview, K-means, Agglomerative hierarchical clustering, DBSCAN, Overview of Cluster Evaluation.

UNIT – IV

10 Hours

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.
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.

TEXT BOOKS:

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

REFERENCE BOOK:

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

UCS044E

MACHINE LEARNING

3 CREDITS

Hrs/Week: 3
Total Hrs.: 40

CIE Marks: 50
SEE Marks: 100

UNIT I

10 Hours

Introduction, What Is Machine Learning?, Examples of Machine Learning Applications

Supervised Learning

Learning a Class from Examples Vapnik-Chervonenkis (VC) Dimension, Probably Approximately Correct (PAC) Learning, Noise, Learning Multiple Classes, Regression, Model Selection and Generalization, Dimensions of a Supervised Machine Learning Algorithm

Bayesian Decision Theory

Introduction, Classification, Losses and Risks, Discriminant Functions, Utility Theory, Value of information, Bayesian Networks, Influence Diagrams, Association Rules

UNIT II

10 Hours

Parametric Methods

Introduction, Maximum Likelihood Estimation, Evaluating an Estimator: Bias and Variance, The Bayes' Estimator, Parametric Classification, Regression, Tuning Model Complexity: Bias-Variance Dilemma, Model Selection Procedures

Multivariate Methods

Multivariate Data, Parameter Estimation, Estimation of Missing Values, Multivariate Normal Distribution, Multivariate Classification, Tuning Complexity, Discrete Features, Multivariate Regression

Dimensionality Reduction

Introduction, Subset Selection, Principal Components Analysis, Factor Analysis, Multidimensional Scaling, Linear Discriminant Analysis

UNIT III

10 Hours

Clustering

Introduction, Mixture Densities, k-Means Clustering, Expectation-Maximization Algorithm, Mixtures of Latent Variable Models, Supervised Learning after Clustering, Hierarchical Clustering, Choosing the Number of Clusters

Nonparametric Methods

Introduction, Nonparametric Density Estimation. Generalization to Multivariate Data Nonparametric Classification, Condensed Nearest Neighbor, Nonparametric Regression: Smoothing Models, How to Choose the Smoothing Parameter

Decision Trees

Introduction, Univariate Trees, Pruning, Rule Extraction from Trees, Learning Rules from Data, Multivariate Trees

UNIT IV

10 Hours

Linear Discrimination

Introduction, Generalizing the Linear Model, Geometry of the Linear Discriminant, Two Classes, Multiple Classes, Pairwise Separation, Parametric Discrimination Revisited, Gradient Descent, Logistic Discrimination, Discrimination by Regression, Support vector machines

Combining Multiple Learners

Rationale, Voting, Error-Correcting Output Codes, Bagging, Boosting, Mixture of Experts Revisited, Stacked Generalization, Cascading

Reinforcement Learning

Introduction, Single State Case: K-Armed Bandit, Elements of Reinforcement Learning, Model-Based Learning, Temporal Difference Learning, Generalization, Partially Observable States

TEXT BOOK:

1. Ethem Alpaydin, 2004, 'Introduction to machine Learning', PHI

REFERENCE BOOK:

1. Tom M Mitchell, 1996, Machine Learning McGraw Hill Publications

Hrs/Week: 3
Total Hrs.: 40

CIE Marks: 50
SEE Marks: 100

UNIT I

10 Hours

Introduction: Machine Perception, Pattern Recognition systems, Design cycle, learning and adaptation. **Bayesian Decision Theory:** Introduction, Bayesian Decision theory - continuous features, classifiers, discriminant functions, and decision surfaces, normal density and discriminant functions, Bayes decision theory - discrete features. **Maximum likelihood and Bayesian parameter estimation:** Introduction, maximum likelihood estimation, Bayesian Estimation, Bayesian parameter estimation.

UNIT II

10 Hours

Nonparametric Techniques: Introduction, Density Estimation, Parzen Windows, k_n -nearest neighbour estimation, nearest neighbor rule, metrics and nearest-neighbor classification, fuzzy classification, reduced coulomb energy, approximations by series expansions.

UNIT III

10 Hours

Linear discriminant functions:

Introduction, linear discriminant functions, generalized linear discriminant functions, minimizing the Perceptron criterion function, relaxation procedures, nonseparable behaviours, minimum squared-error procedures, Ho- Kashyap procedures

UNIT IV

10 Hours

Unsupervised learning and clustering: Mixture densities and identifiability, maximum-likelihood estimates, application to normal mixtures, unsupervised Bayesian learning, data decryption and clustering, criterion functions and clustering, hierarchical clustering, on-line clustering. Component analysis, low-dimensional representations and multidimensional scaling.

TEXT BOOKS:

1. Richard O. Duda, Peter E. Hart and David G Stork, **Pattern Classification**, John Wiley & Sons, Inc.2nd Ed. 2001.
2. Robert Schalkoff, **Pattern Recognition: Statistical, Structural and Neural Approaches**, John Wiley & Sons, Inc.1992. Chapters: 3 and 9.

UCS046E

FILE STRUCTURES

3 CREDITS

Hrs/Week: 3
Total Hrs.: 40

CIE Marks: 50
SEE Marks: 100

UNIT-I

10 Hours

Introduction to the design and specification of file structure: The Heart of the file structures Design, A Short History of File Structures Design;

Fundamental File Processing Operations: Physical Files and Logical Files, Opening Files, Closing Files, Reading and Writing, Seeking;

Secondary Storage: Disks: Organization of disks, estimating capacities space needs, organizing tracks by sector, organizing tracks by blocks, non-data overhead, the cost of a disk access, *CD-ROM*: Physical Organization of CD-ROM, CD-ROM Strengths and weaknesses, Buffer Management.

Fundamental file structure concepts: Field and Record Organization, Using Classes to Manipulate Buffers, Using Inheritance for Record Buffer Classes

UNIT II

10 Hours

Organization of files for performance: Reclaiming Space in files, Internal Sorting and Binary Searching, Key sorting,

Indexing: Introduction, A Simple Index for Entry Sequenced File, Object-Oriented support for Indexed, Entry-Sequenced Files of Data Objects, Operation required to maintain an indexed file, Class text index file, Indexes that are too large to hold in Memory, Indexing to provide access by Multiple keys, Retrieval Using Combinations of Secondary Keys, Improving the Secondary Index structure, Inverted List.

UNIT III

8 Hours

Multi-level indexing and B-trees: Statement of the problem, Indexing with BST, AVL tree, paged binary tree, problem with paged trees, Multilevel indexing: A better approach to tree indexes, Working up from the bottom, Example of Creating a B-Tree, An Object-Oriented Representation of B-Trees, B-Tree Methods search, insert & others, Formal Definition of B-Tree Properties, Worst-case Search Depth, Deletion, Merging and Redistribution during insertion.

UNIT IV

10 Hours

Indexed sequential file access and prefix B+ trees: Indexed Sequential Access, Maintaining a Sequence Set, Adding a Simple Index to the Sequence Set, The Content of the Index: Separators Instead of Keys, The Simple Prefix B+ Tree and its maintenance, Index Set Block Size, Internal Structure of Index Set Blocks: A Variable-order B- Tree, Loading a Simple Prefix B+ Trees.

Hashing: Introduction, A Simple Hashing Algorithm, Hashing Functions and Record Distribution, Extra Memory used, Collision resolution by progressive overflow, Sorting more than one record per address Buckets, Making deletions, Other collision resolution techniques.

TEXT BOOKS:

1. Michael J. Folk, et al, 2004, **File Structures-An Object Oriented Approach with C++**, Third Edition, Pearson education (Chapters 1.1, 1.2, Chapter 2.1 to 2.5, Chapter 3.1, 3.4, 3.5, 3.6, Chapter 4.1, 3.9, 4.2, 4.3, 5.1, 5.2.2, Chapter 6.2 to 6.4, Chapter 7.1 to 7.8, Chapter 8.1, 8.3 to 8.5, Chapter 9.1 to 9.8, 9.10 to 9.13, Chapter 10.1 to 10.9, Chapter 11.1 to 11.8)

REFERENCE BOOKS:

1. Scot Robert Laddm, 1993, **C++ Components and Algorithms**, BPB Publications.
2. Venkatesh N. Baitipuli, 2004, **File Structures, , Conceptual Toolkit with C++**, 1st Edition.
3. Thomas H. Cormen, **Introduction Algorithms** et.al, 2nd edition, PHI

UCS047E DISTRIBUTED DATABASES AND DATABASE WAREHOUSING

3 CREDITS

Hrs/Week: 3
Total Hrs.: 40

CIE Marks: 50
SEE Marks: 100

UNIT-I

10 Hours

Distributed Databases: An overview

Features of Distributed versus centralized database, why distributed databases, Distributed Database Management Systems(DDBMS),Review of databases and networks.

Levels of distribution transparency: Reference architecture for distributed databases, types of data fragmentation, distribution transparency for read only application, distribution transparency for update applications, distributed database access primitives, integrity constraints in distributed database.

UNIT-II

10 Hours

Distributed Database Architecture:

DBMS standardization, Architectural models for distributed DBMSs: Autonomy, Distribution, heterogeneity, Architectural alternatives, Distributed DBMS Architecture:

Client/server systems, peer-to-peer distributed systems, MDBS Architecture ,

Distributed database design :

Alternative design strategies: top down design process, bottom-up design process Distribution design issues: Reasons for fragmentation, fragmentation alternatives, degree of fragmentation, correctness rules of fragmentation, allocation alternatives, information requirements

UNIT-III

09 Hours

The management of distributed transactions:

A framework for transaction management, Supporting atomicity of distributed transactions, Concurrency control for distributed transactions, Architectural aspects of distributed transactions.

UNIT-IV

09 Hours

Concurrency control:

Foundations of distributed concurrency control, Distributed deadlocks, Concurrency control based on Timestamps

Introduction

What is Data Warehouse? , A Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, Data cube Technology, From Data warehousing to Data Mining, Data Mining, Functionalities, Data Cleaning, Data Integration and Transformation, Data Reduction.

TEXT BOOK:

1. Stefano ceri, Giuseppe Pelagatti ,**Distributed databases principles & systems**, McGraw-hill international editions (Chapter 1, 3, 7, 8)
2. M.Tamer Ozsu, Patrick Valduriez,S.Sridhar , **Principles of distributed database systems** , PEARSON Education (Chapter 4, 5)

3. Jiawei Micheline Kamber, **Data mining concepts Techniques** , Morgan kauf mann publishers.
(Chapter 2 (2.1 -2.6))

REFERENCE BOOKS:

1. Sam Ananhory Dennis **Data Warehousing in the real word** Pearson Education, New Delhi 2006
- 2.. Paul raj Ponniah , John Wiely , **Data Ware housing fundamentals.**

UCS048E

ADVANCED DBMS

3 CREDITS

Hrs/Week: 3
Total Hrs.: 40

CIE Marks: 50
SEE Marks: 100

UNIT-I

9 Hours

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, RAID, Disk space management, Buffer manager, Files of records, Page formats and record formats.

UNIT II

10 Hours

Tree Structured and Hash Based Indexing:

Intuition for tree indexes, Indexed sequential access method (ISAM), B+ trees, Search, Insert, Delete, Duplicates, B+ trees in practice, Static hashing: Extendible hashing, Linear hashing, comparisons.

UNIT-III

10 Hours

Query Evaluation and External Sorting:

The system catalog, Introduction to operator evaluation, Algorithms for relational Operations, Introduction to query optimization, Alternative plans, motivating example, what a typical optimizer does, when does a DBMS sort data? A simple two-way merge sort, External merge sort.

Evaluating Relational Operators

The Selection operation, General selection conditions, The Projection operation, The Join operation, The Set operations, Aggregate operations, The impact of buffering

UNIT-IV

11 Hours

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.

Transaction Processing Concepts : Characterizing schedules based on recoverability, Characterizing schedules based on serializability, Concurrency control: Two Phase Locking Techniques, Based on Time Stamp Ordering, Granularity of Data items and Multiple Granularity Locking, Recovery Technique: ARIES Recovery Algorithm, Recovery in MultidataBase Systems, DataBase Backup and Recovery from Catastrophic failures.

Text Books

1. Raghu Ramakrishnan and Johannes Gehrke, 2003, “**Database Management Systems**”, 3rd Edition, McGraw-Hill (Chapters 8, 9, 10, 11, 12, 13.1 to 13.3, 14, 15)
2. Elmasri and Navathe, Addison- Wesley, 2007 **Fundamentals of Database Systems**, 5th Edition, (Chapter 17, 18, 19, 30)

REFERENCE BOOKS:

1. Connolly and Begg, 2002. **Database Systems**, 3rd Edition, Pearson Publications,

**UCS049E AN ALGORITHMIC APPROACH TO BIOINFORMATICS
3 CREDITS**

**Hrs/Week: 3
Total Hrs.: 40**

**CIE Marks: 50
SEE Marks: 100**

UNIT – I

10 Hours

A Primer in biology; Computational Problems arising in biology. Sequence alignment for DNA and Protein sequences.

Sequence alignment for DNA and protein sequences Concepts: homology, sequence similarity and sequence alignment; dynamic programming algorithms. Pairwise alignment. Global and local alignment using dynamic programming. Heuristic alignment methods: BLAST/FASTA and the statistics of local alignments Multiple sequence alignment: Definition, scoring, techniques Aligners for proteins sequences Spliced alignment.

UNIT – II

10 Hours

Motif finding in DNA and proteins Hidden Markov models (HMMs). The basic HMM algorithms: forward, backward, Viterbi, Baum-Welch Applications: CpG islands, gene finding, profile HMMs, pair HMMs

UNIT – III

10 Hours

Genome assembly :Analysis of high-throughput sequencing data. Phylogenetic analysis. Why phylogeny? Neighbor joining, parsimony, and maximum likelihood methods

UNIT – IV

10 Hours

Comparative genomics: gene regulation, gene finding, genome rearrangements (week 13) High throughput biological data: microarrays, mass spectrometry, and protein-protein interactions (week 14)

TEXT BOOKS:

1. Neil C.Jones and Pavel A. Pevzner, 2004, **An Introduction to Bioinformatics algorithms**, MIT Press.

UCS050E

OPERATIONS RESEARCH

3 CREDITS

Hrs/Week: 3
Total Hrs.: 40

CIE Marks: 50
SEE Marks: 100

UNIT - I

10 Hours

Introduction, Linear Programming 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; Implementation.

Introduction to Linear Programming: Prototype example; The linear programming (LP) model.

UNIT - II

10 Hours

Simplex Method: 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. Post optimality analysis. The revised simplex method, a fundamental insight. The essence of duality theory; Economic interpretation of duality. Primal dual relationship.

UNIT III

10 Hours

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.

UNIT IV

10 Hours

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.

Text Books

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

Reference Books

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

UCS051E ETHICS IN COMPUTING PROFESSION AND LEGAL ISSUES 3 CREDITS

Hrs/Week: 3
Total Hrs.: 40

CIE Marks: 50
SEE Marks: 100

UNIT I

10 Hours

Scope and Aims of Engineering ethics- responsibility of engineers- impediments to responsibility – honesty – integrity & reliability

UNIT II

10 Hours

Law –meaning, source, civil law and criminal law ; Risk, safety and liability in engineering-tortious liability and liability under consumer protection act. Law relating to product safety standards.

UNIT III

10 Hours

Computer crimes and adjudication- computer crimes, types of computer crimes-penalties and offences under I.T.Act (with present amendments).-offences, investigation and adjudication issues under IPC, CrPC and under I.T.ACT- digital evidence, Indian evidence act.

UNIT IV

10 Hours

Legislations relating to computer crimes , Indian perspective – copy right law and cyberspace – patent law- trademarks law and cyberspace – law relating to geographical indication- law relating to design – law relating to semi conductor layout and design law.

TEXT BOOKS:

1. Charles. E.Harris, Michael. S. Pritchard and Michael – ‘Engineering Ethics’-, 2nd Edition Robin Thompson Asia, 2003-08-05
2. Ian J Lloyd- ‘Information Technology law’ –3rd edn , Butter worths co ltd, Latest Edition
3. P.Narayan – ‘Intellectual Property Law’- 3rd edn, Eastern Law House, Latest Edition
4. W.R. Cornish – ‘Cases and materials on IPR’ –2nd edn , Universal Law Publishing co pvt ltd, Latest Edition.

**UCS052E FINANCIAL MANAGEMENT AND ACCOUNTING
3 CREDITS**

Hrs/Week: 3
Total Hrs.: 40

CIE Marks: 50
SEE Marks: 100

UNIT – I

10 Hours

INTRODUCTION TO FINANCIAL MANAGEMENT: Forms of organization, direct and indirect taxes. Statutory Registration- excise Duty, central sales tax, VAT, service tax, international fund availability.

WORKING CAPITAL MANAGEMENT: Definition, need and factors influencing the working capital requirement. Determination of operating cycle, cash cycle and operating cycle analysis. Calculation of gross working capital and net working capital requirement.

UNIT – II

10 Hours

LONG TERM FINANCING: Raising of finance from primary and secondary markets. Valuation of securities, features of convertible securities and warrants. Features of debt, types of debt instruments, return on investment(ROI) and credit rating of units. Shares, debentures.

INTRODUCTION: Book keeping – systems of book keeping, journal and ledger posting. Financial Statement, Preparation of Trial balance, profit and Loss Account, Balance Sheet with adjustments.

UNIT – III

10 Hours

RATIO ANALYSIS / ACCOUNTING RATIO: Liquidity ratio – Current ratio, quick ratio, turnover ratio, capital structure ratio- Debt – equity ratio, Coverage ratio, Profitability ratio, Profit margin, Return on assets, Activity ratios – Inventory turnover ratio, Debtors Turnover ratio. Preparation of the balance sheet from various ratios. Analysis of any one published balanced sheet.

UNIT – IV

10 Hours

COSTING: Classification of cost, preparation of cost sheet, absorption and variable costing, job costing, process costing. Classification of the variances analysis – material, labour and overhead variances.

BUDGETING: Types of budgets – Flexible budgets, preparation of cash budgets, purchase and production budgets and master budget, Budgetary control, advantages & limitations of budgeting.

TEXT BOOKS:

1. Khan & Jain, 2001, **Financial Management**, text & problems TMH ISBN 0-07-460208-A.

UCS053E

FUNCTIONAL PROGRAMMING

3 CREDITS

Hrs/Week: 3
Total Hrs.: 40

CIE Marks: 50
SEE Marks: 100

UNIT-I

10 Hours

Elements of Functional Programming:

A Little Language of Expressions, types: Values and Operations, Functional Declarations, Approaches to Expression Evaluation, Lexical Scope, Type Checking.

Basic LISP Primitives:

LISP means symbol manipulation, LISP procedures and Data are symbolic Expressions, Problems, Lists are like bowls, FIRST and REST take lists apart, quoting stops evaluation, problems, some old timers use CARs and CDRs, SETF assigns values to symbols, SETF accepts multiple symbol-value pairs, certain atoms evaluate to themselves, CONS, APPEND, and LIST construct lists, problems, CONS, APPEND, and LIST do not alter symbol values, NTHCDR, BUTLAST, and LAST shorten lists, LENGTH and REVERSE work on top-level elements, ASSOC looks for Indexed sub lists, LISP offers integers, ratios, and floating-point numbers, among others, a few primitives for numbers round out a basic repertoire, problems.

UNIT-II

10 Hours

Procedure definition and binding:

DEFUN is LISP's Procedure-Definition Primitive, Parameter Variable Values Are Isolated by Virtual Fences, Special Variable Values Are Not Isolated by Virtual Fences, Procedures Match Parameters to Arguments, Problems, LET Forms Bind Parameters to Initial Values, LET Forms Produce Nested Fences, LET Forms Evaluate Initial Value Forms in Parallel, LET* Forms Evaluate Initial Value Forms Sequentially, Progressive Envelopment and Comment Translation Help Define New Procedures.

Predicates and conditionals:

A Predicate Is a Procedure That Returns True or False EQUAL, EQ, EQL, and = Are Equality Predicates, MEMBER Tests for List Membership, Keyword Arguments Modify Behavior, LISTP, ATOM, NUMBERP, and SYMBOL Are Data Type Predicates, NIL Is Equivalent to the Empty List, NULL and ENDP Are Empty List Predicates, There Are Many Number Predicates, Problems, AND, OR, and NOT Enable Elaborate Testing, Problems, Predicates Help IF, WHEN, and UNLESS Choose among Alternative, Problems, Predicates Help COND Choose among Alternatives, Problems, CASE IS Still Another Conditional, Conditionals Enable DEFUN To Do Much More, Problems, Problem Reduction Helps Define New Procedure.

UNIT-III

10 Hours

Procedure abstraction and recursion:

Procedure Abstraction Hides Details Behind Abstraction Boundaries, Recursion Allows Procedures To Use Themselves, Recursion Can Be Efficient, Problems, Recursion Can Be Used To Analyze Nested Expressions, Problems, Optional Parameters Eliminate the Need for Many Auxiliaries, Problems, Advanced Programmers Use Rest, Key, and Aux Parameters, Only a Few LISP Primitives Are Really Necessary, Problems.

Iteration on numbers and lists:

DOTIMES Supports Iteration on Numbers, Problems, DOLIST Supports Iteration on Lists, Problems, DO Is More General than DOLIST and DOTIMES, Problems, LOOP Never Stops,

Almost, PROGI and PROGN Handle Sequences Explicitly, Problems and Their Representation Determine Proper Control Strategy.

UNIT IV

10 Hours

List storage, surgery and reclamation:

Lists Can Be Represented by Boxes and Pointers, Boxes and Painters Can Be Represented by Bytes, CONS Builds New Lists by Depositing Pointers in Free Boxes, APPEND Builds New Lists by Copying, NCONC and DELETE Can Alter Box Contents Dangerously, SETF Also Can Alter Box Contents Dangerously, Problems, EQ Checks Pointers Only, Garbage Collection Reclaims Abandoned Memory, LISP Allows You To Write Inefficient Procedures, Problems, Simple Garbage Collections Use the Mark and Sweep Approach, Simulation Procedure Expose Garbage Collection Details, MARK Places Marks on Useful Chunks, SWEEP Collects Unmarked Chunks, Marking Can Be Done without Recursion, Our Nonrecursive Marking Procedure Leaves a Trail of Pointers, Some Garbage Collections Are Incremental.

TEXT BOOKS:

1. P.H.Winston, B.K.Horn, **LISP**, 3rd edition, Addison Wesley, (Chapters 2, 3,4, 5, 7,17)
2. Ravi Sethi, “**Programming Languages concept & constructs**”, 2nd edition, Pearson Education.,(Chapter 8)

REFERENCES:

1. A.Narayanan, W.E.Sharkey, **An Introduction to LISP**,
2. The computation centre and research laboratory of Electronics, MIT, John Mccarthy, Paul W. Abrahams, **LISP 1.5 Programmer’s Manual**, 2nd Edition.
3. R.P.Tennent , 1981 , “**Principles of Programming Languages**”, PHI,.
4. P.Henderson ,1980, **Functional Programming** , PHI.

**UCS054E PRINCIPLES OF PROGRAMMING LANGUAGES
3 CREDITS**

**Hrs/Week: 3
Total Hrs.: 40**

**CIE Marks: 50
SEE Marks: 100**

UNIT-I

8 Hours

Introduction; Names, Scope, and Bindings

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, The binding of reference environments; Binding within a scope; Separate compilation.

UNIT-II

12 Hours

Control Flow

Expression evaluation. Structured and unstructured flow; Sequencing; Selection; Iteration; Recursion; Non-determinacy.

Data Types: Type systems; Type checking; Records and variants; Arrays.

UNIT-III

10 Hours

Strings; Sets; Pointers and recursive types; Lists; Files and Input/Output; Equality testing and assignment.

Subroutines, Data, Control Abstraction and Object Orientation

Review of stack layout; Calling sequences; Parameter passing; Generic subroutines and Modules; Exception handling, Co-routines. Data Abstraction, Object Orientation: Object oriented programming; Encapsulation and Inheritance; Dynamic method binding; Multiple inheritance; Object oriented programming revisited.

UNIT-IV

10 Hours

Functional Languages, Logic Languages, Scripting Languages

Functional Languages: 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.

TEXT BOOKS:

1. Michael L. Scott, 2006, **Programming Language Pragmatics**, 2nd Edition, Elsevier., (Chapters 1.1 to 1.5, 3 excluding the sections on CD, 6 excluding the sections on CD, 7 including the sections on CD, 8 excluding the sections on CD, 9 including the sections on CD, 10 excluding the sections on CD, 11 excluding the sections on CD, 13.1. Note: Text Boxes titled Design & Implementation are excluded.)

REFERENCE BOOKS:

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

UCS055E SERVICES ORIENTED ARCHITECTURE 3 CREDITS

Hrs/Week: 3
Total Hrs.: 40

CIE Marks: 50
SEE Marks: 100

UNIT – I

10 Hours

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).

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

UNIT – II

10 Hours

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

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

UNIT – III

10 Hours

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

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.

UNIT – IV

10 Hours

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

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

TEXT BOOK:

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

REFERENCE BOOK:

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

UCS056E COMPUTER ANIMATION**3 CREDITS****Hrs/Week: 3
Total Hrs.: 40****CIE Marks: 50
SEE Marks: 100****UNIT – I****10 Hours**

Basic Animation – Animation Principles – Camera animation – Key Frame Animation – Dope Sheet Editor – Track Editor. Non-Linear Animation – Motion Path Animation – Using Clusters – Using Deformers – Key Frame Animation Flow Path Objects – Snap Shot Animation.

Character Animation – Creating Walk Cycle – Creating Run Cycle – Female Walk – Male Walk – Four Leg Character Walk cycle – Four Leg Character Run cycle – Lazy Walk – Brisk Walk – Facial Animation – Expressions. Basic Rigging – Creating Bones For Character – Creating Bones For Four Leg Character – Biped Rig – Quadruped Rig – Vehicle Rig – Facial Rig.

UNIT – II**10 Hours**

Character Rigging – Creating Ik's for Character – Creating bone's for Character – Facial Rigging – Binding Shape – Binding & Weight for character – Full body IK.

Maya Basic Modeling – Maya Interface – Creating objects using EP curve, CV curve – Making Table Lamp – Polygon Terminology, Polygon over view – Modeling a dice using Boolean – Making an iron box using loft – Modeling some inorganic objects some inorganic objects – Creating Terrain using sculpt geometry tool.

B.G & Set Modeling – Creating Mountains – Interior & Exterior Modeling – Modeling a garden – Modeling a Landscape. Maya Character Modeling – Modeling the eyes, nose – Modeling the Leg of the Character – Modeling the body – Modeling a Female Character – Modeling a Male Character – Modeling a High Polygonal.

UNIT – III**10 Hours**

Material assigning – Hyper Shade over view – Shade over view – Shades and Textures – Material Linking - Light Linking to the materials – Mental Ray Shades – Mental Ray Textures – Image based Lighting Shades – Controlling Photon Emission from shades.

Character UV Texturing- UV Texturing over View – Applying Texture for Dice – Applying UV's for Inorganic Models- Applying UV's for head – Applying UV's for body – Applying UV's for B.G. Basic Lighting – Types of Light – Editing Light Attribute – Light Effects and Light Glow – Light Linking – Mental Ray Lighting – Light Shadow Passing.

UNIT – IV**10 Hours**

Mental Ray - Environment Lighting – Image based Lighting for Scene – Caustics Passing and traveling – Global illumination – Photon Emitting & Controlling – Motion Blur Lighting – Light fog. B.G Lighting – Environment Lighting – Creation sun light for B.G – Creating Moon light for B.G – Creating a desert Environment – Interior Lighting.

Basic Rendering – Rendering Scene – Interactive Photo Realistic Rendering – Using mental ray for Maya render – Particle Rendering – Software Rendering – Hardware Rendering – Final Gather Rendering – Play Blast Rendering. Batch Rendering – Rendering Formats – Light Pass Rendering – Frames Rendering - F-Check rendering – Occlusion Rendering – Motion Blur rendering – Final Movie Rendering.

TEXT BOOKS:

1. Larry Lewis and Jim Lammers, 2004, **Maya 5 Fundamentals**, First Indian Edition Published By G.C.Jain for Techmedia.
2. Phil Gross and Mike Gross , 2005, **Macromedia Director 8.5 Shock Ware**, BPB Publications, Studio for 3D
3. Tay Vaughan , **Multimedia making it work**, Seventh Edition,Tata Mc Graw- Hill Publishing Company Limited.

REFERENCES:

1. Eric Hanson, Kenneth Ibrahim, **Maya 6 Killer Tips**, First Indian Alex Nijmeh Edition 2005,BPB Publications
2. Barrett Fox , 2004, **3Ds Max 6 Animation**, Tata Mc Graw-Hill Edition.

UCS057E

VIRTUAL REALITY

3 CREDITS

Hrs/Week: 3
Total Hrs.: 40

CIE Marks: 50
SEE Marks: 100

UNIT-I

9 Hours

Introduction: The three I's of virtual reality, commercial VR technology and the five classic components of a VR system.

Input Devices: (Trackers, Navigation, and Gesture Interfaces): Three-dimensional position trackers, navigation and manipulation, interfaces and gesture interfaces.

UNIT – II

9 Hours

Output Devices: Graphics displays, sound displays & haptic feedback.

Modeling : Geometric modeling, kinematics modeling, physical modeling, behaviour modeling, model management.

UNIT – III

9 Hours

Human Factors: Methodology and terminology, user performance studies, VR health and safety issues.

Applications: Medical applications, military applications, robotics applications.

UNIT – VI

11 Hours

VR Programming-I : Introducing Java 3D, loading and manipulating external models, using a lathe to make shapes. (Chapters 14, 16 and 17 of Text Book (2))

VR Programming-II : 3D Sprites, animated 3D sprites, particle systems.
(Chapters 18, 19 and 21 of Text Book (2))

TEXT BOOKS :

1. Gregory C. Burdea & Philippe Coiffet, John Wiley & Sons, **Virtual Reality Technology**, Second Edition, Inc.,
2. Andrew Davison 2005, **Killer Game Programming in Java**, Oreilly-SPD,

REFERENCES :

1. William R.Sherman, Alan Craig, Elsevier(Morgan Kaufmann)
Understanding Virtual Reality, interface, Application and Design.

UCS058E SYSTEM MODELING AND SIMULATION 3-CREDITS

Hrs/Week: 3
Total Hrs.: 40

CIE Marks: 50
SEE Marks: 100

UNIT I

10Hours

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; System modeling , principles used in modeling, Types of Models; Monte Carlo simulation method , Discrete-Event System Simulation; Steps in a Simulation Study.

Simulation examples: Simulation of queuing systems; Simulation of inventory systems;

UNIT II

10Hours

General Principles: Concepts in Discrete-Event Simulation: The Event-Scheduling / Time-Advance Algorithm, World Views, Manual simulation Using Event Scheduling

Random-Number Generation

Properties of random numbers; Generation of pseudo-random numbers; Techniques for generating random numbers; Tests for Random Numbers.

UNIT III

10Hours

Random-Variate Generation: Inverse transform technique-Exponential distribution, uniform distribution, Discrete distributions, Acceptance-Rejection

Technique-Poisson Distribution

Verification and Validation of Simulation Models:Model building, verification and validation; Verification of simulation models;Calibration and validation of models.

UNIT IV

10Hours

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.

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

Simulation of computer system: Introduction Simulation tools- Process orientation, Event Orientation , CPU simulation.

Text Books:

1. Jerry Banks, John S. Carson II, Barry L. Nelson, David M. Nicol: 2007,' **Discrete-Event System Simulation**, 4th Edition, Pearson Education.
- 2.**Geoffrey Gordon "System Simulation"**, PHI, 2 Edition.

Reference Books:

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

EVALUATION METHODOLOGY

Evaluation Methodology for Theory:

Student performance evaluation is based on Continuous Internal Evaluation (CIE) and Semester End Examination (SEE). Both of them are important in assessing the performance of a student. For each subject, 50% weightage is given for CIE and 50% weightage is given for SEE.

Continuous Internal Evaluation (CIE)

- It comprises of 3 tests each of 30 marks for 1 hour.
- The obtained mark for each test is scaled down to maximum of 15 and summed.
- The student is further evaluated for 5 marks through assignment/s

Semester End Examination (SEE)

- It is carried out through an examination for 100 marks of 3 hours duration and later scaled down to 50 marks.

SEE Question Paper Pattern:

1. Total of 8 questions with two from each unit to be set uniformly covering the entire syllabus.
2. Each question will not have more than 4 sub sections.
3. Any five full questions are to be answered choosing at least one from each Unit.

Examination Methodology for Laboratory:

- Each laboratory subject is evaluated for 100 marks (50 for CIE and 50 for SEE).
- **Allocation of 50 marks for CIE**
 - Marks for each experiment 30 marks/No. of proposed experiments.
 - One lab test for 20 marks
- **Allocation of 50 marks for SEE**
 - 25 % of the marks for write-up, 50% of the marks for conduction, calculation and results, 25 % of the marks for viva-voce.