

**SCHEME OF TEACHING AND EXAMINATION
COMPUTER SCIENCE AND ENGINEERING
(Common to CSE & ISE)**

V SEMESTER

SL No.	Sub Code	Title	Teaching Dept.	Teaching hours /week		Examination			
				Theory	Prac	Duration	I.A. Marks	Theory/ Pract.	Total Marks
1.	CS51	System Software	CSE/ISE	04	---	03	25	100	125
2.	CS52	Operating System	CSE/ISE	04	---	03	25	100	125
3.	CS53	Database Management System	CSE/ISE	04	---	03	25	100	125
4.	CS54	Data Communication	CSE/ISE	04	---	03	25	100	125
5.	CS55	Unix and Shell Programming	CSE/ISE	04	---	03	25	100	125
6.	CS56	Advanced Microprocessors	CSE	04	---	03	25	100	125
7.	CSL57	Microprocessor Laboratory	CSE/ISE	---	03	03	25	50	75
8.	CSL58	System Software laboratory	CSE	---	03	03	25	50	75
TOTAL				24	06	---	200	700	900

SYSTEM SOFTWARE
(Common to ISE)

Sub code : CS51
Exam Hours : 03

IA Marks : 25
Total Hrs : 52

Hrs/Week : 04
Exam Marks : 100

1. **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, Pentium Pro Architecture, RISC Machines- Ultra SPARC Architecture, Crat T3E Architecture. **4Hrs**
2. **Assemblers** Basic Assembler Functions – A simple SIC Assembler, Assembler Algorithms and Data Structures, Machine Dependent Assembler Features - Instruction Formats & Addressing modes. Program Relocation, Statements, Expression, Program Blocks, Control Sections and Programming Linking, Assembler design Options – One Pass Assembler, Multi-pass Assembler, Implementation Examples- MASM Assembler, SPARC Assembler. **10 Hrs.**
3. **Loaders And Linkers** Basic Loaders Functions – Design of an Absolute Loaders, A Simple Bootstrap Loaders, Machine-Dependent Loaders features – Relocations, Programming Linking, Algorithm and Data Structures for Linking Loader, Machine- Independent Loader Features – Automatic Library Search, Loader Options, Loader Design Options – Linkage Editor, Dynamic Linkage, Bootstrap Loaders, Implementation Examples – MS-DOS Linker, Sun OS Linker, Cray MPP Linker, **9 Hrs.**
4. **Editors & Debugging Systems** Text Editors – Overview of Editing Process, User Interface, Editor Structure, Interactive, Debugging System – Debugging Functions and Capabilities, Relationship With Other Parts Of The System, User-Interface Criteria. **5 Hrs.**
5. **Macro Processor** Basic Macro Processor Functions – Macro Definitions & Expansion, Macro Processor Algorithm & Data Structure, Machine Dependent Macro Processor Features – Concatenation of Macro Parameters, Generation of unique Labels, Conditional Macro Expansion, Keyword Macro Parameters, Macro Processor Design Option – Recursive Macro Expansion, General Purpose Macro Processor, Macro Processing Within Language Translators, Implementation Examples – MASM Macro Processor , ANSIC Macro Processor. **6 Hrs**
6. **Compilers** Basic Compilers Function- Grammars, Lexical Analysis, Syntactic Analysis, Code Generation, Machine –Dependent Compilers Features – Intermediate Form Of The Program,Machine Dependent Code Optimization, Machine Independent Compilers Features – Structured Variables, Machine Independent Code Optimization, Storage Allocation, Block Structured Languages, Compilers Design Options – Division into Passes, interpreters, P-code Compiler- Compilers. **12Hrs.**
7. **Lex & Yacc** Lex And Yacc – The Simplest Lex Program, Recognizing Words with LEX, Symbol Tables, Grammars, Parser Laxer Communication, The Part of Speech Lexer, A Yacc Parser, The Rules Section, Running LEX & YACC Parser, LEX & Hand Written LexersUsing LEX – Regular Expression, Examples Of Regular Expressions, A word Counting Program, Parsing a Command Line Using YACC - Grammars, Recursive Rules, Shift/Reduce Parsing, What YACC Cannot Parse,A YACC Parser – The Definition Section ,The Rules Section, Symbol Values And Actions, The LEXER, Compiling and Running a Simple Parser,Arithmetic Expressions and Ambiguity, Variable and Typed Tokens. **6Hrs.**

TEXT BOOKS:

1. Leland L Beck. System Software.3rd Edition,Addison_Wesley.1997, Chapters:1(except(1.5.2)2(except(2.5.3),3,4,5(except(5.5),7.2,7.3.
2. John. R. Levine, Tony Mason and Doug Brown, Lex and Yacc, O'Reilly, SPD 1999,Chapters: 1,2(page 27-42),3(page51-65).

REFERANCE BOOK:

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

OPERATING SYSTEMS

Sub code :CS52
Exam Hours :03

IA Marks :25
Total Hrs.:52

Hrs/Week:04
Exam Marks:100

1. Introduction to operating systems & their classification 3 Hrs
What is an operating system, Mainframe systems, Desktop systems, Multiprocessor systems, Distributed system, Clustered system, Real time system, Handheld system, Feature migration, Computing environments.
2. Operating system structures 3 Hrs
System components, OS services, system calls, system programs, system structure, virtual machines.
3. Process, Inter process Communication, Threads & CPU Scheduling 8 Hrs
Process concept, process scheduling, Operation on processes, Cooperating processes, Inter process communication. Threads Overview, Multithreading models, Threading issues, Pthreads, Java threads. CPU scheduling
Basic concepts, Scheduling criteria, Scheduling algorithms, Multiple processor scheduling, Real time scheduling.
4. Process Synchronization and handling Deadlocks 12 Hrs
The Critical section problem, Synchronization hardware, Semaphores, Classical problems of synchronization, Critical regions, monitors. Deadlock System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, deadlock avoidance, Deadlock detection and recovery from deadlock.
5. Storage Management Main memory management 5 Hrs
Background, Swapping, Contiguous allocation, Paging, Segmentation, Segmentation with paging.
Virtual memory 5 Hrs
Background, Demand paging, Process creation, Page replacement algorithms, Allocation of frames, Thrashing.
File System Interface 5 Hrs
File concept, Access methods, Directory structure, File system mounting, File system implementation, Directory implementation, Allocation methods, Free space management.
Mass storage structures 2 Hrs
Disk structure, Disk scheduling methods, Disk management, Swap space management.
6. Protection and Security Goals of protection, Domain of protection, Access matrix, implementation of access matrix, Revocation of access rights, The security problem, Authentication , Program threats, System threats, Securing systems and facilities, Intrusion detection, Cryptography. 6 Hrs
7. Case Study- Linux Operating System
Design principles, Kernel modules, Process management, Scheduling, Memory management, File systems, Input and output, Inter process communication. 3 Hrs.

TEXT BOOK:

1. Operating System Concepts by Abraham silberschatz, Peter Baer Galvin, Greg Gagne, 6th edition, Jhon wiley & Sons 2003.

**DATABASE MANAGEMENT SYSTEMS
(COMMON TO ISE)**

Sub Code: CS53
Exam Hours: 03

IA Marks: 25
Total Hrs: 52

Hrs/Week: 04
Exam Marks: 100

- I. INTRODUCTION TO DATABASE SYSTEMS:
Managing Data; A Historical Perspective; File Systems Versus a DBMS; Advantages of DBMS; Describing and storing data in a DBMS; Queries in a DBMS; Transaction Management; Structure of a DBMS; People who work with the databases. **4 Hours**
- II. ENTITY-RELATIONSHIP MODEL:
Using High- level Conceptual Data Models for Database Design; An Example Database Application; Entity Types, Entity Sets, Attributes and keys; Relationship Types, Relationship Sets, Roles and Structural Constraints; Weak Entity Types; Refining the ER Design for the COMPANY Database; ER Diagrams, Naming Conventions and Design Issues. **5 Hours**
- III. RELATIONAL MODEL AND RELATIONAL ALGEBRA:
Relational model concepts; Relational model Constraints and Relational Database Schemas; Update operations and Dealing with constraint violations; Unary relational operations: SELECT and PROJECT; Relational Algebra Operations from the Set Theory. Binary relational Operations: JOIN and DIVISION; Additional Relational Operations; Examples of Queries in Relational Algebra; Relational Database Design Using ER-to-Relational Mapping. **8 Hours**
- IV. 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; Insert, Delete and Update and Update Statements in SQL; Additional features of SQL; Specifying General Constraints as Assertion; Views (Virtual Tables) in SQL; Database Programming; Issues and Techniques; Embedded SQL, Dynamic SQL. **9 Hours**
- V. DATABASE DESIGN:
Informal Design Guidelines for Relational 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; Multi valued Dependencies and Fourth Normal Form; Join Dependencies and Fifth Normal Form; Inclusion Dependencies; Other Dependencies and Normal Forms. **10 Hours**
- VI. DATABASE SECURITY:
Introduction to Database Security; Access Control; Discretionary Access Control; Mandatory Access Control. **Hours**
- VII. TRANSACTION MANAGEMENT:
The ACID Properties; Transactions and Schedules; Concurrent Execution of Transactions; Lock-Based Concurrency Control; Performance of Locking; Transaction support in SQL; Introduction to crash recovery; 2PL, Serializability and Recoverability; Introduction to Lock Management; Lock Convert ions; Dealing with Deadlocks; Specialized Locking Techniques; Concurrency Control without Locking; Introduction to ARIES: The Log; Other Recovery-Related Data Structures; The Write –Ahead Log Protocol; Check pointing; Recovering from a System Crash; Media Recovery; Other Algorithms and interaction with Concurrency Control **13 hours**

Text Books:

1. **Raghu Ramakrishnan and Johannes Gehrke:** Database Management Systems(Third Edition). McGraw-Hill, 2003 Chapters: 1, 21.1-21.4,16,17,18
2. **Elmasri and Navathe:** Fundamentals of Database Systems (Fourth Edition), Pearson Education, 2003 Chapters: 3, 5, 6.1-6.7, 8, 9.1-9.4.3,10,11

Reference Book:

1. Silbescatz, Korth and Sudarshan: Dtabase system Concepts, Fourth Edition, Mc-GrawHill, 2002

DATA COMMUNICATION
(Common to ISE)

Sub Code:CS54
Exam Hours:03

IA Marks:25
Total Hrs.: 52

Hrs/Week:04
Exam Marks :100

1. Communication Networks and Services

2Hrs

Evolution of Network and Services: Telegraph Networks and Message Switching, Telephone Networks and Circuit Switching, The Internet, Computer Networks and Packet Switching.

2. Application and Layered Architectures

7 Hrs

Example of Protocols, Services, and Layering: HTTP, DNS, and SMTP, TCP and UDP Transport Layer Services; The OSI Reference Model: The seven layer OSI Reference Model, Unified View of Layers, Protocols Services. Overview of TCP/IP Architecture: TCP/IP Architecture, TCP/IP Protocol : How the layer work together, Protocol Overview; Application Layer Protocols and TCP/IP Utilities.

3. Digital Transmission Fundamentals

14Hrs

Digital Representation of Information: Block-Oriented Information, Stream Information; Why Digital Communications? : Comparison of Analog and Digital Transmission, Basic properties of Digital Transmission System; Digital Representation of Analog Signals: Bandwidth of Analog Signals, Sampling of an Analog Signal, Digital Transmission of Analog Signals; Characterization of Communication Channels; Frequency Domain Characterization, Time Domain Characterization, Fundamental limits in Digital Transmission: The Nyquist Signaling Rate ,the Shannon Channel Capacity; Line Coding ; Modem and Digital Modulation: Binary Phase Modulation, QAM and Signal Constellation, Telephone Modem Standards, Properties of Media and Digital Transmission Systems ; Twisted Pair, Coaxial Cable, Optical Fiber, Radio Transmission ,Infrared Light ; Error Detection and Correction : Error Detection, Two Dimensional Parity Checks, Internet Checksum, Polynomial Codes, Standardized Polynomial Codes, Error Detecting Capability of a Polynomial Code.

4. Circuit Switching Networks:

8 Hrs

Multiplexing: Frequency Division Multiplexing, Time Division Multiplexing, wavelength-Division Multiplexing; SONET: SONET Multiplexing, SONET Frame Structure; Transport Networks: SONET Networks, Optical Transport networks; Circuit Switches, Time Division Switches; The b/Telephone Network; Transmission Facilities, End to End Digital Services.

5. Peer-to Peer Protocols and Data Link Layer

12 Hrs

Part-I: Peer-to-Peer Protocols: Peer-to-Peer Protocols and Service Models; ARQ Protocol and Reliable Data Transfer Service: Stop-and-Wait ARQ, Go-Back-N ARQ, Selective Repeat ARQ; Other Peer-to-Peer Protocols; Part-II : Data Link Controls: Framing ;Point to Point Protocol;HDLC Data Link Control; Link Sharing using Packet Multiplexeres: Statistical Multiplexing ,Speech Interpolation and the Multiplexing of Packetized Speech.

6. Medium Access Control Protocols and Local Area Networks

6 Hrs

Part-I: The Medium Access Control Protocols: Multiple Access Communications; Random Access: ALOHA, Slotted ALOHA, CSMA, CSMA-CD; Scheduling Approaches to Medium Access Control : Reservation System Polling, Token-Passing Rings; Channelization : FDMA, TDMA, CDMA.

7. High Speed Digital Access & Connecting Devices

3 Hrs

DSL (Digital Subscriber Line): DSL Technology; Cable Modems; Connecting Devices: Repeaters, Hubs, Bridges, two-Layer Switch, Router and three-layer Switches.

TEXT BOOK :

1.Alberto Leon – Garica and Indra Widjaja, Communication Networks, Fundamental Concepts and key architectures, Tata McGraw-Hill 2nd edition.

(Chapter 1.1,2.1 to 2.3,2.5,3.1 to 3.9 except 3.3,4.3,9.7 & 3.9.8, 4.1 to 4.5,5.1 to 5.7 , 6.1 to 6.4)

2.Behrouz A. Forouza, Data Communications and Networking, Tata McGraw-Hill 3rd Edition/
(Chapters : 3,4,5,6,7,8,9,10,11,12,13,16)

REFERENCE BOOKS :

1.William Stallings, Data Communication, Fifth Edition, Pearson Education/Prentice Hall India.

2. William A Shay, Understanding Data Communications and Networks, 2nd Edition, Thomson.

3. Godbole, Data Communication , Tata McGraw- Hill 2002,

4. Micael A .Gallo & William M. handcock, Computer Communications & Networking Technologies, 2003 Edition , Thomson.

UNIX & SHELL PROGRAMMING (COMMON TO ISE)

Sub Code : CS55
Exam Hours : 03

I.A Marks : 25
Total Hrs : 52

Hrs/Week : 04
Exam Marks : 100

1.BACKGROUND AND SOME BASIC COMMANDS

4Hrs.

Brief history, Salient features of UNIX System, POSIX and the single UNIX specification. The UNIX architecture, Locating Commands, Internal and External Commands, Flexibility of Command Usage, man: Browsing and Manual Pages On-line. Understanding the man Documentation.

Cal: The calendar, date: Displaying and System Date, echo: Displaying a Message, printf: An alternative to echo, bc: The calculator, script: Recording your Session, passwd: changing Your Password, who: Who are the users? uname: knowing Your Machine's characteristics, tty: knowing Your terminal, stty: Displaying and setting Terminal Characteristics

2.THE FILE SYSTEM AND SOME FILE HANDLING COMMANDS

4Hrs

The File, What's in a (File) name? The Parent-Child Relationship, The HOME variable: The Home Directory, pwd : Checking Your Current Directory, cd: Changing the Current Directory, mkdir: Making Directories, rmdir :Removing Directories, Absolute Pathnames, Relative Pathnames, ls :Listing Directory contents, The UNIX file System, cat :Displaying and Creating Files, cp: Copying a File, rm : Deleting Files, mv: Renaming Files, more: Paging output, The lp Subsystem: Printing a File, file: Knowing the File Types, wc: Counting Lines, Words, Characters, od : Displaying in Octal, The spell and ispell, cmp: comparing two Files, comm.: what is common? diff: Converting One File to Other, dos2unix and unix2dos : Converting Between DOS and UNIX, Compressing Files, gzip, gunzip, zip, and unzip commands.

3.FILE ATTRIBUTES

3Hrs

LS -l : Listing File attributes, The -d option : Directory Attributes, listing inode numbers, listing hidden files, time associated with a File, listing timestamps, File Ownership, File Permissions , chmod : Changing File Ownerships, File Systems, Inodes, Hard Links, Symbolic links, and ln, The Directory, umask: Default File and Directory Permissions, Modifications and Access Times, find: Locating Files.

4.THE vi EDITOR

4Hrs

vi Basics, Input Mode-Entering and Replacing Text , Saving Text and Quitting – The ex Mode , Navigation, Editing Text, Undoing Last editing Instructions(u and U), Repeating the Last Command(.), Searching for a Pattern(/ and ?), Substitution-Search and Replace (:s),Customizing vi .

5.THE SHELL

3Hrs

The Shell's Interpretive Cycle, Pattern Matching –The Wild-cards, Escaping and Quoting, Redirection: The three Standard Files, /dev/null and /dev/tty: Two Special Files, Pipes, tee: Creating a Tee, Command Substitution, Shell Variables

6. THE PROCESS

3Hrs

Process Basics, ps :Process Status, System Processes, (-e or -a) Mechanism of Process Creation, Internal and External Commands, Running jobs in Background, nice:Job Execution With low priority, Killing process with Signals, Job Control, fg and bg commands at and batch :Execute Later, cron: Running jobs periodically, time :Timing Processes

7.Communication In Unix

2Hrs

finger: Details of users, mesg: Your Willingness to Communicate write :Communicating alternately, talk: Online Communication, wall: writing on all terminals, news: knowing the local events, Email Basics, The mail command.

8.SIMPLE FILTERS AND grep FAMILY OF COMMANDS

5Hrs

The Sample Database, pr :paginating Files, head: displaying the Beginning of a File, tail: Displaying the End of File, cut : Splitting a File Vertically, paste: Pasting Files, sort: Ordering a File , uniq :Locating Repeated and Non repeated Lines, tr : Translating Characters, An Example: Displaying a word count List.

grep: Searching for a Pattern, Basic Regular Expression (BRE)- An Introduction, Extended Regular Expression(ERE) and egrep

9.SHELL PROGRAMMING

9 Hrs.

Environment Variables, Aliases(bash and ksh), Command History(bash and ksh).Shell scripts, read and readonly commands, UsingCommand Line Arguments, exit and Exit status of a command , The logical operators && and || Conditional Execution. The if conditional, Using test and [] to evaluate Expression, The case conditional, expr: Computation and String Handling, \$0:Calling a script by Different names, while :Looping, for: Looping with a List, set and shift : manipulating the Positional parameters, the here document(<<), trap:Interrupting a Program, Debugging Shell scripts with set -x , export: Exporting Shell Variables, eval: Evaluating twice, The exec Statement, Development of simple shell scripts to demonstrate the integer and real arithmetic operations, handling of positional parameters, the use of branching and looping constructs in the shell, handling of signals using the trap etc.

10.awk

4Hrs

awk program line and script structure, awk's operational mechanism, Records and fields, special variables \$0,\$1,\$2, etc.,patterns The BEGIN and END, Variables, builtin variables, builtin functions, length, split, getline, print, printf, sprintf, index, system, substr etc. control structures, operators, in awk, associative arrays, writing simple awk scripts, Running awk scripts from the shell.

11.perl

5 Hrs.

perl preliminaries, The structure of perl script, running a perl script, perl data and operators, The chop and chomp functions: removing the Last Character, variables and Operators. The String handling functions, Specifying Filenames in Command Line, Current Line Number(\$), and the Range Operator (..), Lists, and arrays, foreach: Looping Through a List, Split: Splitting into a List or Arrays, join: Joining a List, dec2bin.pl: Converting a Decimal Number to Binary, grep: Searching an Array for a Pattern, associative Arrays,(Hashes), Regular Expressions and substitution, The match and substitute operations, File Handling, File Tests, Subroutines

12.Introduction To System Administration

6 Hrs.

root: The System Administrator's Login, the su command, The Administrator's Privileges, Maintaining Security, /etc/passwd and /etc/shadow files, Managing Disk Space, Device Files, Handling Floppy Diskettes, cpio: A backup Program, tar: The "Tape" Archive Program, Partitions and File Systems, Mounting and Unmounting File Systems, System Startup and init, Shutdown and the sync Operation.

TEXT BOOK:

1.Sumitabha Das, UNIX Concepts and Applications, Third edition, Tata McGraw Hill,2003

ADVANCED MICROPROCESSOR

Sub Code:CS56
Exam Hours:03

IA Marks:25
Total Hrs.: 52

Hrs/Week:04
Exam Marks :100

- 1. Memory Interface** **3 Hrs.**
80286 and 80386SX (16-Bit) Memory Interface, 80386DX and 80486 (32 Bit) Memory Interface, Pentium, Pentium Pro and Pentium II (64-Bit) Memory interface.
- 2. I/O Interface** **4 Hrs.**
8279 Programmable Keyboard and Display interface, 8254 Programmable interval timer, Programmable communication interface.
- 3. Interrupts:** **5 Hrs.**
Basic Interrupt Processing, Hardware Interrupts, Expanding the interrupt structure, 8259 programmable controller.
- 4. Direct Memory Access** **8 Hrs.**
Basic DMA Operation, The 8237 DMA Controller, The Shared bus Operation, Disk Memory system, Video Displays.
- 5. Arithmetic co-processor** **8 Hrs.**
Data Formats, 80X87 Architecture, Instruction Set (No programming required), Introduction to MMX Technology.
- 6. BUS Interface** **5 Hrs.**
The ISA Bus, The Extended ISA (EISA) and VESA local Buses, The Peripheral Component Interconnect (PCI) Bus. The parallel printer interface, The Universal Serial Bus. (USB).
- 7. The 80386 and 80486 Microprocessors** **9 Hrs.**
Introduction to 80386 microprocessor, Special 80386 registers, 80386 Memory Management, Moving to protected mode, Virtual 8086 Mode, Memory Paging Mechanism, Introduction to 80486.
- 8. Pentium Processors** **7 Hrs.**
Introduction to Pentium processors, Special Pentium registers, Pentium memory management, new Pentium instructions (No Programming), Introduction to Pentium Pro microprocessor, Special Pentium pro processor, Introduction to the Pentium II microprocessor, The Pentium III, The Pentium 4.
- 9. Reduced instruction Set Computer Principles** **3 Hrs.**
RISC versus CISC, RISC Properties, RISC Evaluation, On-Chip Register File versus Cache Evaluation, Overview of RISC Development and Current System.

Text Books :

1. The INTEL Microprocessors, 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium and Pentium pro processors by Barry B Brey, 6th Edition, Pearson Education/PHI 2003.
Chapters: 10.4-10.6, 11.4-11.6, 12.1-12.4, 13.1-13.5, 14.1-14.3, 14.5, 15.1-15.5, 17.1-17.7, 18.1-18.6, and 19.1,19.3-19.4
2. Advanced Microprocessors by Daniel Tabak, 2nd Edition, Mc-GrawHill, 1995,
Chapters: 6.1-6.5

**MICROPROCESSOR LABORATORY
(COMMON TO ISE)**

Sub Code: CSL57
Hrs/ Week: 03
Total Hrs: 42

IA Marks: 25
Exam Hours:03
Exam Marks: 50

- Sl.No. Experiments / Programs
- 1) a) Search a key element in a list of n numbers using the **Binary Search Algorithm**.
 - 1) b) Read the status of eight input bits from the Logic Controller Interface and display FF, if it is even parity bits otherwise display 00. Also display number of 1's in the input data.
 - 2) a) Write ALP macro:
To read a character from the keyboard in the module (1) (in a different file).
 - i) To display a character in module(2) (from different file)
 - ii) Use the above two modules to read a string of characters from the keyboard terminated by the carriage return and print the string on the display in the next line.
 - 2)b) Perform the following functions using Logic Controller Interface.
i) BCD up-down Counter ii) Ring Counter
 - 3) a) Sort a given set of N numbers in **ascending and descending** orders using the bubble sort algorithm.
 - 3) b) Read the status of two 8-bits inputs (X&Y) from the Logic controller Interface and display X*Y.
 - 4) a) Read the alphanumeric character and display its equivalent ASCII code at the center of the screen.
 - 4) b) Display message FIRE and HELP alternately with flickering effects on a 7-segment display interface for a suitable period of time. Ensure a flashing rate that makes it easy to read both the messages (Examiner does not specify these delay values nor it is necessary for the student to compute these values).
 - 5) a) Reverse a given string and check whether it is palindrome or not.
 - 5) b) Assume any suitable message of 12 characters length and display it in the rolling fashion on a 7-segment display Interface for a suitable period of time. Ensure a flashing rate that makes it easy to read the message. (Examiner does not specify these delay values nor it is necessary for the student to compute these values).
 - 6) a) Read two strings, store them in locations STR1 and STR2. Check whether they are equal or not and display appropriate messages. Also display the length of the stored strings.
 - 6) b) Convert a 16-bit binary value (assume to be an unsigned integer) to BCD and display it from left to right and right to left for specified number of times on a 7-segment display interface.
 - 7) a) Read your name from the keyboard and display it at a specified location on the screen in front of the message **What is your name?**. You must clear the entire screen before display.
 - 7) b) Drive a Stepper Motor interface to rotate the motor in **Clockwise direction** by N steps (N is specified by the examiner). Introduce suitable delay between successive steps (Any arbitrary value for the delay may be assumed by the student).
 - 8) a) Compute the factorial of a positive integer 'n' using recursive procedure.
 - 8) b) Drive a stepper Motor interface to rotate the motor in **Anti-Clockwise direction** by N steps (N is specified by the examiner). Introduce suitable delay between successive steps (Any arbitrary value for the delay may be assumed by the student).
 - 9) a) Compute **nCr** using recursive procedure. Assume that 'n' and 'r' are non-negative integers.
 - 9) b) Drive a Stepper Motor interface to rotate the motor **N steps left direction and N steps right direction** (N is specified by the examiner). Introduce suitable delay between successive steps (Any arbitrary value for the delay may be assumed by the student).
 - 10)a) Find out whether given sub-string is present or not in a main string of characters.
 - 10)b) Scan a 8X3 keyboard for key closure and to store the code of the key pressed in a memory location or display on screen. Also display row and column numbers of the key pressed.
 - 11)a) Generate the first 'n' **Fibonacci numbers**.

- 11)b) Scan a 8 X 3 key pad for a key closure and simulate ADD and SUBTRACT operations as in a calculator.
- 12)a) Read the **current time** from the system and display it in the standard format on the screen.
- 12)b) Generate a **Sine Wave** using the DAC interface (The output of the DAC is to be displayed on a CRO).
- 13)a) Program to simulate a **Decimal Up-counter to display 00 to 99**.
- 13)b) Generate a **Half Rectified Sine wave** form using the DAC interface (The output of the DAC is to be displayed on a CRO).
- 14)a) Read a pair of input co-ordinates in BCD and move the cursor to the specified location on the screen.
- 14)b) Generate a **Fully Rectified Sine** wave form using the DAC interface (The output of the DAC is to be displayed on a CRO).
- 15)a) Program to create a file (input file) and to delete an existing file.
- 15)b) Drive an Elevator Interface in the following way to move an elevator from ground to top floor and top to ground floor.

Note: In the examination question papers must be given in lots. Each student must be given one full question.

SYSTEM SOFTWARE LABORATORY

Sub Code : CSL58
Hrs/Week : 03
Total Hrs : 42

IA Marks : 25
Exam Hours : 03
Exam Marks : 50

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 and negative fractions
- 4) Program to count the number 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 & printf 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.

Execution of the following programs using YACC:

- 1) Program to test the validity of a simple expression involving operators +,-,*,/.
- 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 operators +,-,* 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 strings 'aaab', 'abbb' 'ab' and 'a' using the grammar ($a^n b^n, n \geq 0$).
- 7) Program to recognize the grammar ($a^n b^n, n \geq 10$).

Part B

Students (A batch must consist of 2 students) must do one of the below mini projects. However all the projects must be carried out by some batches in a class.

- 1) Implement a 2-Pass assembler for working of model 8086.
- 2) Implement a Text Editor.
- 3) Implement a Linux Shell for a set of Commands.
- 4) Implement a Simple Lexical Analyzer.

Note:

A report of about 10 – 12 pages on the packages developed in Part B, duly certified by the department must be submitted during examination.

Instructions:

In the examination, a combination of one LEX and one YACC problem has to be asked from Part A for 30 marks. The Package developed under Part B has to be evaluated for a total of 20 marks.

VI SEMESTER

SL No.	Sub Code	Title	Teaching Dept.	Teaching hours /week		Examination			
				Theory	Prac	Duration	I.A. Marks	Theory/Pract.	Total Marks
1.	CS61	Unix Systems Programming	CSE/ISE	04	---	03	25	100	125
2.	CS62	Software Engineering	CSE/ISE	04	---	03	25	100	125
3.	CS63	Computer Graphics	CSE	04	---	03	25	100	125
4.	CS64	Computer Networks-I	CSE/ISE	04	---	03	25	100	125
5.	CS65	System Simulation and Modeling	CSE	04	---	03	25	100	125
6.		Elective-I (Group A)							
i)	CS661	Principles of Programming Languages	CSE/ISE	04	---	03	25	100	125
ii)	CSL62	Decision Support Systems	CSE/ISE	04	---	03	25	100	125
7.	CSL67	Visual Programming & Data Base Applications Laboratory	CSE/ISE	---	03	03	25	50	75
8.	CSL68	Graphics Laboratory	CSE	---	03	03	25	50	75
TOTAL				24	06	---	200	700	900

UNIX SYSTEMS PROGRAMMING
(COMMON TO ISE)

Sub. Code: CS61
Exam Hours: 03

IA MARKS: 25
Total Hours: 52

Hrs/Weeks: 04
Exam Marks: 100

Introduction: 06 Hrs.

UNIX and ANSI Standards: The ANSI C standard, the ANSI/ ISO C++ standards, Difference between ANSI C and C++, the POSIX standards, the PISIX.1 FIPS standards, the X/Open standards. UNIX and POSIX APIs: The POSIX APIs, The UNIX and POSD Development Environment, API Common Characteristics.

2. UNIX Files 12 Hrs

File Types, The UNIX and POSIX File System, The UNIX and POSIX File Attributes, modes 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, File Listing Program.

3. UNIX Processes 16 Hrs

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.

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.

4. Signals and Daemon Processes 08 Hrs

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.1b Timers.

Daemon Processes:

Introduction, Daemon Characteristics, Coding Rules, Error Logging, Client-Server Model.

5. Interprocess Communication 10 Hrs

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, AnOpen Server-Version 1, Client-Server Connection Functions.

TEXTBOOKS:

1 Terrence Chan: Unix System Programming Using C++, Prentice Hall India, 1999.

[1, 5, 6, 7, 8, 9, 10]

2 W.Richard Stevens: Advanced Programming in the UNIX Environment, Addison-Wesley/PHI.

[7, 8, 9, 13, 14, 15]

REFERENCE BOOKS:

1 Maurice.J.Bach: The Design of the UNIX Operating System, Pearson Education/Prentice Hall of India.

2 Uresh Vahalia: Unix Internals, Pearson Education, ASIA, 2001.

SOFTWARE ENGINEERING
(Common to ISE)

Sub Code:CS62
Exam Hours:03

IA Marks:25
Total Hrs.: 52

Hrs/Week:04
Exam Marks :100

1. Overview

6 Hrs

Introduction: FAQ's about software engineering, Professional and ethical responsibility.

Software Process: Software Process Models, Process iteration, Software specification, Software design and implementation, Software validation, Software evolution, Automated Process Support.

2. Requirements Engineering

12 Hrs

Software Requirements : Functional and Non-Functional requirements, User requirements, System requirements, The software requirement document.

Requirement Engineering process : Feasibility studies, Requirements elicitation and analysis, Requirements validation, Requirements management.

System models : Context models, Behavioral models, Data models, Object models, CASE workbenches.

Software prototyping : Prototyping in software process, Rapid prototyping techniques, User interface prototyping.

3. Software Design

10 Hrs

Architectural Design : System structuring, Control models, Modular decomposition, Domain specific architectures.

Object-oriented design : Objects and objects Classes, An Object Oriented design process, Design evolution.

User Interface design: User interface design principles, User interaction ,Information presentation, User support ,Interface Evaluation.

4. Verification and Validation

7 Hrs

Verification and validation planning, Software inspections, Automated static analysis, Clean room software development.

Software testing: Defect testing, Integration testing, object Oriented testing, Testing Workbenches.

5. Critical Systems :

4 Hrs

Critical Systems : Critical System, Availability and reliability, Safety and Security.

Critical system Specification : Software reliability specification, safety specification.

6. Software Management

9 Hrs

Project management: Management activities, Project planning, Project Scheduling, Risk management.

Software cost estimation : Productivity, Estimation techniques, Algorithmic cost modeling, project duration and staffing.

Quality Management : Quality assurance and standards, Quality Planning , Quality Control, Software measurements and metrics.

7. Software Evolution

4 Hrs

Legacy System : Legacy system structures, Legacy system design and assessment.

Software Reengineering: Source code translation, reverse engineering, Program structure improvement, program modularization, Data reengineering.

TEXT BOOK :

1. Software Engineering , Ian Sommerville, 6th Edition, Person Education Ltd., 2001.
(Chapters:- 1,3 to 8, 10 , 12, 15, 16, 17, 19, 20, 23, 24, 26,28)

REFERENCE BOOKS :

1. Software Engineering- A Practitioners approach , Roger.S.Pressman, Tata-McGraw Hill 4th Edition.
2. An Integrated Approach to Software Engineering, Pankaj Lalote, Narosa Publications.

COMPUTER GRAPHICS

Sub Code : CS63
Exam Hours: 03

IA Marks : 25
Total Hrs :52

Hrs/Week :04
ExamMarks : 100

1. Introduction:

8Hrs

Image processing as picture analysis, Advantages of interactive graphics, Representative uses of computer graphics, Classification of applications, Development of hardware and software for computer graphics, Conceptual framework for interactive graphics, Hardcopy technologies, Raster scan display systems, The video controller, Random-scan display processor, Input devices for operator interaction, Image scanners.

2.Raster Graphics Algorithms:

10 Hrs

Overview , Scan converting lines, Scan converting circles , Filling rectangles, Filling polygons, Filling Ellipse arcs, Pattern filling , Thick primitives, line style and pen style ,Clipping in a raster world , Clipping lines, Clipping circles and ellipses, Clipping polygons, Generating characters, Antialiasing.

3. Geometrical Transformations:

5 Hrs

2D Transformation, Homogeneous coordinates and Matrix representation of 2D Transformations, composition of 2D Transformations, The window to view port transformation, Efficiency, Matrix representation of 3D transformations, composition of 3D transformations, Transformations as a change in coordinate system.

4. Viewing In 3D:

5 Hrs

Projections, Specifying an arbitrary 3D view, Examples of 3D viewing

5.Interaction Techniques, Dialogue Design And User Interface System

6Hrs

Interaction hardware , Basic Interaction tasks, Composite Interaction Task, The form and content of User – Computer Dialogues, User interface Styles, Important Design Considerations, Modes and Syntax, Visual Design, The Design Methodology.

6.Three Dimensional Object Representations

8Hrs

Polygon surfaces, Curved Lines and surfaces, Quadric Surfaces, Bezier Curves & Surfaces, B-Spline Curves and Surfaces, Octrees, BSP Trees, Fractal Geometry methods.

7. Visible Surfaces Determination:

10 Hrs

Functions of Two variables, Techniques for Efficient Visible Surface Algorithms, Algorithms for Visible line determination, The Z-buffer algorithm, List priority Algorithms, scan-line Algorithms, Area-subdivision algorithms, algorithms for Octrees, Algorithms for curved surfaces, visible-Surfaces Ray Tracing.

TEXT BOOKS:

1. James D Foley, Andries Van Dam, Steven K Feineer, John F Hughes, Computer Graphics, Addison-wesley 1997.
(Chapter 1,3 (except 3.4,3.16), 4(except 4.2),5,6,(6.1,6.2,6..3),8,,9,15)
2. Donald Hearn and Pauline Baker, Computer Graphics- C Version, Second Edition, Pearson Education, 2003
(Chapter 10(10.2,10.2,10.3,10.8,10.9,10.16,10.17,10.18))

REFERENCE BOOKS:

- 1.Zhigang Xiang and Roy Plastok, Computer Graphics, Second Edition, Schaum's OutLines.
2. David F.Rogers, Procedural Elements for Computer Graphics, second Edition, TataMcGraw-Hill Edition 2001

Computer Networks – I

Sub code: CS64

Total Hours: 52

1. Introduction to Computer Networks.

7Hrs.

Uses of computer networks: Business Applications, Home Applications, Mobile users, Social Issues; Network hardware: Local Area Networks, Metropolitan Area Networks, Wide Area Networks, Wireless Networks, Home Networks, Internetworks; Network Software: Protocol Hierarchies, Design issues for the layers, Connection-Oriented and Connectionless Services, Service Primitives, The Relationship of services to Protocols; Example Networks: The Internet, Connection-Oriented Networks: X.25, Frame Relay & AT.

2. Local Area Networks

10Hrs.

LAN Protocols: LAN Structure, The Medium Access Control Sublayer, The Logical Link Control Sub Layer; Ethernet and IEEE 802.3 LAN Standard: Ethernet Protocol, Frame Structure, Physical Layers, Fast Ethernet, Gigabit Ethernet, Token Ring IEEE 802.5 LAN Standard: Token Ring Protocol, Frame Structure; FDDI; Wireless LANs and IEEE 802.11 Standard: Ad hoc and Infrastructure Networks, Frame Structure and Addressing, Medium Access Control; LAN Bridges and Ethernet Switches: Transparent Bridges, Source Routing Bridges, Mixed-Media Bridges, Virtual LANs.

3. Network layer

18Hrs.

Network layer design issues: Store and Forward Packet Switching, Services Provided to the Transport Layer, Implementation of Connectionless Service, Implementation of Connection-Oriented Service, Comparison of Virtual Circuit and Datagram Subnets; Routing Algorithms: The Optimality Principle, Shortest Path Routing, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing, Broadcast Routing, Multicast Routing, Routing for Mobile Hosts, Routing in ad hoc networks, Node lookup in Peer to Peer Networks; Congestion Control Algorithms: General Principles of Congestion Control, Congestion Prevention Policies, Congestion Control in Virtual-Circuit Subnets, Congestion Control in Datagram Subnets, Load Shedding, Jitter Control ; Quality of Service: Requirements, Techniques for achieving Good Quality of Service, Integrated Services, Differentiated Services, Internetworking: How Networks Differ, How Networks Can be Connected, Concatenated Virtual Circuits, Connectionless Internetworking , Tunneling, Internetwork Routing , Fragmentation; The Network Layer in the Internet: The IP Protocol, IP Addresses, Internet Control Protocols, The Interior Gateway Routing Protocol, OSPF, The Exterior Gateway Routing Protocol: BGP, Internet Multicasting, Mobile IP, Ipv6.

4. The Transport Layer

12Hrs.

The Transport Service: Services Provided to the Upper Layers, Transport Service Primitives, Berkeley Sockets; Elements of Transport Protocols: Addressing, Connection Establishment, Connection Release, Flow Control and Buffering, Multiplexing, Crash Recovery; The Internet Transport Protocols (UDP): Introduction to UDP, Remote Procedure Call, The Real-time Transport Protocol; The Internet Transport Protocols (TCP): Introduction to TCP, The TCP Service Model, The TCP Protocol, The TCP Segment Header, TCP Connection Establishment, TCP Connection Release. Modelling TCP Connection Management, TCP Transmission Policy, TCP Congestion Control, TCP Timer Management, Wireless TCP and UDP, Transactional TCP; Performance Issues: Performance Problems in Computer Networks, Network Performance Measurement, System Design for Better Performance, Fast TPDU Processing, Protocols for Gigabit Networks.

5. ATM Networks

5Hrs.

Why ATM?, BISDN Ref. Model, ATM Layer, ATM Adaptation Layer, ATM Signaling PNNI Routing, Classical IP Over ATM.

Text Books:

- 1) Andrew S. Tanenbaum, Computer Networks, Fourth Edition, PHI/Person Publication 2002.
- 2) Alberto Leon - Garcia and Indra Widjaja, Communication Networks- Fundamental Concepts and Key Architectures, Tata McGraw-Hill 2nd Edition.

SYSTEM SIMULATION & MODELING

Sub Code : CS65 **IA Marks : 25** **Hrs/Week :04**
Exam Hours: 03 **Total Hrs :52** **Exam Marks: 100**

1. Introduction To Simulation

04 Hrs

When Simulation is the Appropriate Tool: When Simulation is not Appropriate : Advantages & Disadvantages of Simulation : Areas of Application: System & System Environment; Components of System; Discrete & Continuous System; Model of Systems; Types of Models; Discrete-Event System Simulation; Steps in Simulation Study

2. Simulation Examples

06 Hrs

Characteristics of Queuing Systems; Queuing Notation; Simulation of Queuing Systems; Simulation of Inventory Systems.

3. General Principles

04 Hrs

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

4. Random-Number Generation

05 Hrs

Properties of Random Numbers; Generation of Pseudo-Random Number; Techniques for Generating Random Numbers; Tests for Random Numbers.

5. Random Variate Generation

04 Hrs

Inverse Transform Technique; Exponential Distribution, Uniform Distribution, Discrete Distributions; Acceptance-Rejection Technique: Poisson Distribution.

6. Input Modeling

07 Hrs

Data collection; Identifying the Distribution with Data ; Parameter Estimation ; Goodness of fit tests; Selecting input Models without Data; Multivariate & Time-Series Input Models.

7. Verification & Validation of Simulation

05 Hrs

Model Building Verification & Validation; Verification of Simulation Models Calibration & Validation of Models.

8. Output Analysis For Single Model

08 Hrs

Types of Simulations with Respect to Output Analysis; Stochastic Nature of Output Data; Measures of Performance & Their Estimation; Output Analysis for Terminating Simulations; Output Analysis for Steady-State Simulations.

9. Simulation of Computer Systems

08 Hrs

Introduction; Simulation Tools; Model Input; High Level Computer System Simulation ; CPU Simulation ; Memory Simulation.

TEXT BOOKS:

1. Jerry Banks, John S. Carson, Barry L. Nelson, David M Nicol, "Discrete-Event system Simulation ", Third Edn, Pearson Education/Prentice-Hall India
(Chapters 1,2, 6,2,3.1,7,8.1.1,8.1.2,8.1.7,8.4.1,9,10,11,14)

REFERENCE BOOKS:

1. Averill M. Law, W. David Kelton, "Simulation Modeling & Analysis", Third Edn, McGrawHill.
2. Geoffrey Gordon, "System Simulation", Second Edn, Prentice-Hall India.

PRINCIPLES OF PROGRAMMING LANGUAGES

Sub:Code:CS661
Exam Hours: 03

IA Marks: 25
Total Hrs:52

Hrs/Week:04
ExamMarks: 100

1. **Introduction** 5 Hrs
Toward Higher-level languages, Programming Paradigms language implementation: Bridging the gap. Expression notations Abstract syntax trees.
2. **Types: Data Representation** 9 Hrs
Elementary Data Types -Data objects , Variables & Constants, Data types, Declaration. Types checking & type conversion. Numeric data types, Enumerations, Booleans, Characters. Structured data types –Structured data objects & data types Specification of data structure types, Implementation of data Structure types , Vectors & arrays , Records. Type equivalence.
3. **Imperative programming** 11 Hrs
Basic statements ,structured sequence control, Handling special cases in loops , Programming with invariants , Proof rules for partial correctness. Procedure activation-Simple call-return subprograms, Parameters passing methods , Scope rules for names, Nested scopes in the source text, Activation recorder, Lexical scope : Procedure as in C.
4. **Object-Oriented programming** 7 Hrs
Program design with modules, what is an object? , Object oriented thinking, Inheritance, object oriented programming in C++, Derived classes & information hiding.
5. **Fundamental Programming** 13 Hrs
Elements of fundamental programming- A little language of expression, types : values & operations, Approaches to expression evaluation , Lexical scope , Type checking, Functional programming in a typed language-Exploring a list, function declaration by cases , function as first class values , ML: Implicit types data types , Exception handling in ML. Functional programming with lists-scheme, a dialect of lisp, the structure of lists, List manipulation.
6. **Logi Programming** 7 Hrs
Computing with relations, Introduction to prolog , data structures in prolog, Programming techniques, Control in prolog.

TEXT BOOKS:

1. Ravi sethi, programming languages, 2nd Edn . Addison Wesley..
(1.1,1.3,1.4,2.1,2.2,3.4,3.5,3.6,5.2 to 5.6,6.3,7.1 to 7.4,7.6,8.1,8.2,8.4,8.5,8.6,9.1, to 9.6,10.1, to 10.3,11.1 to 11.5)
3. Terrence W Pratt, programming languages design and implementation, 4th Edn, Pearson/PHI.
(5.1.1 to 5.1.4,5.2.1 to 5.2.4,6.1.1 to 6.1.3,6.1.5,6.1.6,6.4.1,8.3.1.8.3.2,9.1.1)

REFERENCE BOOKS:

1. Allen Tucker ,Robert Nonan, Programming languages, Tata McGrawHill, Edition 2002. Doris Appleby Julius J Vandekopple , Programming languages paradigm & practice , 2nd Tata McGraw-Hill 1998.

DECISION SUPPORT SYSTEMS
(COMMON TO ISE)

Sub:Code :CS662
Exam Hours: 03

IA Marks: 25
TotalHrs:52

Hrs/Week :04
ExamMarks: 100

1. Decision Making & Computerized Support

12 Hrs

Managers & decision Making , Managerial Decision Making & Information Systems Managers & computerized support. The need for Computerized Support technologies, A frame work for decision support. The concept of decision support systems, Group decision support Systems Executive Systems & information Systems Expe Systems Artificial Neural Networks , Hybrid Support Systems , The Evolution & Attributes of Comuterized Decision aids , Introduction & definitions, Systems, Models, The Modeling process, Decision Making : The Design phase, Decision Making : The Choise phase, Evaluation, Decision Making : Implementation Phase.

2. Decision Supports Systems-I

6 Hrs

DSS Configuration , What is DSS?, Characteristics , Capabilities , Components of DSS, The Data Management Sub System , The Model Management Subsystem , The knowledge based Management system , The User Interface, The User DSS Hardware, Distinguishing DSS from management Science & MIS,DSS Classification.

3. Decision Supports Systems-II

12 Hrs

Introduction to DSS Development, The Traditional System Development life cycle Alternate Development Methodologies, Prototyping: The DSS Development Methodologies ,DSS Technology Levels & bTools, DSS Development platforms, DSS Development Tool Selection . Team Development DSS, End user Developed DSS, Developing DSS : Putting the System together , DSS research Direction & the DSS of the future. Group Decision Making , Communication & Collaboration , Communication support , collaboration Support: computer-Supported Cooperative work Group support Systems, Group support Systems Technologies, Group Systems , The GSS Meeting Process, Distance Learning Creativity & Idea Generation , GSS & Collaborative Computing Issues & research .

4. Expert Systems

10 Hrs

Knowledge Based DSS Concepts & Defination of Artificial Intelligence, AI versus Natural Intelligence , The Artificial Intelligence field , Types of knowledge-Based decision support systems basic concepts , The Human Element in Expert System , How Expert System works ? Problem areas addressed by ES, Benefits, Problems & Limitations of ES, ES Success Factors, Types of Expert Systems ,ES& the Internet/Intranet/Web, Knowledge Engineering , Scope of Knowledge , Difficulties in knowledge Acquisition , Methods of knowledge Acquisition , Machine Learning , Intelligent Agents, Selecting an appropriate knowledge Acquisition method , knowledge Acquisition from Multiple Experts , Validation & Verification of knowledge base , Analyzing & coding Documenting & diagramming , Numeric & Documented knowledge Acquisition, knowledge Acquisition & Internet/Intranet , Induction & Table Example.

5. Expert systems-II, Societal Impacts

12 Hrs

Reasoning in Artificial Intelligence , Differencing with rules :Inference with frames, Model-Based Reasoning , Case Based Reasoning , Explanation & meta Knowledge , Inference with Uncertainly , Representing Uncertainly , Probabilities & Related Approaches , Theory of certainty. The Expert System Development Life cycle , phase I- Project Initialization , Phase-II-System analysis & Design Phase III-Rapid prototyping & a Demonstration prototype , Phase IV-System Development , Phase V-Implementation , Phase VI –Post implementation ., The future of Expert System Development Process.

TEXT BOOKS:

1. Efraim Turban & Jay E Aronson: ‘Decision Support Systems & Intellegence Systems’,Sixth Edn ,Pearson Education Asia /PHI, 2001
(chapter 1:1.2-1.11,1.14,1.15,chapter 2: 2.2-2.10,chapter 3: 3.2 – 3.13,Chapter 6: 6.2 – 6.12, chapter 7: 7.2 – 7.11, chapter 10: 10.1 – 10.9,10.11 – 10.16, chapter 11: 11.2 – 11.5,11.12 – 11.19, chapter 13: 13.2 – 13.3,13.5 – 13.13,chapter 14: 14.2 – 14.4,14.10 – 14.14)

REFERENCE BOOKS:

1. Giarratano & Riley: ‘Expert System: Principles & programming’, Thomson Brooks/cole, 2002.
2. Sprague R.H. Jr & H J Watson : ‘Decisin Support Systems’, 4th Edn ,Prentice Hall, 1996