

3.1 OPERATING SYSTEMS

L T P
4 - 2

RATIONALE

The course provides the students with an understanding of human computer interface existing in computer system and the basic concepts of operating system and its working. The students will also get hand-on experience and good working knowledge to work in DOS and windows environments. The aim is to gain proficiency in using various operating systems after undergoing this course. While imparting instructions, the teachers are expected to lay more emphasis on concepts and principles of operating systems, its features and practical utility.

DETAILED CONTENTS

1. Introduction to System Software (4 Hrs)
 - 1.1 Compiler
 - 1.2 Assembler
 - 1.3 Loader
 - 1.4 Operating system
2. Brief Introduction to MS-DOS , WINDOWS and LINUX (8 Hrs)
 - 2.1 Brief history of DOS and WINDOWS
 - 2.2 Main features of DOS
 - 2.3 Directory structure of DOS
 - 2.4 File structure of DOS
 - 2.5 Detail concept of DOS commands
 - 2.6 Introduction to Windows and linux
3. Overview of Operating Systems (8 Hrs)
 - 3.1 Definition of Operating Systems
 - 3.2 Functions of Operating Systems
 - 3.3 Types of Operating Systems (Single user, Multiuser, Network,Distributed Operating system)
 - 3.4 Storage structure, I/O structure, Caching
4. Functions of Operating System (44 Hrs)
 - 4.1 Process Management Functions (Principles and Brief Concept)
 - a) Process Scheduler
 - b) Scheduling Criteria, Scheduling Algorithm
 - c) Process synchronization
 - d) Deadlocks- characterization
 - e) Methods for handling deadlocks
 - f) Deadlock avoidance, Bonker's Algorithm
 - g) Deadlock prevention
 - h) Recovers from Deadlock

- 4.2 Memory Management Function (Principles and Brief Concept)
 - a) Introduction
 - b) Single Process System
 - c) Fixed Partition Memory
 - d) Paging
 - e) Segmentation
 - f) Swapping
 - g) Fragmentation
 - h) Virtual memory management
 - i) Demand paging
- 4.3 I/O Management Functions (Principles and Brief Concept)
 - a) Dedicated Devices
 - b) Shared Devices
 - c) I/o Devices
 - d) Storage Devices
 - e) Buffering
 - f) Spotting
- 4.4 File Management
 - a) File concept, File attributes, File operations
 - b) File types
 - c) File structure
 - d) Access methods
 - e) Directory structure
 - f) Free space management

LIST OF PRACTICALS

1. Demonstration of all the controls provided on Control Panel
2. Exercises involving various internal and external DOS commands (20 No.)
3. Exercises involving Basics of Windows (20 No.)
4. Exercises on windows operating system
5. Exercise on basic commands of Linux Operating System
6. Exercise on shell programming on Linux (10 No.s)

RECOMMENDED BOOKS

1. Operating system Principles by A. Silberschatz, Peter Baer Galvin and Greg Gagne; Wiley Student Edition.
2. Operating System by Stallings, Tata McGraw Hill, New Delhi.
3. Operating System Concepts by Ekta Walia, Khanna Publishers, New Delhi.
4. System Programming by Dham Dhare
5. Operating Systems by C. Ritchie
6. Operating Systems by John J Donovan
7. MS DOS by Peter Norton, BPB Publications
8. Microsoft Windows Manual
9. Windows 2000 by BPB Publication, New Delhi.

SUGGESTED DISTRIBUTION OF MARKS

| Topic No. | Time Allotted (in hrs) | Marks Allotted (%) |
|------------------|-----------------------------------|-------------------------------|
| 1 | 4 | 6 |
| 2 | 8 | 12 |
| 3 | 8 | 12 |
| 4 | 44 | 70 |
| Total | 64 | 100 |

3.2 COMPUTER PERIPHERALS AND INTERFACING

L T P

4 - 3

RATIONALE

A computer engineer should be able to interface and maintain peripheral devices along with computer system. The course provides the necessary knowledge and skills regarding working construction and interfacing aspects of peripherals. This subject provides the required background of computer installation, maintenance and testing of peripheral with computer system.

DETAILED CONTENTS

1. Display Devices (8hrs)
Basic Terms: Pixel, Resolution, Refresh rate, Response time, bandwidth. Horizontal scanning frequency, vertical scanning frequency, Interlaced versus non interlaced monitor. Video display adapters EGA, VGA and SVGA. Overview of Raster Scan and Random Scan, their main differences and relative advantages. Working principle of CRT. CRT colour monitor : Block diagram and function of each block.
2. Motherboard (8hrs)
Introduction, functions and features, various components of motherboard: processor, cache, SIMM, DIMM, BIOS, ROM, chipset, slots, sockets and connectors, serial port, parallel port.
3. Interfacing standards (8 hrs)
RS232, Centronics, IDE, SCSI, IEEE488, USB.
4. Keyboard and Mouse (8 hrs)
Construction and Working principle of Keyboard, Types of key switches : Membrane, Mechanical, Rubber dome, Capacitive. Scan code generation.
Construction and working of Mouse, Types of mouse: Mechanical, Opto-mechanical, optical. Interfacing of keyboard and mouse with computer.
5. Disk Drives (10 hrs)
Constructional features, working and logical structure of Disk Drives(Hard disk drive, floppy disk drive, Optical drives). Difference between HDD and FDD. Reading and Writing operation in Hard disk drives, Interleaving factor. Terms related to Hard Disk Drives: Track, Sector, cylinder, cluster, landing zone, MBR, Formatting, Low level formatting, High level formatting, partitioning, FAT, access time. Hard disk drive interface: features of parallel AT attachment (PATA), Serial AT attachment (SATA).

6. Input Output Devices (12 hrs)

Scanner : Flat bed, sheetfed, Handheld, Construction and working of a scanner.
Construction and working of light pen, joystick, digitizer, touch screen and tablets.
Printer : Types of Printers: Impact and Non-Impact. Construction and working principle of Dot Matrix printer, inkjet printer, laser printers.
Plotters: types and working principle.

7. Power Supplies: (6hrs)

Introduction to SMPS, CVT and UPS: functions and comparison.
UPS: Types: Online and offline ups and their comparison.

8. Input/output drivers (4 hrs)

- a. Software aspects of peripheral devices
- b. Device dependant and independent softwares
- c. Device drivers

LIST OF PRACTICALS

1. To identify various components and peripheral devices.
2. Exercise on assembling of a PC.
3. Exercise on installation of a PC.
4. Installation of peripherals like printer, scanner.
5. Studying parts of motherboard, FDD, HDD.
6. Fault finding and repair of peripherals (HDD, FDD, DMP, Laser printer, Inkjet printer).
7. Using antivirus software.

REFERENCE BOOKS:

1. IBM PC and Clones by B.Govind Rajalu, TMH
2. Hardware and Software of Personal Computers by S.K.Bosr, Wiley Eastern Limited
3. Microprocessor and Interfacing by Hall, Douglas, McGraw Hill
4. Inside the PC by Peter Norton, Tech Media Publication

INSTRUCTIONAL STRATEGY

While teaching the subject the teacher may take the interfacing device like HDD, FDD, Scanner, Printer, etc physically and explain the parts and working of the device. Additional practical exercise on identification/location of parts can be taken up in practical class.

SUGGESTED DISTRIBUTION OF MARKS

| Topic No. | Time Allotted (in hrs) | Marks Allotted (%) |
|------------------|-----------------------------------|-------------------------------|
| 1. | 8 | 14 |
| 2. | 8 | 12 |
| 3. | 8 | 12 |
| 4. | 8 | 12 |
| 5. | 10 | 16 |
| 6. | 12 | 22 |
| 7. | 6 | 8 |
| 8. | 4 | 4 |
| Total | 64 | 100 |

3.3 DATA COMMUNICATION

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RATIONALE

Data Communication Course is intended to provide practical exposure and awareness of existing and upcoming Communication technologies

Detailed Contents

1. Introduction (08 hrs.)
Data Communication- Components, Data representation, Data flow
Networks- Distributed processing, Network criteria , Physical structures
Network Category- LAN, WAN, MAN
2. Data and Signals (12 hrs.)
Analog and Digital data, Analog and digital signals, Periodic and Non Periodic signals, periodic analog signals
Digital Signals- Bit rate, Bit length, Digital signal as a composite analog signal, transmission of digital signals
Transmission Impairment- Attenuation, Distortion and noise
Performance- bandwidth, throughput, latency, jitter
3. Digital and Analog Transmission (08hrs)
Analog transmission- Digital to Analog Conversion- ASK, PSK, FSK
Analog to Analog Conversion- AM, PM,FM(No mathematical treatment)
Digital transmission- Digital to digital conversion- coding and schemes
Analog to digital conversion- PCM and Delta Modulation (DM)
Transmission modes- Serial and parallel transmission
4. Multiplexing – FDM, WDM, TDM (03 hrs)
5. Transmission media (05 hrs)
Guided media-Twisted pair cable, Co-axial cable, fibre optics cable
Unguided Media- radio wave, Microwave, Infrared

6. Error Detection and Correction (12 hrs)

Types of Errors, redundancy, detection v/s correction, Forward error correction v/s retransmission.

Error detection through Parity bit, block parity to detect double errors and correct single errors.

General principles of error detection and correction using cyclic redundancy check

INSTRUCTIONAL STRATEGY

Explanation of basic concept of data communication and all entities involved need to be elaborated precisely by the teacher with the emerging technologies. The topics should be clarified diagrammatically as well as with help of multimedia presentations.

RECOMMENDED BOOKS

1. Data Communication and Networking by Forouzan; Tata McGraw Hill
2. Computer Networking by Tanenbaum; Prentice Hall of India, New Delhi
3. Data and Computer Communication by William Stalling
4. Data Communication by PS Gupta
5. Computer Communication and Networking by John Freer

SUGGESTED DISTRIBUTION OF MARKS

| Topic No. | Time Allotted (in hrs) | Marks Allotted (%) |
|--------------|---------------------------|-----------------------|
| 1. | 8 | 16 |
| 2. | 12 | 26 |
| 3. | 8 | 18 |
| 4. | 3 | 6 |
| 5. | 5 | 10 |
| 6. | 12 | 24 |
| Total | 48 | 100 |

3.4 DIGITAL ELECTRONICS - I

L T P
4 - 2

RATIONALE

The objective of this subject is to enable the students to know the basic concepts of digital electronics and gain familiarity with the available IC chips. The students will learn about number systems, logic gates, various codes, parities, Boolean algebra, mux and demux, flip-flop, counters, shift registers. This will form a broad base for studying digital system design, advanced microprocessors and further studies.

DETAILED CONTENT

1. Introduction (01 hrs)
 - a) Define digital and analog signals and systems, difference between analog and digital signals
 - b) Need of digitization and applications of digital systems

2. Number Systems (10 hrs)
 - a) Decimal, binary, octal, hexadecimal number systems
 - b) Conversion of number from one number system to another including decimal points
 - c) Binary addition, subtraction, multiplication, division, 1's and 2's complement method of subtraction
 - d) BCD code numbers and their limitations, addition of BCD coded numbers, conversion of BCD to decimal and vice-versa
 - e) Excess-3 code, gray code, binary to gray and gray to binary conversion
 - f) Concept of parity, single and double parity, error detection and correction using parity

3. Logic Gates (04 hrs)
 - a) Logic gates, positive and negative logic, pulse waveform, definition, symbols, truth tables, pulsed operation of NOT, OR, AND, NAND, NOR, EX-OR, EX-NOR gates
 - b) NAND and NOR as universal logic gates

4. Logic Simplification (08 hrs)
- a) Rules and laws of Boolean algebra, logic expression, Demorgan's theorems, their proof
 - b) Sum of products form (minterm), Product of sum form (maxterms), simplification of Boolean expressions with the help of Rules and laws of Boolean algebra
 - c) Karnaugh mapping techniques upto 4 variables and their applications for simplification of Boolean expression
5. Arithmetic Circuits (03 hrs)
- a) Half adder, full adder circuits and their operation
 - b) Parallel binary adder, 2-bit and 4-bit binary full adder, block diagram, working
6. Multiplexer/Demultiplexer (04 hrs)
- a) Basic functions, symbols and logic diagrams of 4-inputs and 8-inputs multiplexers,
 - b) Function/utility of 16 and 32 inputs multiplexers,
 - c) Realization of Boolean expression using multiplexer/demultiplexers
7. Decoders, Display Devices and Associated Circuits (04 hrs)
- a) Basic Binary decoder, 4-line to 16 line decoder circuit
 - b) BCD to decimal decoder, BCD to 7-segment decoder/driver, LED/LCD display
8. Encoders and Comparators (04 hrs)
- a) Encoder, decimal to BCD encoder, decimal to BCD priority encoder, keyboard encoder
 - b) Magnitude comparators, symbols and logic diagrams of 2-bit and 4-bit
 - c) Comparators

9. Latches and Flip-Flops (07 hrs)
- a) Latch, SR-latch, D-latch, Flip-flop, difference between latch and flip-flop
 - b) S-R, D flip-flop their operation using waveform and truth tables, race around condition
 - c) JK flip-flop, master slave and their operation using waveform and truth tables
10. Counters (10 hrs)
- a) Asynchronous counter, 4-bit Asynchronous counter, Asynchronous decade counter
 - b) Asynchronous counter, 4-bit synchronous binary counter, Asynchronous decade counter
 - c) Up/down Asynchronous counters, divide by N counter MOD-3, MOD-5, MOD-7, MOD-12 counters
 - d) Ring counter, cascaded counter, counter applications
11. Shift Registers (08 hrs)
- a) Shift registers functions, serial-in-serial out, serial-in-parallel-out, parallel-in-serial-out, parallel-in-parallel out
 - b) Universal shift register, shift register counter and applications of shift registers

LIST OF PRACTICALS

1. Study of logic breadboard with verification of truth table for AND, OR, NOT, NAND, EX-OR, NOR gate
2. Verification of NAND and NOR gate as universal gates
3. Construction of half-adder and full adder circuits using EX-OR and NAND gate and verification of their operation
4. Verify the operation of
 - a) multiplexer using an IC
 - b) de-multiplexer using an IC

5. a) Verify the operation of BCD to decimal decoder using an IC
b) Verify the operation of BCD to 7 segment decoder using an IC
6. Verify operation of SR, JK, D-flip-flop master slave JK flip-flop using IC
7. Verify operation of SISO, PISO, SIPO, PIPO shift register. (universal shift register)
8. Study of ring counter, Up/down counter
9. Construct and verify the operation of an asynchronous binary decade counter using JK flip-flop
10. Testing of digital ICs using IC tester

RECOMMENDED BOOKS

1. Digital Electronics and Applications by Malvino Leach, Tata McGraw Hill, New Delhi
2. Digital Logic Designs by Morris Mano, Prentice Hall of India, New Delhi
3. Digital Fundamentals by Thomas Floyds, Universal Book Stall
4. Digital Electronics by RP Jain, Tata McGraw Hill, New Delhi
5. Digital Electronics by KS Jamwal, Dhanpat Rai & Co., New Delhi
6. Digital Electronics by Rajiv Sapra, Ishan Publication, Ambala
7. Digital Electronics by BR Gupta, Dhanpat Rai & Co., New Delhi
8. Digital Systems: Principles and Applications by RJ Tocci, Prentice Hall of India, New Delhi
9. Digital Electronics by Rajaraman V., Prentice Hall of India, New Delhi

INSTRUCTIONAL STRATEGY

The Digital Electronic – 1 has significant importance in the field of Electronics. Adequate competency need to be developed by giving sufficient practical knowledge in microprocessor, A/D, D/A, convertors and other topics. Help may be taken in the form of charts, simulation packages to teach of the subject.

SUGGESTED DISTRIBUTION OF MARKS

| Sr. No. | Topic | Time Allotted (hrs) | Marks Allocation |
|----------------|--|----------------------------|-------------------------|
| 1. | Introduction | 02 | 06 |
| 2. | Number Systems | 10 | 06 |
| 3. | Logic Gates | 04 | 06 |
| 4. | Logic Simplification | 08 | 12 |
| 5. | Arithmetic Circuits | 03 | 10 |
| 6. | Multiplexer/Demultiplexer | 04 | 10 |
| 7. | Decoders, Display Device and Associated Circuits | 04 | 10 |
| 8. | Encoders and Comparators | 04 | 10 |
| 9 | Latches and Flip Flops | 07 | 10 |
| 10. | Counters | 10 | 10 |
| 11. | Shift Registers | 08 | 10 |
| Total | | 64 | 100 |

3.5 INTERNET AND WEB DESIGNING

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4 - 3

RATIONALE

This course will enable the students to understand the basics of internet and various application of internet. In addition this course develops competency amongst the students to design professional web sites.

DETAILED CONTENTS

1. Internet Basics (10 hrs)
Concept of internet and its evolution. Hardware and software requirement. How internet works? Application and use of internet in various fields of Science and Technology. Specification and technical details for establishing internet.
What is a modem? Types and functions of modem. Concept of IP Address, internet domains, domain name server, TCP/IP protocol, ISP, intranet, extranet. How DNS works?
2. Connecting to Internet (6hrs)
Ways: Dial up connection, Broadband, ISDN, Leased line, VSAT, RF link, cable.
Their Hardware and software requirements, relative advantages.
3. World Wide Web (6hrs)
WWW and its evolution, web page, web server, HTTP protocol. Web Browser: Netscape and internet explorer to surf internet. Concept of URL, Hypertext, hyperlinks, hypermedia, search engines, proxy servers.
4. Services of Internet (6hrs)
E-mail. Telnet, Search engine, USENET, Newsgroup, FTP, IRC, Video Conferencing, ecommerce.
Comparing email with snail mail. How e-mail works? What are the advantages of emails.
5. Developing Web Portals using HTML (20hrs)
Introduction to HTML: History, Characteristics of HTML language, Structure of a HTML page. Describing Tags. How to create a HTML document? Viewing HTML document, commonly used web browsers.

HTML tags: Container elements, empty elements. Using tags, Heading, Paragraph, Changing appearance of text(bold, italics, underline, subscript, superscript), center tag, title tag. Changing font size, text color and background, Changing the background color and background of HTML page, Top margin, left margin, <hr> and its attributes.

Using list and images: Unordered lists: type attribute. Ordered lists: start attribute, type attribute, value attribute. Nested lists. Inserting images, aligning an image, centering image, adding border to a image, alternate text, setting height and width, adding space around the image.

Working with links: Anchor elements. Creating hyperlink to a document. Internal linking and external linking.

Creating tables: Creating a table, attributes of table tag(BORDER, BORDERCOLOR, BGCOLOR, ALIGN, CELLSPACING, CELLPADDING, WIDTH) Attributes of table row <tr> and table data <td> tag(BORDERCOLOR, BGCOLOR, ALIGN, VALIGN, HEIGHT). Rowspan and Colspan.

Working with Frames. Use and creating frames.

Steps for creating a web site. Points to be considered to make a good website.

6. Using Front Page (4hrs)

Introduction, advantages of developing webpage using front page, introduction to front page editor.

7. Flash (12hrs)

Introduction to flash and its working environment. Introduction to animated GIF's, Difference between flash and GIF's. Advantages of flash.

Drawing tools: Introduction and using pencil tool, brush, line, oval, rectangle, eraser, ink bottle, paint bucket, eye dropper, pen tool, selection tool – Arrow and Lasso tool, Navigation tool – Hand and Zoom.

Importing graphics in flash.

Button: Creating simple button, advance button.

Tweening: Introduction, types- motion guide tween, tint tween, shape tween.

Exploring flash interface, basics of animation- frames, playing animation.

LIST OF PRATICALS

1. Setting up internet on a standalone machine.
2. Familiarization with web browser and search engine.
3. Creating email account, sending and receiving emails.
4. Using search engine for finding information of internet.
5. Using IRC.
6. Demonstration of Video conferencing.
7. Demonstration of e-commerce.
8. Demonstration of TELNET.
9. Creating web pages using basic tags, lists, images, hyperlinks, tables and frames.
10. Practice on using FLASH.

REFERENCE BOOKS

1. The Internet by Margy Levine Young, Complete Reference, Tata McGraw Hill
2. HTML by Ivan Byross; Bpb
3. Flash to the Core and Interactive Sketch Book by Joshva Davis
4. Designing Web Standards by Keffrey Weldom

INSTRUCTIONAL STRATEGY

Students must be extensively exposed to internet, HTML and Flash as the subject is practical oriented. Development of a web site given at the end of the semester would add to the proper understanding of the topic.

SUGGESTED DISTRIBUTION OF MARKS

| Topic No. | Time Allotted (in hrs) | Marks Allotted (%) |
|------------------|------------------------------------|-------------------------------|
| 1. | 10 | 14 |
| 2. | 6 | 10 |
| 3. | 6 | 10 |
| 4. | 6 | 10 |
| 5. | 20 | 32 |
| 6. | 4 | 6 |
| 7. | 12 | 18 |
| Total | 64 | 100 |

3.6 COMPUTER WORKSHOP

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RATIONALE

The course aims at making the students familiar with various parts of computers and how to assemble them, and different types of peripherals desired. In addition, the course will provide the students with necessary knowledge and skills in computer software installation and maintenance to make him diagnose software faults.

DETAILED CONTENTS

Part-A

1. Familiarization with various components and parts of personal computers, mother board details, hard disk and hard disk drive, floppy disk drive. CD Rom drive, DVD, keyboard, display devices, various chips (memory chips and CPU); serial and parallel ports, assembly of complete PC making it operational, fault finding.

Fault diagnosis, repair and maintenance of inkjet, Dot matrix and Laser printers, Modems, Connectors and Cables, ratings and fault diagnosis of UPS (600VA, 1KVA, 2KVA, 5KVA)

2. Assembly and Disassembling of PCs : Power supply, linear power supply and switch mode power supply, trouble shooting of SMPS.

Part-B

3. Loading of various operating system, LINUX, Windows XP, 2007, 2008. Familiarization of their features with practical demonstrations. Changing settings on Windows XP, 2007, 2008.
4. Loading software like MS-Office, Visual Basic, Adobe Photoshop, Macromedia Flash. Corel Draw, AutoCAD.
5. Installation and Uninstallation of Antivirus Softwares
6. Virus detection, prevention and cure. Use of PC tools. Learning settings of at least two Antivirus packages.
7. Installation and configuration of latest version of database software like Oracle, My SQL/SQL Server
8. Visit to computer manufacturing industry or assembly unit

INSTRUCTIONAL STRATEGY

As the subject is practice oriented, sufficient exercises on assembling and disassembling of computer system should be given. Exercises in repair and fault finding of peripheral devices like printers, display devices, disk drive should be given to the student. Field visits to the places where assembly of computers is taking place will be helpful to the students. Visits to the manufacturing units of CVT or UPS will also be helpful to the students.

RECOMMENDED BOOKS

- 1) PC Upgrade and Maintenance Guide 8th Edition by Mark Minasi, BPB Publication
- 2) Hardware Bible by Winn Rosch, Techmedia Publications
- 3) IBM PC and Clones by Govinda Rajalu. Tata McGraw Hill, Publishers, New Delhi
- 4) Electronic Instrumentation and Measurement Techniques by WD Cooper and Adhelfrics. Prentice Hall of India
- 5) Common Computer Circuits and Faults Vol. 1 by M. Lotia, BPB Publications
- 6) Monitor and Fault Diagnosis Vol. 1 and II. M. Lotia, DPB Publications
- 7) Unix System Administration by Unleashed. Tech. Media Publications
- 8) Understanding Unix Tech Media Publications
- 9) Linux Unleashed Tech Media Publications
- 10) Unix Configuration and Installation DPB Publications
- 11) Novel Network Novel's Guide to Network 4.01 Networks
- 12) Teach Yourself Unix BPB Publications
- 13) Study Guide Windows NT Server and Workstation 4 Tech Media Publications
- 14) Complete Guide to Window NT and Workstation by Peter Norton. Tech Media Publications
- 15) Complete Guide to Windows 98 by Peter Norton. Tech. Media Publications
- 16) Training Guide Windows 98 by MCSE, Tech Media Publications