

### **3.1 OPERATING SYSTEMS (OS)** (Common with Information Technology)

L T P  
3 - 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. | Brief Introduction to System Software                           | (6 Hrs)  |
|    | 1.1 Compiler  |          |
|    | 1.2 Assembler   |          |
|    | 1.3 Loader  |          |
|    | 1.4 Operating system  |          |
| 2. | Brief Introduction to MS-DOS and WINDOWS                        | (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                                     |          |
| 3. | Overview of Operating Systems                                   | (10 Hrs) |
|    | 3.1 Definition of Operating Systems                             |          |
|    | 3.2 Types of Operating Systems                                  |          |
|    | 3.3 Importance of Operating Systems                             |          |
|    | 3.4 Softness organization                                       |          |
|    | 3.5 Linking, loading and executing control program              |          |
| 4. | Functions of Operating System                                   | (24 Hrs) |
|    | 4.1 Process Management Functions (Principles and Brief Concept) |          |
|    | 4.1.1 Job Scheduler   |          |
|    | 4.1.2 Process Scheduler   |          |

- 4.1.3 Process synchronization
- 4.2 Memory Management Function (Principles and Brief Concept)
  - 4.2.1 Introduction
  - 4.2.2 Single Process System
  - 4.2.3 Fixed Partition Memory
  - 4.2.4 System Loading
  - 4.2.5 Segmentation
  - 4.2.6 Swapping
  - 4.2.7 Simple Paging System
- 4.3 I/O Management Functions (Principles and Brief Concept)
  - 4.3.1 Dedicated Devices
  - 4.3.2 Shared Devices
  - 4.3.3 I/o Devices
  - 4.3.4 Storage Devices
  - 4.3.5 Buffering
  - 4.3.6 Spotting
- 4.4 File Management  
Principles and Brief Concept  
Types of File System
  - Simple file system
  - Basic file system
  - Logical file system
  - Physical file system

### **LIST OF PRACTICALS**

1. Demonstration of all the controls provided on Control Panel
2. Practical exercises involving various internal and external DOS commands (20 No.)
3. Practical exercises involving Basics of Windows (20 No.)
4. Exercises on windows operating system

### **RECOMMENDED BOOKS**

1. Operating System Concepts by Ekta Walia , Khanna Publishers, New Delhi.
2. Operating Systems by John J Donovan
3. System Programming by Dham Dhare

4. Operating Systems by C. Ritchie
5. MS DOS by Peter Norton, BPB Publications
6. Microsoft Windows Manual
7. First Course in Computers by Sanjay Saxena; Vikas Publishing House Pvt. Ltd., Jungpura, New Delhi
8. DOS Manual
9. Windows 2000 by BPB Publication, New Delhi.
10. Operating System by Stallings, Tata McGraw Hill, New Delhi.

## 3.2 DIGITAL ELECTRONICS - I

(Common with ECE and Information Technology)

L T P  
4 - 3

### RATIONALE

The objective of this subject is to enable to 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 CONTENTS

1. **Introduction** (01 hrs)
  - a) Define digital and analog signals and systems, difference between
  - 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 Gages** (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, Demorgen's theorems, their proof
  - b) Sum of products form ( ) 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, operation
- b) Parallel binary adder, 2-bit and 4-bit binary full adder, block diagram, working
6. **Multiplexer/Demultiplexer** (04 hrs)
- a) Base functions, symbols and logic diagrams of 4-inputs and 8-inputs multiplexers, function/utility of 16 and 32 inputs multiplexers
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 comparators
9. **Latches and Flip-Flops** (08 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, using waveform and truth tables
10. **Counters** (10 hrs)
- a) Asynchronous counter, 4-bit Asynchronous, counter Asynchronous decode counter
- b) Asynchronous counter, 4-bit synchronous binary counter, Asynchronous decode counter
- c) Up/down Asynchronous counters, divide by N counter MODIFICATION-3, 5, 7, 12
- 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.
  - a) Verify the operation of multiplexer using an IC
  - b) Verify the operation of 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 and decade counter using JK flip-flop
10. Verification of truth tables and study the operation of tristate buffer IC 74126 or similar IC and construction of 4/8 bit bi-directional bus by using an IC
11. 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 Publications, Ambala
7. Digital Electronics by BR Gupta, Dhanpat Rai & Sons, New Delhi

8. Digital Systems: Principles and Applications by RJ Tocci, Prentice Hall of India, New Delhi
9. Digital Fundamentals by Terry LM Bartlet
10. Digital Electronics by Rajaraman V, Prentice Hall of India, New Delhi
11. Digital Electronics by Sanjay K Bose, Wiley Eastern (P) Ltd., New Delhi

### **3.3 DATA STRUCTURES USING 'C'** (Common with Information Technology)

L T P  
3 - 6

#### **RATIONALE**

Data structures are the techniques of designing the basic algorithms for real-life projects. Understanding of data structures is essential and this facilitates the understanding of the language. The practice and assimilation of data structure techniques is essential for programming. The knowledge of 'C' language and data structures will be reinforced by practical exercises during the course of study. The course will help students to develop the capability of selecting a particular data structure.

#### **DETAILED CONTENTS**

- |    |   |          |
|----|---|----------|
| 1. | Fundamental Notations   | (8 hrs)  |
|    | 1.1 Problem solving concept, top down and bottom up design, structured programming    |          |
|    | 1.2 Concept of data types, variables and constants                                    |          |
|    | 1.3 Concept of pointer variables and constants  |          |
| 2. | Arrays  | (12 hrs) |
|    | 2.1 Concept of Arrays   |          |
|    | 2.2 Single dimensional array  |          |
|    | 2.3 Two dimensional array   |          |
|    | 2.4 Operations on arrays with Algorithms (searching, traversing, inserting, deleting) |          |
| 3. | Linked Lists  | (12 hrs) |
|    | 3.1 Introduction to linked list and double linked list                                |          |
|    | 3.2 Representation of linked lists in Memory  |          |
|    | 3.3 Traversing a linked list  |          |
|    | 3.4 Searching linked list   |          |
|    | 3.5 Insertion and deletion into linked list   |          |
|    | 3.6 Application of linked lists   |          |
|    | 3.7 Doubly linked lists   |          |
|    | 3.8 Traversing a doubly linked lists  |          |
|    | 3.9 Insertion and deletion into doubly linked lists                                   |          |
| 4. | Stacks, Queues and Recursion  | (12 hrs) |
|    | 4.1 Introduction to stacks  |          |
|    | 4.2 Representation of stacks  |          |
|    | 4.3 Implementation of stacks  |          |
|    | 4.4 Uses of stacks  |          |
|    | 4.5 Introduction to queues  |          |



- 4.6 Implementation of queues (with algorithm)
- 4.7 Circular Queues
- 4.8 De-queues
  
- 5. Trees (18 hrs)
  - 5.1 Concept of Trees
  - 5.2 Concept of representation of Binary Tree
  - 5.3 Traversing Binary Trees (Pre order, Post order and In order)
  - 5.4 Searching, inserting and deleting binary search trees
  
- 6. Sorting and Searching (20 Hrs)
  - 6.1 Introduction
  - 6.2 Search algorithm (Linear and Binary)
  - 6.3 Concept of sorting
  - 6.4 Sorting algorithms (Bubble Sort, Insertion Sort, Quick Sort, Selection Sort, Merge Sort, Radix Sort, Heap Sort, Radix Exchange Sort)
  - 6.5

### LIST OF PRACTICALS

Write programmes in C to implement

1. The selection (exchange) sort techniques
2. The bubble sort technique
3. The quick sort technique
4. The merge sort technique
5. The binary search procedures to search an element in a given list
6. The linear search procedures to search an element in a given list
7. The addition of two matrices using functions
8. The multiplication of two matrices using pointers
9. Push and pop operation in stack using pointers
10. Insertion and Deletion of elements in queue using pointers
11. Insertion and Deletion of elements in circular queue using pointers
12. Insertion and Deletion of elements in linked list
13. Insertion and Deletion of elements in doubly linked list
14. Conversion from in-fix to post-fix notation
15. The factorial of a given number using recursion

**RECOMMENDED BOOKS**

- 1) Expert data structures with C by R.B. Patel – Khanna Publishers, New Delhi.
- 2) Data structures – Schaum's Outline Series – McGraw Hill
- 3) Data structures – O.G. Kakde and U.A. Deshpande
- 4) Data Structures by Kruse
- 5) Data Structures by Sanjiv Sofat, Khanna Publishers, New Delhi
- 6) Data Structures by Horwitz and Sartaj Sahni
- 7) Data Structures by Tanenbaum, Prentice Hall of India, New Delhi

### 3.4 MICROPROCESSORS – I

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#### RATIONALE

The course will cover 8085 in detail with sufficient exposure to the industrial applications. The course will also deal with the architecture, instruction sets and control applications of 8051 with introduction to 8086. The subject will deal in detail the configurations and instructional pair configuration systems and working of various peripheral interface chips.

The study of microprocessors in terms of architecture, software and interfacing techniques leads to the understanding of working of CPU in a microcomputer. The development in microprocessors of 32 bit architecture brings them face-to-face with mainframe finding employment in R&D, assembly, repair and maintenance of hardware of microprocessors and computers.

#### DETAILED CONTENTS

##### 1. Microprocessor Architecture

- Intel 8085-Functions of ALU, Timing and Control unit, Registers," Data, Address and Control, Buses, Pin Configuration and functions of various pins, Opcode, Operand.
- Instruction Word Size, Fetch, Execute Operation, Machine Cycle and States, Instruction and Data flow, Timing Diagram, Memory Read Write operation, 8085 based Microcomputer System.

##### 2. Instruction Set for Intel 8085

Instruction and data formats, Addressing modes, Status Flags, Data transfer Arithmetic, Logical, Branch Group Machine Control instruction, looping, Counting and indexing, Use of Counters and Time Delays, Use of Stacks & Subroutines, Example of Assembly Language programming

##### 3. Interfacing and Data Transfer Schemes

- Memory Mapped I/O and I/O mapped I/O schemes, Memory interfacing, I/O interfacing. Data transfer scheme Programmable data transfer, DMA Data transfer, Synchronous, Asynchronous and Interrupt driven data transfer.
- Interrupts of 8085 : Interrupt process, Maskable & Non-maskable Interrupt, Steps to initiate and implement Interrupt, Interrupts priority, SIM & RIM instructions, Brief concept of DMA.

## LIST OF PRACTICALS

1. Study of 8085 Microprocessor Kit used in laboratory  
  
Familiarization with Kit and identification of its various parts like keyboard, Memory, Timer, Interrupt Controller, Display Unit, Interface Unit
2. Writing an assembly language program using mnemonics and test them on 8 BIT MICROPORCESSOR KIT
  - Addition of two 8 bit number
  - Subtraction of 8 bit number
  - Multiplication of 8 bit number
  - Division of 8 bit number
  - Finding average of N given Integers
  - Finding maximum number out of three given numeric
  - To arrange the data array in ascending andJ descending order
  - Addition of two 16 Bit number
  - Setting up 0 to 09 count BCD addition, BCD subtraction and other
  - Exercises given by the Lab-Incharge.
3. Study of interfacing cards of AID and D/A converter
4. Study of 8255, 8257, 8259, 8279, 8253 study card using a 8 bit Microprocessor
5. Some exercises of assembly language programmes using a 8255 input & output ports.

## RECOMMENDED BOOKS

1. Introduction to Microprocessor by Mathur
2. Fundamentals of Microprocessors and Microcontrollers by B. Ram
3. Microprocessor Architecture, Programming and Applications by RS Gaonkar

### **3.5 DATA COMMUNICATION** ( Common with Computer Engineering)

L T P  
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#### **RATIONALE**

Data communication course is intended to provide practical exposure and awareness of existing and upcoming communication technologies. The course is designed in conjunction with the course "Computer Networks" which provides concepts of networks

#### **DETAILED CONTENTS**

1. Methodology (12 hrs)

Need for a modulation in communication systems. Concept of AM, FM, PM, PAM, FSK, PSK and PCM (no mathematical treatment)

Concept of bandwidth, noise and channel capacity of different communication system such as radio, microwave, different types of electrical communication lines, optical fiber system and issues like line characteristics and impedance matching.
2. Data Communication Principles (12 hrs)

Transmission of binary data, concept of simplex, half duplex and full duplex modes, two and four line systems.

Byte level data communication, synchronous communication data transfer efficiency

Synchronous communication, start-stop bits, data transfer efficiency, relative advantage and disadvantage with synchronous communication

Frame level communication, data packets, address encoding and decoding of data packets, data encryption and decryption

Serial and parallel data communication, comparison in terms of speed of data transfer

Aasynchronous transmission, synchronous transmission
3. Error Detecting (10 hrs)

Source of errors in data communications, effects of errors, data error rate and its dependency on data transfer rates. Error detecting through parity bit, block parity to detect double errors and correct single error

Characteristics of white noise and digital noise

4. Communicating Methods and Standards (8 hrs)

One to one connections, multi drop lines, method of implementation, channel capacity

Multiplexed lines, time division multiplexing and demultiplexing

5. Concept of Synchronization (6 hrs)

Synchronization method, direct mode of communication, need for handshake mode of communication, handshake modes.

### **RECOMMENDED BOOKS**

1. Introduction to Data Communications- A Practical Approach by Larry Hughes, Narosa Publishing House Pvt Ltd , Darya Ganj New Delhi 110002
2. Data and Computer Communication by William Stalling
3. Computer Communication and Networking by John Freer
4. Computer Networking by Tennan Baum
5. Data Communication by PS Gupta

### 3.6 COMPUTER WORKSHOP ( Common with Computer Engineering)

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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.

Use Modems.

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 NT, Windows 95 and 98. Familiarization of their features with practical demonstrations. Changing settings on Windows 2000, XP, millennium

4. Loading other software like MS-Office, Visual Basic, Page Maker, Corel Draw, AutoCAD etc.

5. Virus detection, prevention and cure. Use of PC tools. Learning various types of virus such as polymorph virus, stealth viruses; boot sector virus, file virus, partition table viruses.

Structure of floppy disk and hard disk, writing to boot sector and reading from it.

#### 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 8<sup>th</sup> 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