COMPUTER ENGINEERING
DETAILED CONTENTS
OF
VARIOUS SUBJECTS
SECOND YEAR

Operating System

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Rationale

The course provides the students with an understanding of human computer interface existing in computer systems and the basic concepts of operating system and its working. The aim is to gain proficiency in using various operating systems after undergoing this course.

Detailed Contents

1. Brief introduction to system software: Compiler, Assembler, Loader, Operating System.

2. Overview of Operating System: Operating System as resource manager, operating system services, system calls, operating system classifications- single user, multi-user, batch-processing time-sharing real-time Operating System, multi processing, distributed operating system, network operating system.

3. Memory Management: Single Contiguous allocation, partitioned allocation, relocatable partitioned allocation, paged allocation, segmentation.

4. Processor Management: Processor overview, process states, multi-programming, levels of schedulers, multi-processor scheduling, Deadlock, necessary conditions for deadlock, Deadlock prevention.

5. File Management: File supports, access methods, contiguous, linked and indexed allocation, directory systems, single level, two levels, tree structure, graph directory system and file protection.

6. Device Management: Dedicated, Shared and Virtual devices, sequential access, direct access devices, Interrupt processing, idea of spooling, disk scheduling.

7. Case Study: Case study of Window operating System

List of Practical:

1. Practical exercises involving various Internal and External DOS Commands.
2. Exercises on Windows operating system.
3. Exercises on UNIX/Linux operating system-Shell programming/Operating system commands.

Reference Books

1. Operating system concepts-Silberschatz, Galvin
2. Operating system design and implementation-Andrew Tanenbaum and Woodhull
3. Operating system – Godbalakar
4. Operating System-Dhamdhere

DIGITAL ELECTRONIC

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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. This will form a broad base for studying Microprocessor and further subjects.

Detailed contents

1. **NUMBER SYSTEM AND CODES**
   - BINARY NUMBERS: - Decimal, binary, octal, hexadecimal number systems, conversion from one number system to another system
   - BINARY ARITHMETIC: - binary addition, subtraction, multiplication, division, 1's complement and 2's complement of binary numbers, arithmetic operations with signed numbers.
   - BINARY CODES: - binary coded decimal (BCD) code, excess-3 code, error detection code, the gray code or reflected code, alphanumeric code.

2. **BOOLEAN ALGEBRA**
   - Digital logic operation: digital logic, +ve logic, -ve logic, logic operation, logic gates: definition and symbols.
   - Fundamental of Boolean algebra: Boolean algebra, Boolean function, basic theorem and identities.
   - Minimization technique for logic operation: sum of product and product of sum rule, karnaugh map technique up to 4 variables.
   - Digital logic family: Direct coupled logic circuits, resistor transistor logic, transistor transistor logic (TTL), complementary MOS (CMOS), characteristic and comparison of TTL and CMOS.

3. **COMBINATIONAL LOGIC CIRCUIT**
   - Adders and Sub tractors: basic adders and sub tractors, parallel binary address, ripple carry and look ahead carry address.
   - Digital comparators: exclusive OR gates as comparator, comparator for 2 bit binary number.
   - Decoder, Encoder: Multiplexer, Demultiplexer.

4. **SEQUENTIAL LOGIC CIRCUITS**
   Operating characteristics of flip-flop (latch), Set reset flips flop, clocked flip-flop, edge triggered flip-flop, T flip-flop, D flip flop, and master slave JK flip flop.

5. **COUNTERS**
   3bit Asynchronous counter, binary ripple counter, synchronous counter, synchronous decade counter, and up-down counter.

6. **REGISTER AND MEMORIES**
   - Registers: flip-flop as register, types of register serial in serial out shift register, serial in parallel out shift register, parallel in parallel out shift register, parallel in serial out shift register.
   - Memories: classification of memories, RAM, ROM.

7. **ANALOG TO DIGITAL & DIGITAL TO ANALOG CONVERTERS.**
   General principle of A/D & D/A conversion and brief idea of their application Binary register network register and register ladder network. method of D/A conversion

List of Practical

1. Study of Logic Breadboard with verifications of Truth Table for AND, OR, NAND. EX-OR. NOR Gate.
2. Verification of NAND and NOR gate as universal gates
3. Construction of half adder and full adder circuit using EX-OR gate and NAND gate and verification of their operation
4. Verify the operation of MUX using an IC
5. Verify the operation of DEMUX using an IC
6. Verify the operation of BCD to Decimal Decoder using an IC
7. Verify the operation of BCD to Seven-segment decoder using an IC
8. Verify operation SR, JK, D, flip flop, master-slave JK flip flop using an IC
9. Verify operations of SISO, PISO, SIPO, and PIPO Shift registers (universal Shift register)
10. Study of Ring counter UP-DOWN counter
11. Construct and verify the operation of an asynchronous binary and decade Counter using JK flip flop
12. Verification of truth tables and study the operation of tri-state buffer IC74126 or similar IC and construction of 4/8 bit bi directional bus by Using an IC
13. Testing of digital IC's using IC tester.

REFERNCE BOOKS:

1. Digital Electronics - Bartelt
2. Digital Logic Design - Morris Mano
3. Digital Principles and application - Albert Paul Malvino and Leach
4. Digital Electronics practice using IC - R.P.Jain and MMS Anand
5. Digital fundamental - Thomas Floyds

DATA STRUCURES USING C

Rationale

The data structures are the technique of designing the basic algorithm for real life projects .Understanding of data structure is essential and this facilitates the understanding of the language.

Detailed Concepts

1 Problem solving concepts:

Top down and bottom up design, structured programming & debugging technique, program testing to documentation, consideration for choice of paper

2 Data type and data structure

Concept of data type and data structures, difference between data type and data structures, view of data structure at logical level, implementation level and application level, built in data structures and user defined data structures

3 User defined data structures

Difference between user-defined and Built-in data structures.
Linear linked list, creation, insertion, deletion, traversal, array, circular link list creation, insertion, deletion, traversal, doubly linked list: creation, insertion, deletion, traversal and their application.

4 Stacks:

Stack definition and examples representation of stacks as an array, stack operation, pointer implementation of lists, comparison of two implementation; linked list representation of stacks, application of stacks

5 Queues

Queues definitions and examples, representation of queues using arrays, queues operation, linked list representation of queues, application of queues, dequeue

6 Non linear data structures:

Trees, terminology of trees, concepts and application of binary trees, linked representation of binary trees, tree traversal technique and algorithms using recursion and non recursive methods, creation of binary tree, inserting a node in binary tree and deletion a node from a binary tree and searching in a binary tree

7 Searching and sorting

Searching techniques-Sequential search and binary search, sorting techniques: Insertion sort, selection sort, bubble sort, quick sort, merge sort, heap sort and their efficiency consideration

List of practical

1. Problems on arrays for insertion, deletion and searching
2. Problems on operation of linear linked list
3. Problems on operations of circular linked list

4.   Problems on operations of doubly linked list
5.   Program on implementations of stack as an array as well as pointers
6.   Program on implementation of queues as an array
7.   Program on dequeues
8.   Program on tree such as construction of binary trees, insertion, deletion and searching in binary trees
9.   Program on tree traversal algorithm-Preorder, inorder and post order
10.   Program to count the leaves and to find the height of tree
11.   Program on linear and binary search.
12   Program on sorting technique
          Insertion sort, selection sort, bubble sort, quick sort, merge sort

Reference Books

1	Date and Lily	-	Data structures
2	Schaum series	-	Data Structures
3	Tanenbaum, Augesistein	-	Data structures using C.

Microprocessor

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Rationale

The study of Microprocessor in terms of Architecture, software and interfacing techniques leads to the understanding of working of CPU in a micro computer. The development in microprocessor of 32 bit architecture brings them face to face with main frame finding employment in R& D, assembly, repair and maintenance of hardware of microprocessor and computer

Detailed contents

1. Microprocessor Architecture

   Intel 8085-Architecture blocks diagram, functions of ALU, timing and control unit, registers, data, address and control buses

   Pin configuration and function of various pins, flags.

   Instruction cycle-Fetch and execute operation. M/C cycle and state

   Timing Diagram- opcode fetch cycle, memory read and write operation.

   Memory organization, Memory map and addresses, Basic concepts of memory interfacing. Address decoding and memory addresses

2. Microprocessor Instruction.

   Instruction set, Instruction classification, Instruction word size, Addressing modes

   Detailed instruction-Data transfer instruction, Arithmetic instructions, Logic instructions, Branch instructions, Machine control instructions

3. Programming concepts

   Programming techniques-Looping, counting, indexing

   Use of counters and time delays

   Use of stacks and subroutines

4. Interfacing and data transfer scheme

   Memory mapped I/O and I/O mapped I/O

   Synchronous and asynchronous data transfer

   Microprocessor controlled data transfer and peripheral controlled data transfer

5. Interrupts

   Interrupt process

   Mask able and non mask able interrupt

   Interrupt priority

   RIM and SIM instructions

6. Supporting chips: 8251, 8253, 8254, 8255, 8257, 8259.

List of Practical

1. Familiarization with micro processor kit location of 8085, 8279, 8263, kyeboard, display field, EPROM programmer, expansion slot TTY and serial lines

   Performing exercise on microprocessor kit.

2. Addition of two 8 bit numbers

3. Subtraction of 8 bit numbers

4. Decimal addition of two 8 bit numbers

5. Addition of two 16 bit numbers

6. Find the largest number out of three given numbers

7. Find the larger of two numbers

8. To arrange the data array in ascending and descending order

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10. Counter design with time delay
11. BCD addition
12. BCD subtraction and other exercises given by the lab in charge

Reference Books
1. Fundamental of microprocessor and microcomputer-B Ram
2. Microprocessor architecture, programming and application with 8085-Ramesh S. Gaonkar

COMPUTER WORKSHOP-I

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RATIONALE

The course aims at making the student 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.

DETAILED CONTENTS

1. **Electronic CAD**
   Familiarization with electronic CAD software such as electronic workbench for design of simple analog and digital circuits using simulation provided by electronic CAD software. Use of existing libraries adding components to the libraries.
2. **AUTOCAD :**
   Familiarization with latest AUTOCAD software. Basic AUTOCAD commands, drawing and editing commands, editing and dimensioning. 2 D examples.
3. **Loading and Familiarisation of operating system :** Linux, Windows NT, Windows 2000, Windows XP
4. **Familiarisation of Page Maker & Corel Draw**

REFERENCE BOOKS

1. Mastering Autocad 2000-George Omora
2. Corel Draw – William D. Harrel