

GUJARAT TECHNOLOGICAL UNIVERSITY

Master of Computer Application

Subject Name: Fundamentals of Computer Organization

Subject Code: 2610004

(W.E.F June 2012)

Objectives: Students will learn

- The elements of Computer Organization and Architecture.
- The basic knowledge necessary to understand the hardware operation of digital computers.

Prerequisites: None

Contents: ([] indicates no. of lectures)

1. Basic Components of a digital computer [1]

2. Basic Working of Peripheral devices [4]

(Circuit Diagrams not necessary)

- Key board
- Mouse
- Display Unit
- Printer
- Multimedia Projector
- Scanner

3. Introduction to Number System [9]

- Decimal System
- Bistable Devices
- Counting in Binary System
- Binary Addition and Subtraction
- Converting Decimal Number to Binary
- Negative Numbers
- Use of Complements to represent negative numbers
- Complements in other number system
- Binary Number Complements
- Weighted Code
 - BCD Code
- Octal and Hexadecimal Number System

4. Boolean Algebra and Logic Gates [9]

- Fundamental Concepts of Boolean Algebra
- Logic Gates
- Logical Multiplication
- AND Gate and OR Gate
- Complementation and Inverts
- Evaluation of logical Expression

- Evaluation of an Expression containing Parenthesis
 - Basic Laws of Boolean Algebra
 - Proof by Perfect Induction
 - Simplification of Expressions
 - De Morgan's Theorems
 - Basic Duality of Boolean Algebra
 - Derivation of a Boolean Algebra
 - Interconnecting Gates
 - Sum of Products And Product of Sums
 - Derivation of POS Expression
 - Derivation of 3 input variables expression
 - NAND Gates and NOR Gates
 - K-Map Method for Simplifying Boolean Expressions
 - Subcubes and Covering
 - POS Expression and Don't Care
 - Design Using NAND Gates Only
 - Design Using NOR Gates
- 5. Basic Concepts of Sequential Logic [3]**
- RS Flip Flop
 - A Basic Shift Register
 - Binary Counter (Asynchronous) Counter
- 6. Basic Concepts of Combinational Logic [4]**
- Construction of ALU
 - Integer Representation
 - 1 bit Binary Half Adder
 - 1 bit Binary Full Adder
 - Positive and Negative Number
 - Addition in 1's Complement System
 - Addition in 2's Complement System
 - Shift Operation
 - Logical and Modulo Operations (Circuit Diagrams not necessary)
 - Basic working and application of Multiplexer
- 7. Introduction to Memory and Storage Devices [4]**
- Random Access Memories
 - Basic Memory Cell
 - Static RAM (Circuit Diagrams not necessary)
 - Dynamic RAM (Circuit Diagrams not necessary)
 - ROM
 - Magnetic Disk Memories
- 8. Introduction to Buses [1]**
- Interfacing Buses (Circuit Diagrams not necessary)
 - Concepts of Address Bus, Data Bus and Control Bus, Bus Width (Circuit Diagrams not necessary)

9. Introduction to Control Unit [2]

- Construction of Instruction Word
- Instruction Cycle and Execution Cycle organization of Control Registers

10. Basic Concepts of Computer Organization [6]

- Instruction Word Formats-Number of Addresses
- Representation of Instruction and Data
- Addressing Techniques
- Direct Addressing
- Immediate Addressing
- Relative Addressing
- Indirect Addressing
- Indexed Addressing

11. Introduction to Intel 8086 Architecture [7]

- Introduction
- Bus Interface Unit
- Execution Unit
- Introduction to Instruction Set
- Data Addressing Modes
- Instruction Format
- Working of MOV, ADD, SUB, MUL, DIV, CMP, IMC, DEC, NEG, AND, OR, NOT, XOR instructions

Main Reference Book(s):

- A. Digital Computer Fundamentals, Tata McGraw Hill, 6th Edition, Thomas C. Bartee
- B. Microprocessor 8086 – Architecture, Programming and Interfacing, Prentice Hall India (PHI), Sunil Mathur

Other Reference Book(s):

1. Computer System Architecture, PHI/Pearson Education, 3rd Edition, M. Morris Mano

Unit wise Coverage from the main reference book – A:

Unit – 1: Chapter – 1: 1.7

Unit – 3: Chapter – 2: 2.1 to 2.13

Unit – 4: Chapter – 3: 3.1 to 3.22

Unit – 5: Chapter – 4: 4.1, 4.7, 4.8

Unit – 6: Chapter – 5: 5.1 to 5.4, 5.6 to 5.8, 5.14, 5.15, 5.19, 5.20

Unit – 7: Chapter – 6: 6.1, 6.2, 6.7 to 6.10

Unit – 8: Chapter – 8: 8.2, 8.3

Unit – 9: Chapter – 9: 9.1, 9.2

Unit - 10: Chapter – 10: 10.1 to 10.9 (Except 10.6)

Unit wise Coverage from the main reference book – B:

Unit – 11: Chapter – 2(2.1, 2.2), Chapter – 4(4.1, 4.2.1, 4.3, 4.5)

Unit – 2: To be covered from Internet/latest books

Accomplishments of the student after completing the course:

- Students will get the knowledge of computer organization and architecture.
- They will know the actual working and organization of digital computer system.

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