

# Unit 1-Introduction

## Syllabus:

Concept of computer organization and architecture, Fundamental unit, Computer function and interconnection, CPU structure and function.

**Source for study:** Computer Organization & Architecture-10<sup>th</sup> addition- William Stalling- Chapter 1 and Chapter 3, Class note Book & PPT.

## Question Bank:

1. What, in general terms, is the distinction between computer organization and computer architecture?
2. What, in general terms, is the distinction between computer structure and computer function?
3. What are the four main functions of a computer?
4. List and briefly define the main structural components of a computer.
5. List and briefly define the main structural components of a processor.
6. What is a stored program computer?
7. List and explain the key characteristics of a computer family.
8. What is the key distinguishing feature of a microprocessor?
9. Draw and explain Computer Components: Top-Level View.
10. Draw & explain Basic Instruction Cycle.

# Unit 2-Instruction Sets

## Syllabus:

Characteristics, Types of operands, Types of operations, Assembly language, Addressing modes, Instruction format, Types of instruction, Instruction execution, Machine state and processor status, Structure of program, Introduction to RISC and CISC architecture.

**Source for study :** Computer Organization & Architecture-10<sup>th</sup> addition- William Stalling-Chapter 12.1,12.2,12.4,13.1,13.2,13.3,13.4,13.5, Class note Book & PPT.

## Question Bank:

1. Explain stored program concept with diagram.
2. Explain Von Neumann Architecture with diagram.
3. Explain Harvard Architecture with diagram.
4. Difference between Von Neumann Architecture & Harvard Architecture.
5. Explain Characteristics of an instruction.
6. Explain different Types of operands.
7. Explain different types of instruction.

8. Explain assembly language programming tools. Explain any assembly language program.
9. Differentiate RISC and CISC architecture.
10. What is the difference between an arithmetic shift and a logical shift?
11. What is the difference between big endian and little endian?
12. Explain Instruction cycle state diagram.
13. Explain different addressing modes with example.

## Unit 3-Computer Arithmetic

### Syllabus:

The arithmetic and logic Unit, Integer representation, Integer arithmetic, Floating point representation, Floating point arithmetic, Introduction of arithmetic co-processor.

**Source for study :** Computer Organization & Architecture-10<sup>th</sup> edition- William Stalling- Chapter 10  
Class note Book & PPT.

### Question Bank:

1. Represent number "X" and "-X" in straight binary, 1's complement, 2's complement and sign magnitude format. (Assume any 2 digit or 3 digit decimal number in place of X).
2. What are disadvantages of sign magnitude representation? How they are removed in 2's complement representation? Explain with example.
3. What is sign extension? Explain.
4. Explain Characteristics of Twos Complement Representation and Arithmetic.
5. Explain ALU with block diagram.
6. Explain Block Diagram of Hardware for Addition and Subtraction of integer.
7. Explain Hardware Implementation of Unsigned Binary integer Multiplication
8. Explain Flowchart/algorithm for Unsigned Binary integer Multiplication
9. Perform Multiplication of unsigned number 7 and 9 using Unsigned Binary Multiplication algorithm.
10. Explain Booth's Algorithm for Twos Complement Multiplication.
11. Perform Multiplication of two signed integer +7 and -6 using Unsigned Binary Multiplication algorithm.
12. Explain Flowchart for Unsigned Binary Division.
13. Perform division -14/3 using Unsigned Binary Division.
14. How signed integer division is performed? Explain.
15. Explain Typical 32-Bit and 64 bit Floating-Point Format.
16. Solve example of floating point...(Class notebook).
17. Explain Floating-Point Addition and Subtraction flowchart.
18. Explain Floating-Point multiplication division flowchart.

## Unit 4-Memory Organization

### Syllabus:

Internal Memory: Semiconductor main memory, Error correction, Advanced DRAM organization, Virtual memory systems and cache memory systems. External Memory: Organization and characteristics of magnetic disk, Magnetic tape, Optical memory, RAID, Memory controllers.

**Source for study:** Computer Organization & Architecture-10<sup>th</sup> addition- William Stalling-Chapter 5 and chapter 6, Class note Book & PPT.

### Question Bank:

1. Explain Key Characteristics of Computer Memory Systems.
2. The Memory Hierarchy with diagram.
3. Explain Cache/Main Memory Structure. Also explain Cache Read Operation.
4. What is cache mapping? Explain different types of cache mapping technique with its advantages.
5. Solve problem on cache mapping.
6. What are the differences among direct mapping, associative mapping, and setassociative mapping?
7. Explain different types of semiconductor memories.
8. Explain difference between SRAM and DRAM with structure.
9. Why refresh is required in DRAM. Explain.
10. Explain typical DRAM organization.
11. What is virtual memory system.
12. What are different error detecting and correcting codes.
13. Solve problem of Hamming code..(Refer class note book)
14. Explain different ROM's.
15. Explain physical characteristics and working of magnetic memory.
16. Explain different optical memories.
17. What is RAID memory? Explain different levels.
18. What is role of DMA controller? Explain its working.

## Unit 5-Control Unit and Input / Output Organization

### Syllabus:

**Control unit operation:** Micro-operations, Control of the processor, Hardwired implementation, Micro- programmed Control Unit, Basic concepts, Micro-instruction sequencing, Micro-instruction execution, Applications of micro-programming. **Input/output Organization:** External devices, I/O

module, Programmed I/O, Interrupt driven I/O, Direct memory access, I/O channels and processors, External interface.

**Source for study:** Computer Organization & Architecture-10<sup>th</sup> addition- William Stalling-Chapter 20 and 21,Chapter 7(7.1 to 7.8) Instruction pipe-lining (Chapter 14.4): Concepts. Parallel processing: Multiple processor organization, Symmetric multiprocessor, Cache coherence and the MESI protocol. (Chapter 17(17.1 to 17.3) , Class note book, PPT.

**Question Bank:**

1. What is micro operation in processor? Explain.
2. Explain micro operations for the instruction....MOV R1, R2.
3. Explain flowchart for instruction cycle.
4. Explain basic model of control unit.
5. Explain MESI protocol.
6. How Instruction pipe-lining enhance performance of processor? Explain.
7. What is the difference between Hardwired implementation & Micro- programmed Control Unit.
8. Explain interrupt driven IO and Program driven IO.
9. Explain Wilkes design of micro programmed control unit.
10. What is multiprocessing? Differentiate Symmetric and asymmetric multiprocessing.
11. What is cache coherence? How to overcome cache coherence problem.
12. Explain micro programmed control unit hardware and function of each block.
13. Explain Format of the  $\mu$ -instruction control word.