

# **COA**

## **1. Functional Units of a Digital System and Interconnections:**

- 1. Overview of digital systems.**
- 2. Functional units and their roles.**
- 3. Interconnections between functional units.**

## **2. Buses and Bus Architecture:**

- 1. Definition and purpose of buses.**
- 2. Bus architecture.**
- 3. Types of buses.**
- 4. Bus arbitration.**

## **3. Register, Bus, and Memory Transfer:**

- 1. Register organization.**
- 2. Memory transfer.**
- 3. Processor organization.**
- 4. Stack organization.**
- 5. Addressing modes.**

## **4. Arithmetic and Logic Unit (ALU):**

- 1. Look-Ahead Carries Adders:**
  - 1. Enhancing adder performance.**
- 2. Fixed-Point Representations and Arithmetic Operations:**
  - 1. Addition and Subtraction.**
  - 2. Multiplication: Signed operand multiplication, Booth's algorithm, array multiplier.**
  - 3. Division and logic operations.**

## **5. Control Unit:**

- 1. Instruction Types, Formats, Cycles, and Sub-Cycles:**
  - 1. Overview of instructions.**
  - 2. Instruction formats.**
  - 3. Instruction cycles and sub-cycles (fetch and execute).**

## **2. Micro-operations:**

- 1. Execution of a complete instruction.**
- 2. Program Control.**
- 3. Reduced Instruction Set Computer (RISC).**
- 4. Pipelining.**
- 5. Parallel Processing.**
- 6. Hardwired and Microprogrammed control unit.**

## **6. Input/Output (I/O):**

### **1. Peripheral Devices:**

- 1. Overview of I/O devices.**

### **2. I/O Interface, Ports, and Interrupts:**

- 1. I/O interface.**
- 2. I/O ports.**
- 3. Interrupts: Hardware, types, and exceptions.**

### **3. Modes of Data Transfer:**

- 1. Programmed I/O.**
- 2. Interrupt-initiated I/O.**
- 3. Direct Memory Access (DMA).**
- 4. I/O channels and processors.**

### **4. Serial Communication:**

- 1. Synchronous & asynchronous communication.**

## **7. Memory:**

### **1. Basic Concepts and Hierarchy:**

- 1. Overview of computer memory.**
- 2. Memory hierarchy.**

### **2. Semiconductor RAM Memories:**

- 1. Types and characteristics.**
- 2. 2D & 2 1/2D memory organization.**

### **3. ROM Memories:**

- 1. Types and applications.**

### **4. Cache Memories:**

1. Concept and design issues.
  2. Performance considerations.
  3. Address mapping and replacement.
5. Auxiliary Memories:
  1. Magnetic disk, magnetic tape, and optical disks.
6. Virtual Memory:
  1. Concept and implementation.