**Practice Set**
**End Semester Examination, Spring- 2026**

**Program: Diploma in Engineering (CSE)**
**Semester: IV**
**Course: Computer Architecture**
**Course Code: 3DPCC208**

**Course Objective:**
*The objective of this course is*

• To introduce the fundamentals of computer organization, including instruction codes, registers, and control units.
• To explore the design and working of basic computer instructions, instruction cycles, and addressing modes.
• To impart knowledge on computer arithmetic operations such as multiplication and division using various algorithms.
• To explain the principles of memory organization and input-output systems including DMA, cache, and virtual memory

## UNIT-1

**Section: I (10 Marks)**

1. Define instruction codes. Why are instruction codes necessary in basic computer organization?
2. List the various computer registers used in a basic computer and state the primary function of each.
3. Differentiate between direct and indirect address instructions with a simple diagram and example.
4. Explain the concept of timing and control in a basic computer system.
5. What are computer instructions? Discuss the basic instruction format.
6. Draw a block diagram showing the relationship between a computer's control unit and its registers.
7. Briefly explain how an instruction code is mapped to a physical operation in the CPU.

**Section: II (20 Marks)**

1. Draw the block diagram of the common bus system for a basic computer. Explain the function of the various registers connected to the common bus.

## UNIT-II

**Section: I (10 Marks)**

1. What is an Instruction Cycle? List and briefly explain its different phases.
2. Differentiate between memory-reference and register-reference instructions.
3. What is the role of Input-Output instructions in a computer system? Give two examples.
4. Define a Central Processing Unit (CPU). List its major internal components.
5. Draw a block diagram of a General Register Organization and briefly explain how it works.
6. What is Stack Organization? Explain the difference between a register stack and a memory stack.
7. Explain the concept of Instruction Formats with a suitable example (e.g., zero, one, or two-address format).
8. Discuss the primary function of an Accumulator Logic Shift Unit.
9. Define addressing modes. Why is it beneficial for a CPU to have multiple addressing modes?

**Section: II (20 Marks)**

1. Explain at least five different addressing modes used in CPU architecture with clear examples for each.
2. Discuss the design and implementation of an Accumulator Logic unit with a neat block diagram.
3. Describe the detailed execution of an instruction cycle using a flowchart.

## UNIT-III

**Section: I (10 Marks)**

1. What are peripheral devices? Give three examples of common input/output peripherals.

2. Explain the purpose of an Input-Output Interface in connecting external devices to the CPU.
3. Describe Asynchronous Data Transfer and state why it is used.
4. What is a Priority Interrupt? How does the system determine which interrupt to service first?
5. Explain the basic principle of Direct Memory Access (DMA).
6. List and define the three main modes of data transfer (Programmed I/O, Interrupt-initiated I/O, DMA).
7. Discuss the basic hardware implementation required for fixed-point binary multiplication.

**Section: II (20 Marks)**

1. What is Direct Memory Access (DMA)? Explain the block diagram of a DMA controller and describe its mode of data transfer.
2. Describe the division algorithm for fixed-point binary numbers, supported by a flowchart.

## UNIT-IV

**Section: I (10 Marks)**

1. What is a Memory Hierarchy? Draw a diagram to illustrate the different levels of memory.
2. Distinguish between Main Memory (RAM/ROM) and Auxiliary Memory (Magnetic disks/tapes).
3. Define Associative Memory. What is its primary advantage over standard random-access memory?
4. What is Cache Memory? Explain its role in speeding up a computer system.
5. Explain the concept of Virtual Memory in your own words.
6. Briefly explain the function and importance of Memory Management Hardware.
7. What is a "hit ratio" in the context of cache memory, and why is it important?

**Section: II (20 Marks)**

1. Explain the three different cache memory mapping techniques (Direct, Associative, and Set-Associative Mapping) in detail.
2. What is Virtual Memory? Discuss the concept of paging and explain how a logical address is translated into a physical address.

3. Discuss the detailed organization of Main Memory. Include an explanation of RAM and ROM chips and how they interface with the CPU.

**Course Outcome:**

*By the end of the course students will be able to:*

**CO1:** Understand and explain the fundamental components and functioning of basic computer organization including instruction codes, registers, and control timing.
**CO2:** Analyze the working of instruction cycle, CPU architecture, instruction formats, and addressing modes to understand how processors execute programs.
**CO3:** Apply knowledge of arithmetic algorithms and input/output data transfer mechanisms including interrupt handling and DMA in real-time computing systems.
**CO4:** Evaluate different memory organization techniques such as cache, virtual memory, and associative memory, and explain their impact on system performance

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