*Total No. of Questions: 24*

**Enrollment No :** _____

MEDICAPS UNIVERSITY

# Faculty of Engineering

# End Semester Examination May 2025

## CA3CO06 Computer Architecture

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|---|---|---|---|---|---|
| **Programme** | : | BCA / BCA-MCA (Integrated) | **Branch/Specialisation** | : | - |
| **Duration** | : | 3 hours | **Maximum Marks** | : | 60 |

**Note:** *All questions are compulsory. Internal choices, if any, are indicated. Assume suitable data if necessary. Notations and symbols have their usual meaning.*

### Section 1 (Answer all question(s))

| | | Marks | CO | BL |
|---|---|---|---|---|
| **Q1.** | Which of the following best describes a computer? | 1 | 1 | 2 |

- ○ A machine that can perform arithmetic operations only
- ◉ A machine that follows a set of instructions to perform tasks
- ○ A machine that can only store and retrieve data
- ○ A machine that operates without human intervention

| | | | | |
|---|---|---|---|---|
| **Q2.** | What is an instruction set in computer architecture? | 1 | 1 | 1 |

- ○ A collection of software programs
- ○ A set of rules for executing applications
- ◉ A group of machine-level instructions that a processor can execute
- ○ A protocol for communication between computers

| | | | | |
|---|---|---|---|---|
| **Q3.** | Which algorithm is used for multiplying two binary numbers? | 1 | 2 | 1 |

- ○ Newton-Raphson algorithm
- ○ Euclidean algorithm
- ◉ Booth's algorithm
- ○ Bresenham's algorithm

| | | | | |
|---|---|---|---|---|
| **Q4.** | Floating point numbers are represented using: | 1 | 2 | 2 |

- ◉ Sign, Exponent, Mantissa
- ○ Base, Exponent, Multiplier
- ○ Sign, Integer, Denominator
- ○ Fraction, Integer, Sign

| | | | | |
|---|---|---|---|---|
| **Q5.** | The term "Micro-operation" refers to: | 1 | 3 | 1 |

- ○ Execution of a single machine instruction
- ○ Small-scale software operation
- ◉ A simple operation on data stored in registers
- ○ A low-power operation performed by a CPU

| | | | | |
|---|---|---|---|---|
| **Q6.** | Which component in a CPU performs arithmetic and logic operations? | 1 | 3 | 1 |

- ○ Control Unit
- ◉ Arithmetic Logic Unit (ALU)
- ○ Register File
- ○ Memory Unit

| | | | | |
|---|---|---|---|---|
| **Q7.** | In the 8086 microprocessor, which of the following registers is used as a pointer for stack operations? | 1 | 4 | 2 |

- ○ AX
- ○ BX
- ◉ SP
- ○ SI

| | | | | |
|---|---|---|---|---|
| **Q8.** | In assembly language, which instruction is used to move data from one register to another? | 1 | 4 | 1 |

- ◉ MOV
- ○ ADD
- ○ CMP
- ○ JMP

| | | | | |
|---|---|---|---|---|
| **Q9.** | What is the purpose of cache memory in a computer system? | 1 | 5 | 1 |

- ○ To store instructions permanently
- ○ To provide backup storage
- ◉ To store frequently accessed data for quick retrieval
- ○ To increase the power efficiency of the CPU

**Q10.** Which type of memory is the fastest? **1 5 1**

- ○ RAM
- ○ ROM
- ◉ Cache Memory
- ○ Hard Disk

## Section 2 (Answer all question(s))

**Marks CO BL**

**Q11.** What are the main components of a desktop computer? **2 1 1**

| Rubric | Marks |
|---|---|
| main components of a desktop computer | 2 |

**Q12.** What is a computer? Define computer architecture and its importance. **3 1 1**

| Rubric | Marks |
|---|---|
| computer-1<br>computer architecture and its importance-2 | 3 |

**Q13. (a)** What is an instruction set architecture? Explain the design considerations for an efficient instruction set. **5 1 2**

| Rubric | Marks |
|---|---|
| instruction set architecture ISA-2<br>design considerations for an efficient ISA-3 | 5 |

**(OR)**

**(b)** Describe the von Neumann architecture with a labeled diagram.

| Rubric | Marks |
|---|---|
| Von Neumann architecture-2<br>Explanations with labeled diagram-3 | 5 |

## Section 3 (Answer all question(s))

**Marks CO BL**

**Q14.** Explain the basic addition and subtraction process in binary numbers with circuit diagram. **3 2 2**

| Rubric | Marks |
|---|---|
| addition and subtraction process in binary numbers-1.5<br>circuit diagram- 1.5 | 3 |

**Q15. (a)** Explain the working of Booth's multiplication algorithm and Solve (-3) *(4). **7 2 3**

| Rubric | Marks |
|---|---|
| working of Booth's multiplication algorithm-3<br>Solve (-3) *(4) - 4 | 7 |

**(OR)**

**(b)** Perform binary division of (1010)/ (100) using any division algorithm? Explain the used algorithm by steps or flowcharts.

| Rubric | Marks |
|---|---|
| binary division of (1010)/ (100)-4<br>Explanation by steps or flowcharts.-3 | 7 |

## Section 4 (Answer all question(s))

**Marks CO BL**

**Q16.** What is bus? Explain the difference between a data bus and an address bus. **2 3 1**

| Rubric | Marks |
|---|---|
| bus-1<br>difference between a data bus and an address bus-1 | 2 |

**Q17.** What is register transfer language (RTL)? Why is it important? **3 3 2**

| Rubric | Marks |
|---|---|
| register transfer language-2<br>importance of RTL-1 | 3 |

**Q18. (a)** Explain the design and working of a 4-bit ALU with a truth table. **5 3 3**

| Rubric | Marks |
|---|---|
| design and working of a 4-bit ALU-4<br>truth table.-1 | 5 |

**(OR)**

**(b)** What is micro-operation? Explain in detail. Give any four examples with description.

| Rubric | Marks |
|---|---|
| micro-operations-3<br>four examples with description-2 | 5 |

## Section 5 (Answer all question(s))

**Marks CO BL**

**Q19.** Draw the pin diagram of 8086. **2 4 1**

| Rubric | Marks |
|---|---|
| pin diagram | 2 |

**Q20.** What is an addressing mode? List different addressing modes in 8086. **3 4 2**

| Rubric | Marks |
|---|---|
| addressing mode-1.5<br>List different addressing modes-1.5 | 3 |

**Q21. (a)** Explain the internal architecture of 8086 with suitable block diagram. **5 4 2**

| Rubric | Marks |
|---|---|
| block diagram-2.5<br>Explanation of the internal architecture-2.5 | 5 |

**(OR)**

**(b)** Explain the instruction set of 8086 in detail.

| Rubric | Marks |
|---|---|
| instruction set of 8086 | 5 |

## Section 6 (Answer all question(s))

**Marks CO BL**

**Q22.** Explain the difference between RAM and ROM. **2 5 1**

| Rubric | Marks |
|---|---|
| difference between RAM and ROM | 2 |

**Q23.** What is memory hierarchy? Arrange different types of memory in order. **3 5 2**

| Rubric | Marks |
|---|---|
| memory hierarchy-1.5<br>Arrange different types of memory in order- 1.5 | 3 |

**Q24. (a)** What is the difference between associative memory and virtual memory? **5 5 2**

| Rubric | Marks |
|---|---|
| difference between associative memory and virtual memory | 5 |

**(OR)**

**(b)** What is cache memory? Why is it faster than main memory?

| Rubric | Marks |
|---|---|
| cache memory-2.5<br>faster than main memory-2.5 | 5 |

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