



*K. Sambal*

## Avinashilingam Institute for Home Science and Higher Education for Women

(Deemed to be University Estd. u/s 3 of UGC Act 1956, Category 'A' by MHRD)  
Re-accredited with 'A++' Grade by NAAC. Recognised by UGC Under Section 12B  
Coimbatore - 641 043, Tamil Nadu, India

**Bachelor's Degree Examination - November 2024**

**I Semester**

**Class : I UG**

**Time : 3 Hours**

**Major : Computer Science/ BCA**

**Max. Marks : 100**

**23BCSC02 / 23BCAC01 Computer System Architecture**

### Course Outcomes:

- CO1: Apply Boolean Logic in circuit design with gates and other digital hardware
- CO2: Distinguish the application of various micro-operations in Register Transfer Language.
- CO3: Handle the various parameters related to instruction execution.
- CO4: Understand the control unit implementation and CPU instruction handling.
- CO5: Appraise the various information storage - retrieval concepts and I/O transfer methods.

### Part A

**10 x 1 = 10**

#### Choose the Correct Answer

1. What is the binary representation of the decimal number 25?  
a. 10101                      b. 11001                      c. 11100                      d. 10011                      CO1K1
2. How does a multiplexer select its output?  
a. Based on a control input                      b. Randomly  
c. By adding two inputs                      d. By dividing inputs                      CO1K1
3. What is the primary use of Register Transfer Language?  
a. For creating databases  
b. For describing data transfers between registers  
c. For high-level programming  
d. For designing network protocols                      CO2K1
4. What is the main function of a control bus?  
a. To transfer data between components  
b. To provide power to different components  
c. To send control signals like read/write commands  
d. To store data temporarily                      CO2K1
5. What is the primary purpose of a computer register?  
a. To store large amounts of data permanently  
b. To temporarily hold data or instructions during processing  
c. To connect peripheral devices  
d. To execute network operations                      CO3K1
6. Which part of the instruction cycle is responsible for interpreting the fetched instruction?  
a. Fetch phase                      b. Decode phase  
c. Execute phase                      d. Write-back phase                      CO3K1
7. In a general register organization, which register type is typically used to hold intermediate results of computations?  
a. Program Counter                      b. Accumulator  
c. Memory Address Register                      d. Instruction Register                      CO4K1
8. Which register is used to keep track of the next instruction to be executed in a basic CPU design?  
a. Accumulator                      b. Program Counter                      CO4K1  
c. Memory Address Register                      d. Instruction Register
9. The DMA controller has \_\_\_\_\_ registers.  
a. 4                      b. 2                      c. 3                      d. 1                      CO5K1
10. What is the benefit of using virtual memory?  
a. Faster memory access times  
b. Increased memory capacity  
c. Improved multitasking capabilities  
d. All the above.                      CO5K1

**Part B**

**5 x 6 = 30**

**Answer ALL questions**

**Each answer should not exceed 400 words or two pages**

- 11.a. Elaborate the working of a D flip-flop with the help of a truth table and a timing diagram. CO1K2  
(or)
- 11.b. Interpret the working principles of a D flip-flop with the help of a truth table and a timing diagram. CO1K2
- 12.a. Compare a "shift left" and a "shift right" micro-operation. CO2K3  
(or)
- 12.b. Discuss the role of shift micro-operations in digital computing and illustrate with an example. CO2K3
- 13.a. Illustrate the function of the accumulator (AC) register in a basic computer system. Describe its role during the execution of arithmetic and logic operations. CO3K2  
(or)
- 13.b. Identify the components involved in the execution of a memory reference instruction. Discuss their roles and interactions in the process. CO3K2
- 14.a. Sketch the bus organisation for CPU registers with common ALU. CO4K2  
(or)
- 14.b. Describe the key characteristics of RISC architecture and how they differ from CISC architecture. CO4K2
- 15.a. Illustrate the principles of Asynchronous Data Transfer with appropriate diagrams. CO5K3  
(or)
- 15.b. Identify the different forms of CPU-IOP communication. CO5K3

**Part C**

**5 x 12 = 60**

**Answer ALL questions**

**Each answer should not exceed 800 words or four pages**

- 16.a. Simplify the following expression using Karnaugh Map  $F = A'B'C'D' + A'B'C'D + ABCD + ABC'D + A'BCD + A'BC'D$ . CO1K3  
(or)
- 16.b. Illustrate the operations of basic, universal and derived logic gates with truth tables and appropriate gate diagrams. CO1K3
- 17.a. Construct an arithmetic logic unit (ALU) that performs addition, subtraction, AND, and OR operations. Describe the design, including the logic gates used and the flow of data. CO2K3  
(or)
- 17.b. Demonstrate how to apply micro-operations to execute a complex instruction in a hypothetical CPU. Describe the sequence of micro-operations involved. CO2K3
- 18.a. Draw a flowchart and show the micro operations for the execution of the memory reference instructions. CO3K2  
(or)
- 18.b. Describe the various computer instructions and instruction formats. CO3K2
- 19.a. Describe the stack organization and how it handles function calls and returns. Explain with diagram. CO4K3  
(or)
- 19.b. Demonstrate the various Instruction formats used in computer systems. CO4K3
- 20.a. Examine the different modes of Data transfer. CO5K3  
(or)
- 20.b. Show the organisation and different operations involved in Associative Memory. CO5K3

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