

**BONAM VENKATA CHALAMAYYA INSTITUTE OF TECHNOLOGY & SCIENCE
(AUTONOMOUS)**

III - B. Tech I-Semester Supplementary Examinations (BR23), Mar/Apr - 2026

COMPUTER ORGANIZATION AND ARCHITECTURE (CSE-AIDS)

Time: 3 hours

Max. Marks: 70

*Question Paper consists of Part-A and Part-B
Answer ALL the question in Part-A and Part-B*

PART-A (10X2 = 20M)

	Marks	CO	BL
1. a) State the advantages of complement representation.	(2M)	CO1	BL1
b) Apply 2's complement to find $(45 - 27)_{10}$.	(2M)	CO1	BL3
c) Describe the operation of a full adder.	(2M)	CO2	BL1
d) Explain the working principle of a 4:1 multiplexer.	(2M)	CO2	BL2
e) Define memory reference instructions with examples.	(2M)	CO3	BL1
f) Compare hardware multiplication vs software multiplication.	(2M)	CO3	BL4
g) List the components of a micro instruction.	(2M)	CO4	BL1
h) Illustrate stack-based addressing with a diagram.	(2M)	CO4	BL3
i) Analyze the advantages of cache memory over main memory.	(2M)	CO5	BL4
j) Define the modes of data transfer in I/O.	(2M)	CO5	BL1

PART-B (5X10 = 50M)

2	Simplify the Boolean function $F(A,B,C,D) = \sum m(0,2,5,7,8,10,13,15)$ using 4-variable K-Map and implement using NOR gates.	10(M)	CO1	BL3
	(OR)			
3a.	Explain the procedure for detecting and correcting errors using Hamming code. Calculate the Hamming code for data 1011.	5(M)	CO1	BL4
b.	Discuss 1's complement and 2's complement representation with examples.	5(M)	CO1	BL2
4a.	Design a half subtractor and full subtractor with truth table and logic diagram.	5(M)	CO2	BL6
b.	Construct a 2-to-4 decoder and explain how it can be used as a demultiplexer.	5(M)	CO2	BL3
	(OR)			
5.	Design a mod-6 synchronous counter with state diagram and excitation table.	10(M)	CO2	BL6
6a.	Describe the non-restoring division algorithm with a detailed example.	5(M)	CO3	BL1
b.	Explain the multiplication of two floating-point numbers with IEEE format.	5(M)	CO3	BL4
	(OR)			
7a.	Apply the hardware algorithm for signed magnitude multiplication of (+9) and (+5).	5(M)	CO3	BL3
b.	Describe the timing and control mechanisms in basic computer organization.	5(M)	CO3	BL1
8a.	Explain the concept of control memory and its role in microprogrammed control.	5(M)	CO4	BL4
b.	Design the format of a microinstruction with all control fields.	5(M)	CO4	BL6

(OR)

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| 9a. | Discuss the concept of program control with conditional branching and subroutine calls. | 5(M) | CO4 | BL2 |
| b. | Construct a CPU with general register organization and explain the bus structure. | 5(M) | CO4 | BL3 |
| 10. | Explain the input-output interface and modes of transfer (programmed I/O, interrupt-driven I/O, DMA). | 10(M) | CO5 | BL4 |

(OR)

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| 11a. | Describe the memory hierarchy and explain the principle of locality. | 5(M) | CO5 | BL1 |
| b. | Evaluate the performance improvement using cache memory with hit ratio calculation. | 5(M) | CO5 | BL5 |
