



SCHOOL OF COMPUTER SCIENCE AND ENGINEERING
CONTINUOUS ASSESSMENT TEST - I
FALL SEMESTER 2025-2026

Programme Name & Branch : B.Tech. (CBS)
Course Code and Course Name : CBS1004 Computer Architecture and Organization
Faculty Name(s) : R M Brisilla
Class Number(s) : VL2025260103255
Date of Examination : 18/08/2025
Exam Duration : 90 minutes
Maximum Marks: 50

General instruction(s):

- Answer All Questions
- M - Max mark; CO - Course Outcome; BL - Blooms Taxonomy Level (1 - Remember, 2 - Understand, 3 - Apply, 4 - Analyse, 5 - Evaluate, 6 - Create)
- Course Outcomes:
 1. Provide fundamentals on machine instructions and addressing modes
 2. Comprehend the various algorithms for computer arithmetic

Q. No	Question	M	CO	BL																										
1.	a) What is the addressing mode used in the IAS computer? Justify your answer.	3	1	4																										
	b) Consider the following instruction sequence where registers R1, R2 and R3 are general purpose and MEMORY[X] denotes the content at the memory location X. <table><tr><th>Instruction</th><th>Semantics</th><th>Instruction Size</th></tr><tr><td>MOV R1, (5000)</td><td>$R1 \leftarrow \text{MEMORY}[5000]$</td><td>4</td></tr><tr><td>MOV R2, (R3)</td><td>$R2 \leftarrow \text{MEMORY}[R3]$</td><td>4</td></tr><tr><td>ADD R2, R1</td><td>$R2 \leftarrow R1 + R2$</td><td>2</td></tr><tr><td>MOV (R3), R2</td><td>$\text{MEMORY}[R3] \leftarrow R2$</td><td>4</td></tr><tr><td>INC R3</td><td>$R3 \leftarrow R3 + 1$</td><td>2</td></tr><tr><td>DEC R1</td><td>$R1 \leftarrow R1 - 1$</td><td>2</td></tr><tr><td>BNZ 1004</td><td>Branch if not zero to the</td><td>2</td></tr><tr><td>HALT</td><td>Stop</td><td>1</td></tr></table> Assume that the content of the memory location 5000 is 05, and the content of the register R3 is 3000. The content of each of the memory locations from 3000 to 3010 is 50. The instruction sequence starts from the memory location 1000. All the numbers are in decimal format. Assume that the memory is byte addressable. i. Trace the program execution and create an iteration table showing the content of each register (R1, R2, and R3) after every iteration. ii. Determine the final content of memory locations 3000 to 3005 after the program completes execution.	Instruction	Semantics	Instruction Size	MOV R1, (5000)	$R1 \leftarrow \text{MEMORY}[5000]$	4	MOV R2, (R3)	$R2 \leftarrow \text{MEMORY}[R3]$	4	ADD R2, R1	$R2 \leftarrow R1 + R2$	2	MOV (R3), R2	$\text{MEMORY}[R3] \leftarrow R2$	4	INC R3	$R3 \leftarrow R3 + 1$	2	DEC R1	$R1 \leftarrow R1 - 1$	2	BNZ 1004	Branch if not zero to the	2	HALT	Stop	1	7	
Instruction	Semantics	Instruction Size																												
MOV R1, (5000)	$R1 \leftarrow \text{MEMORY}[5000]$	4																												
MOV R2, (R3)	$R2 \leftarrow \text{MEMORY}[R3]$	4																												
ADD R2, R1	$R2 \leftarrow R1 + R2$	2																												
MOV (R3), R2	$\text{MEMORY}[R3] \leftarrow R2$	4																												
INC R3	$R3 \leftarrow R3 + 1$	2																												
DEC R1	$R1 \leftarrow R1 - 1$	2																												
BNZ 1004	Branch if not zero to the	2																												
HALT	Stop	1																												
2.	a) Explain the function of the Arithmetic Logic Unit (ALU) and describe how it communicates with memory. Illustrate your explanation with a clear diagram.	5	1	3																										



SCHOOL OF COMPUTER SCIENCE AND ENGINEERING
CONTINUOUS ASSESSMENT TEST - I
FALL SEMESTER 2025-2026

	b) i) Does RISC architecture prioritize register-to-register operations or memory-to-register operations? Justify your answer with a suitable example, comparing RISC and CISC instructions. ii) Identify which of the following micro-operations are not carried out by the Arithmetic Logic Unit (ALU): Increment, Compare, Memory Read, and Arithmetic Shift. Provide justification for your choice.	5		
3.	a) What is microprogramming? Explain the working of a microprogrammed control unit with a block diagram. b) The instructions HALT, WAIT, RETURN, and JUMP are used in processor control flow. 1. Explain the specific function of each instruction. 2. Analyze how the misuse of any one of these instructions could affect program execution in an embedded system.	5	1	2
4.	a) What is Booth recoding? Why is it used in binary multiplication? Perform multiplication of -15×7 using Booth algorithm with explanation of the stepwise operation.	10	2	5
5.	a) Perform division using restoring division algorithm for $17/3$. b) Represent -15 and $+15$ in an 8-bit register using the following number representations, and then perform the addition operation in 2's complement i) Sign magnitude ii) 1's complement iii) 2's complement	6	2	5
		4		
