



VIT

Vellore Institute of Technology
CHENNAI

Reg. Number:

Continuous Assessment Test (CAT) – I - AUGUST 2024

Programme	:	B.Tech(CSE)	Semester	:	Fall Semester 2024-25
Course Code & Course Title	:	BCSE205L Computer Architecture and Organization	Class Number	:	CH2024250100533 CH2024250101444 CH202425Q102663 CH2024250100888
Faculty	:	Dr.A.R.Revathi Dr.R.M.Bhavadharani Dr.R.Madura Meenakshi Dr.A.Kaja Mohideen	Slot	:	A2+TA2
Duration	:	1 ½ hours	Max. Mark		50

General Instructions:

- Write only your registration number on the question paper in the box provided and do not write other information.

Answer all questions

Q. No	Sub Sec.	Description	Marks
1	a.	<p>Suppose you are an architect at Zion Computers and you are assigned the task of designing a processor that stores both data and instructions in the same memory and always accesses a pair of instructions at a time. You are provided with the following set of instructions</p> <p>LOAD LOCA, R1 SUB R1, R2 STORE R1, LOCB</p> <p>Where LOCA, LOCB are two different memory addresses and R1, R2 are registers. Assume the register R2 contains value 50.</p> <p>Identify the suitable architecture for the given scenario and explain its structure with a neat diagram. [5 marks]</p>	10
	b.	<p>For the above instructions, explain the sequence of operations performed by the CPU as it executes each instruction. What will be the final content of memory location LOCB after the program has executed? [5 marks]</p>	
2		<p>A processor supports the following instructions:</p> <p>MOV R0, [SI] – Load the value from the memory address pointed to by the Source Index (SI) into register R0.</p> <p>MOV [DI], R1 – Store the value from register R1 into the memory address pointed to by the Destination Index (DI).</p> <p>PUSH R2 – Push the value in register R2 onto the stack.</p>	

		<p>POP R3 – Pop the top value from the stack into register R3.</p> <p>MOV BP, SP – Copy the current stack pointer into the base pointer.</p> <p>What are the different categories of registers used for executing the above set of instructions? Explain each of their specific roles towards the execution of the above instructions.</p>	10
3		<p>a) Design an algorithm for division of unsigned numbers using restoring approach. [4 Marks]</p> <p>b) Show the working of your algorithm for $(19)_{10} \div (5)_{10}$ with all intermediate steps. [6 Marks]</p>	10
4		<p>Perform the following Floating-point operation on the numbers $(251.75)_{10}$ and $(142.525)_{10}$.</p> <p>a) Convert the above decimal numbers to normalized notation of binary format. [4 Marks]</p> <p>b) Perform subtraction for the given numbers and write the normalized result in IEEE single precision format. [6 Marks]</p>	10
5		<p>Identify the addressing mode used in each of the instructions below and explain how the effective address is calculated for each one.</p> <p>(i) MOV R1, #10</p> <p>(ii) ADD R4, R1, 10[R3]</p> <p>(iii) DIV R3, (R2)</p> <p>(iv) SUB R1, [PC+4]</p> <p>(v) MUL R1, (R2)+</p>	10