

**VIT**Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)
CHENNAIReg. Number: **Continuous Assessment Test(CAT) – I - FEB 2024**

Programme	: B.TECH	Semester	: WIN 23-24
Course Code & Course Title	: BCSE205L- Computer Architecture and Organization	Class Number	: CH2023240502012 CH2023240502018 CH2023240502008
Faculty	: Prof.NIVEDITA M Dr.A. K ILAVARASI Dr.S.PAVITHRA	Slot	: C1+TC1
Duration	: 90 Mins	Max. Mark	: 50

General Instructions: < Use this space to provide additional information such as graph sheet, data book etc.>

- Write only your registration number on the question paper in the box provided and do not write other information.
- Use statistical tables supplied from the exam cell as necessary
- Use graph sheets supplied from the exam cell as necessary
- Only non-programmable calculator without storage is permitted

Answer all questions

Q. No	Sub Sec.	Description	Marks
1	a	Identify the type of processor that uses separate memory to store instructions and data. Discuss the architecture with a diagram and how it reflects on the performance.(5 marks)	(10)
	b	The above processor is used to subtract two numbers 25 and 12, present in the main memory location 3000 and 4000 respectively. Trace the contents of Program Counter, Memory Address Register, Memory Data Register, Instruction Register, during each instruction fetch and execution cycle.(5 marks)	
2	a	Develop a set of assembly instructions to efficiently calculate the result of the mathematical expression: $Z = Y * X$, considering a processor architecture characterized by a simplified instruction set. (4 marks)	(10)
	b	Considering the address lines in 2 bits and data lines in 16 bits. Draw and Explain the register file with three access ports for the instruction $R4 \leftarrow R3 - R2$. (6 Marks)	
3		Design a hardware implementation with appropriate algorithm to perform unsigned multiplication. Provide a step-by-step breakdown of the algorithm's execution for the following $(39)_{10} * (9)_{10}$. Validate your final results.	(10)
4	a	Illustrate the design of a processor with Non- Restoring Division. Outline the steps involved in performing division using the algorithm. Assume the dividend is $(-47)_{10}$, and the divisor is $(7)_{10}$.(6 Marks)	(10)
	b	Perform addition operation to calculation the gravitational force	

		between these two bodies. Suppose you have two celestial bodies with masses $M1 = 5.624 \text{ kg}$ and $M2 = 3.223 \text{ kg}$. Represent the result using IEEE 754 single-precision format.(4 Marks)	
5		<p>Identify the addressing modes for the following instructions. Find the effective address and the operands for the below instructions with the register contents $R1=200$, $R3=400$, $R4=500$ and Memory location 400 has the value 550 and 550 has the value 600 and 1000 has a value of 700.</p> <ul style="list-style-type: none"> i. Mov R1,1000 ii. Mov R2,#300 iii. Add R1,(400) iv. Mov R2,[R3] v. Mov R3,50[R4] 	(10)
*****All the best *****			