Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

SCHOOL OF COMPUTER SCIENCE ENGINEERING AND INFORMATION SYSTEMS
CONTINUOUS ASSESSMENT TEST - II
FALL SEMESTER 2025-2026

SLOT: C1+TC1+TCC1

Programme Name & Branch	**: BCA(CS)**
Course Code and Course Name	**: UBCA102L &Computer Organization and Architecture**
Faculty Name(s)	**: Dr. ALAGIRI I & Dr. Rajesh p**
Class Number(s)	**: VL2025260105754 & VL2025260105745**
Date of Examination	**: 07/10/2025**
Exam Duration	**: 90 minutes**

Maximum Marks: 50

General instruction(s):

Answer All Questions

CO2: Apply the instruction set for problems with the design of central processing unit.

CO3: choose the various operations for computer arithmetic metrics.

Q. No	Question	M	CO	BL
1	A computer system uses a memory unit with **256 words of 32 bits each.** A binary instruction code is stored in one word of memory. The instruction format has four fields: 1. An **indirect bit** 2. An **operation code** (opcode) 3. A **register code** field to specify one of **64 registers** 4. An **address part** to specify a memory word Answer the following: **a)** How many bits are there in the **operation code**, the **register code**, and the **address part**? **b)** Draw the **instruction word format** and indicate the number of bits in each field. **c)** How many bits are there in the **data input/output lines** and the **address input lines** of the memory? **d)** Give a sample **binary instruction word** (32 bits) and interpret its fields (indirect bit, opcode, register, address).	10	2	3
2	Convert the given **infix expression** into its **equivalent postfix expression.** Apply the proper operator precedence and associativity rules while performing the conversion. The expression is: $$X = \frac{(A^B + C) \times (D - E^F)}{H \times K^F}$$	10	3	3

REG.NO.:

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3	Consider the following arithmetic expression: $$X = \frac{(A^B + C) \times (D - E^F)}{H \times K^F}$$ a) Represent the above expression in **0-address instruction format** b) Represent the same expression in **3-address instruction format**.	10	3	3
4	Draw the flowchart that performs both **signed** and **unsigned** binary addition, showing decisions for sign check, two's-complement conversion when needed, binary addition, and overflow/carry detection. Using that flowchart, perform step-by-step binary calculations for **9 – 10** and **10 – 9** (use 8-bit representation) and show how the algorithm proceeds at each step. For each case, display the intermediate binary forms (including the two's-complement of the subtrahend), the binary addition steps, and the resulting bit pattern. State and explain the final result for **both signed and unsigned** interpretations and indicate where overflow or carry occurs (if any).	10	3	4
5	Explain multiplication algorithm used for signed binary multiplication. Illustrate the algorithm by performing step-by-step multiplication of –5 and –6. Clearly show the binary representation of the numbers, the successive steps of the algorithm, and the result obtained.	10	3	4

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