Seat No./Enrollment No.: _____

GUJARAT TECHNOLOGICAL UNIVERSITY
BACHELOR OF ENGINEERING – SEMESTER 4 – EXAMINATION – SUMMER 2026

Subject Code: BE04000251 **Date: 30/05/2026**

Subject Name: Computer Organization & Architecture

Time: 10:30 AM TO 01:00 PM **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

Q.1	**(a)**	Explain the Von Neumann architecture with diagram.	**03**
	(b)	Define the limitations of fixed-point representation. Explain the alternative technique used to solve it with suitable example.	**04**
	(c)	Define the register transfer language. Explain the following RTL operations: 1. M[AR] ← DR 2. D_3T_4: AR ← IR(0-11), SC ← 0 3. P: R2 ← ashr R2 4. D_6T_4: DR ← M[AR], PC ← PC + 1 5. AC ← shl AC, AC(0) ← E, E ← AC(15)	**07**
Q.2	**(a)**	Explain the following terms: Three-State Bus Buffers, memory reference instruction ISZ, register reference instruction SPA.	**03**
	(b)	Explain input-output instructions for basic computer.	**04**
	(c)	Draw and explain flowchart of interrupt cycle.	**07**
		OR	
Q.2	**(c)**	Draw and explain hardwire control unit for basic computer.	**07**
Q.3	**(a)**	Write an assembly language program to perform a logical OR operation using basic computer instructions.	**03**
	(b)	Explain three address and zero address instruction format.	**04**
	(c)	Define the address symbol table. Explain the second pass of assembler with the help of a flowchart.	**07**
		OR	
Q.3	**(a)**	Explain the following terms: MRI instruction table, non-MRI instruction table and Pseudo Instruction table.	**03**
	(b)	Explain register stack and memory stack organizations.	**04**
	(c)	Write an assembly language program to perform multiplication of two 8-bit unsigned positive numbers.	**07**
Q.4	**(a)**	Draw and explain microinstruction format for microprogrammed control organization.	**03**
	(b)	Explain 5-stage instruction pipeline with example.	**04**
	(c)	Write a brief note on microprogram sequencer with diagram.	**07**
		OR	

Q.4	**(a)**	Describe the major hazards in pipelined execution.	**03**
	(b)	List out the Flynn's classification. Explain any one in detail.	**04**
	(c)	Write a brief note on overlapped register windows.	**07**
Q.5	**(a)**	Draw and explain the flowchart of CPU-IOP communication.	**03**
	(b)	Discuss various dynamic arbitration algorithms for interprocessor arbitration.	**04**
	(c)	Discuss cache coherence problem and its solutions.	**07**

OR

Q.5	**(a)**	Differentiate between Isolated I/O vs Memory-mapped I/O.	**03**
	(b)	Explain the flowchart of Booth's multiplication algorithm of signed-2's complement numbers.	**04**
	(c)	Explain any two types of mapping procedures for cache memory organization.	**07**

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