

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE- SEMESTER– IV EXAMINATION – SUMMER 2026****Subject Code:3140707****Date:25-05-2026****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.

|            |                                                                                                                                                 | Marks     |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>Q.1</b> | (a) List the basic computer data-types.                                                                                                         | <b>03</b> |
|            | (b) List the arithmetic micro-operations supported by a basic computer.                                                                         | <b>04</b> |
|            | (c) Explain $r$ 's complement and $r-1$ 's complement with examples for two different values of $r$ .                                           | <b>07</b> |
| <b>Q.2</b> | (a) List the names of registers within a basic computer.                                                                                        | <b>03</b> |
|            | (b) List the logical operations supported by a basic computer.                                                                                  | <b>04</b> |
|            | (c) Discuss the associative memory.                                                                                                             | <b>07</b> |
|            | <b>OR</b>                                                                                                                                       |           |
|            | (c) Explain the sequence of micro-operations required to load the value from an address in the memory.                                          | <b>07</b> |
| <b>Q.3</b> | (a) Explain the micro-instruction format with diagram.                                                                                          | <b>03</b> |
|            | (b) Write a program to load an integer from address 3000h and multiply it by 32 using shift operations. Store the result at address 3002h.      | <b>04</b> |
|            | (c) Discuss addressing modes of instructions.                                                                                                   | <b>07</b> |
|            | <b>OR</b>                                                                                                                                       |           |
| <b>Q.3</b> | (a) Analyze the role of control unit in instruction execution.                                                                                  | <b>03</b> |
|            | (b) Show the use of JNZ instruction in an example of assembly program.                                                                          | <b>04</b> |
|            | (c) Categorize and explain instruction based on number of bytes.                                                                                | <b>07</b> |
| <b>Q.4</b> | (a) In case the speed of processor is 1Mhz. How long will a sequence of following instructions take at least? Give your answer in milliseconds. | <b>03</b> |
|            | LDA 2100H<br>MOV B,A<br>LDA 2101H<br>ADD A,B<br>STA 3000H<br>HLT                                                                                |           |
|            | (b) Write assembly program to add two BCD numbers stored in memory. Store the result at address 3000h.                                          | <b>04</b> |
|            | (c) Explain the usefulness of priority interrupt with appropriate example.                                                                      | <b>07</b> |

**OR**

- Q.4** (a) An instruction in assembly program is written as MOV CX, 302001h. What is the size of address lines in this computer? **03**
- (b) Draw the circuit diagram for half – adder. **04**
- (c) Explain the sequence of asynchronous data transfer. **07**
- Q.5** (a) What is arithmetic pipelining? **03**
- (b) Draw and mark the details in the IEEE-754 floating point format. **04**
- (c) Discuss various characteristics of multiprocessor system. **07**

**OR**

- Q.5** (a) What are different architectures as suggested by Flynn’s taxonomy? **03**
- (b) Draw only the flowchart for Booths’ multiplication algorithm. **04**
- (c) Discuss in brief the concept of inter-processor communication and synchronization. **07**

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