

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-VII (NEW) EXAMINATION – WINTER 2023****Subject Code:3172001****Date:14-12-2023****Subject Name: Microcontrollers and Embedded Systems****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> | <b>(a)</b> Give the difference between C programming and Embedded C programming.                               | <b>03</b> |
|            | <b>(b)</b> Compare Von-Neuman vs Harvard architecture.                                                         | <b>04</b> |
|            | <b>(c)</b> Explain the block diagram of the PIC18F4xx microcontroller.                                         | <b>07</b> |
| <b>Q.2</b> | <b>(a)</b> Explain interrupts in microcontroller 8051.                                                         | <b>03</b> |
|            | <b>(b)</b> Compare RISC vs CISC architecture.                                                                  | <b>04</b> |
|            | <b>(c)</b> Define embedded systems and give examples. Draw the block diagram of a generalized embedded system. | <b>07</b> |
|            | <b>OR</b>                                                                                                      |           |
|            | <b>(c)</b> Using a suitable diagram, explain the architecture of the microcontroller 8051.                     | <b>07</b> |
| <b>Q.3</b> | <b>(a)</b> Draw & explain 8051 connections to RS-232 port using MAX232 IC.                                     | <b>03</b> |
|            | <b>(b)</b> Give the bit pattern of TMOD register in the 8051 and explain significance of each bit.             | <b>04</b> |
|            | <b>(c)</b> Draw & explain the memory organization in PIC18F4xx.                                                | <b>07</b> |
|            | <b>OR</b>                                                                                                      |           |
| <b>Q.3</b> | <b>(a)</b> State the bit manipulation instructions.                                                            | <b>03</b> |
|            | <b>(b)</b> Explain H-bridge concept for DC motor control                                                       | <b>04</b> |
|            | <b>(c)</b> Explain the data framing protocol for asynchronous serial communication in 8051.                    | <b>07</b> |
| <b>Q.4</b> | <b>(a)</b> State the machine control instructions.                                                             | <b>03</b> |
|            | <b>(b)</b> State & explain instructions related to subroutines.                                                | <b>04</b> |
|            | <b>(c)</b> Interface 7-segment display with PIC18F4xx.                                                         | <b>07</b> |
|            | <b>OR</b>                                                                                                      |           |
| <b>Q.4</b> | <b>(a)</b> Which are the different serial communication protocols used in Embedded Systems?                    | <b>03</b> |
|            | <b>(b)</b> Define checksum byte. How is checksum operation performed?                                          | <b>04</b> |
|            | <b>(c)</b> Explain different types of addressing modes of PIC18F4xx.                                           | <b>07</b> |
| <b>Q.5</b> | <b>(a)</b> Explain a single processor embedded system for engineering and automation applications.             | <b>03</b> |
|            | <b>(b)</b> Explain arithmetic operation in PIC18F Family.                                                      | <b>04</b> |
|            | <b>(c)</b> Explain the interfacing of the stepper motor with the 8051 microcontroller.                         | <b>07</b> |
|            | <b>OR</b>                                                                                                      |           |
| <b>Q.5</b> | <b>(a)</b> Explain concept of current sourcing and sinking.                                                    | <b>03</b> |
|            | <b>(b)</b> Explain the significance of stack and stack pointer register.                                       | <b>04</b> |
|            | <b>(c)</b> Explain controlling of DC motor using Pulse width modulation using 8051 microcontroller.            | <b>07</b> |

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