Seat No.: _____ Enrolment No._____

# GUJARAT TECHNOLOGICAL UNIVERSITY

**BE - SEMESTER–VI (NEW) EXAMINATION – WINTER 2023**

**Subject Code:3161009 Date:13-12-2023**

**Subject Name:Embedded Systems**

**Time:02:30 PM TO 05:00 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** |
|---|---|---|---|
| **Q.1** | **(a)** | Define Embedded system. Describe its type with two example of each. | **03** |
| | **(b)** | Define RTOS. Describe its type with example. | **04** |
| | **(c)** | Compare UART, I2C, SPI protocol. Give advantage of each protocol over other protocol. | **07** |
| **Q.2** | **(a)** | Describe Synchronous, Iso-synchronous, and Asynchronous communication. | **03** |
| | **(b)** | Describe use of RTC and WDT in Embedded system. | **04** |
| | **(c)** | Describe CAN bus protocol. | **07** |
| | | **OR** | |
| | **(c)** | Describe and compare Wi-fi and Bluetooth protocol. | **07** |
| **Q.3** | **(a)** | Define interrupt, interrupt latency, Task Deadline. | **03** |
| | **(b)** | Describe device driver used in embedded system. | **04** |
| | **(c)** | Describe dead-lock condition with example in embedded system. How to come out of dead-lock condition? | **07** |
| | | **OR** | |
| **Q.3** | **(a)** | Describe polled based IO and interrupt based IO. | **03** |
| | **(b)** | Sketch diagram to interface DMA with microprocessor or microcontroller. | **04** |
| | **(c)** | Describe shared data problem with example. | **07** |
| **Q.4** | **(a)** | Enlist co-operative scheduling mechanism | **03** |
| | **(b)** | Compare Process, Thread and Function. | **04** |
| | **(c)** | Describe Earlier Deadline First (EDF) and rate-monotonic scheduling mechanism. | **07** |
| | | **OR** | |
| **Q.4** | **(a)** | Enlist pre-emptive scheduling mechanism. | **03** |
| | **(b)** | Describe PV Semaphore with example. | **04** |
| | **(c)** | Describe Round-robin with interrupt scheduling with example. | **07** |
| **Q.5** | **(a)** | Describe MSP430 USCI module and its modes. | **03** |
| | **(b)** | Describe low-power modes of MSP430. | **04** |
| | **(c)** | Write a C-program to generate square wave of 100Hz using timer-A. Assume SMCLK = 1MHz | **07** |
| | | **OR** | |
| **Q.5** | **(a)** | Describe multiplexing scheme of MSP430 pins. | **03** |
| | **(b)** | Describe reset condition of MSP430: BOR, POR and PUC | **04** |
| | **(c)** | Sketch interfacing diagram to interface 8 LEDs with MSP430. Turn-ON LEDs in ring counter fashion. | **07** |

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