

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VII (OLD) EXAMINATION – WINTER 2023****Subject Code:2171005****Date:14-12-2023****Subject Name: 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.

- Q.1** (a) Define Embedded system. Describe skills and hardware/software needed to design sophisticated embedded system. **03**
- (b) Describe use of SOC and FPGA for designing Embedded System. **04**
- (c) Describe I2C protocol. Give merits and demerits of I2C over SPI communication. **07**
- Q.2** (a) Enlist example of asynchronous and synchronous communication protocol used in embedded system. **03**
- (b) What is watch-dog timer ? Explain with example. **04**
- (c) Describe Bluetooth piconet and scatternet connections. Differentiate Bluetooth and WiFi protocol. **07**
- OR**
- (C) Describe AMBA AHB and APB protocol. **07**
- Q.3** (a) Define : (1) Interrupt (2) Interrupt Latency (3) Interrupt Deadline **03**
- (b) Describe PV Semaphore. **04**
- (c) Define Device Driver. Describe function of device driver. **07**
- OR**
- Q.3** (a) Describe polled IO and interrupt based IO. **03**
- (b) Differentiate: Binary semaphore and Mutex **04**
- (c) Sketch and describe direct memory access (DMA) for data transfer between memory and IO device. **07**
- Q.4** (a) Differentiate hard-real time and soft-real time system. **03**
- (b) What is Process Control Block? What are the fields included in PCB ? **04**
- (c) Discuss shared data problem with example. How to solve shared data problem? **07**
- OR**
- Q.4** (a) Differentiate co-operative and pre-emptive scheduling method used in RTOS. **03**
- (b) Explain various interrupt service (handling) mechanisms used in the embedded systems in brief. **04**
- (c) Discuss problem of priority inversion. How to solve it? **07**
- Q.5** (a) Describe features of multiplexed IO lines in MSP430. **03**
- (b) Describe clock-sources in MSP430. **04**
- (c) Describe Timer-modes for MSP430. Write a C-program to generate square wave of 1Hz using timer-A (up-down mode). **07**
- OR**
- Q.5** (a) Describe special features of MSP430. Why it is called mixed signal processor? **03**
- (b) Describe Status register fields of MSP430 that is used for setting up different low -power modes. **04**
- (c) Sketch interfacing diagram to interface following device with MSP430. **07**

(1) common-cathode 7-segment LED at Port-1 and

(2) switch interfacing at P2.0.

Write a C-program to count and display on 7-segment display number of times switch pressed .
