Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII(NEW) EXAMINATION – SUMMER 2019

Subject Code:2171005 Date:14/05/2019

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.**

Q.1	**(a)**	Enlist the criteria for choosing CPU for any embedded application.	**03**
	(b)	What is RTOS ? Describe types of RTOS with two examples.	**04**
	(c)	Describe I2C and CAN bus protocol.	**07**
Q.2	**(a)**	Describe advantage and disadvantage of serial and parallel communication protocol.	**03**
	(b)	Describe Watchdog timer and RTC needed for embedded application.	**04**
	(c)	Describe Wi-Fi and Zigbee protocols. Discuss the application areas for both the protocols.	**07**
		OR	
	(c)	Explain classification of embedded system with examples.	**07**
Q.3	**(a)**	Describe concept of interrupt service thread.	**03**
	(b)	Describe interrupt latency and deadline with example.	**04**
	(c)	Describe dead-lock condition. Write pseudo code for deadlock utilizing mutex M1 and M2 shared between two processes P1 and P2.	**07**
		OR	
Q.3	**(a)**	Describe why atomic operation is needed in some of coding part of	**03**
	(b)	Describe priority inversion with example. How to deal with such condition.	**04**
	(c)	Describe counting and binary semaphore as a resource key.	**07**
Q.4	**(a)**	Differentiate : Function and ISR	**03**
	(b)	Describe co-operative and pre-emptive scheduling.	**04**
	(c)	Why Inter Process Communication is needed in multi-process system ? Describe mailbox, lock and spin-lock methods for IPC.	**07**
		OR	
Q.4	**(a)**	What is Process Control Block? What are the fields included in PCB ?	**03**
	(b)	Describe task/services to be performed by OS.	**04**
	(c)	Describe memory and file management in RTOS.	**07**
Q.5	**(a)**	Describe low power modes of MSP430.	**03**
	(b)	Describe MSP430 GPIO registers associated with I/O port.	**04**
	(c)	Describe MSP430 USCI module with different registers and operation.	**07**
		OR	
Q.5	**(a)**	Describe POR, PUC and BOR for MSP430.	**03**
	(b)	Describe clocking system of MSP430.	**04**
	(c)	Sketch interfacing diagram to interface common anode seven-segment display with Port 1 and 8 push button switches with Port 2 with MSP430. When SW1(P2.0) pressed and it should display “1”. Write C language program to display pressed switch number on seven segment display.	**07**

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