GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER–VI EXAMINATION – SUMMER 2025

Subject Code: 3161009   **Date: 30-05-2025**
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)**	Write down skills Required for an Embedded System Designer.	**03**
	(b)	What is and Embedded system? What are its characteristics?	**04**
	(c)	Explain the working of the Secure Digital Input Output (SDIO) protocol.	**07**
Q.2	**(a)**	What is watch dog Timer? Explain its function in brief.	**03**
	(b)	How does Brown Out Reset work in microcontroller?	**04**
	(c)	Explain the working of Spy-Bi-Wire serial communication protocol.	**07**
		OR	
	(c)	List down wireless communication protocol and explain any one in detail.	**07**
Q.3	**(a)**	Describe Earliest Deadline First Mechanism with example.	**03**
	(b)	Explain concept of interrupt service routine.	**04**
	(c)	What is context switching? Explain context switching on interrupts.	**07**
		OR	
Q.3	**(a)**	Describe MSP430 USCI module and its modes.	**03**
	(b)	What do you mean by Mutex? Also explain P and V semaphore with appropriate example.	**04**
	(c)	Describe the main problem with semaphores and its limitation.	**07**
Q.4	**(a)**	Describe the four sources of clock in MSP430 processor.	**03**
	(b)	MSP430 is having an orthogonal CPU architecture supported with RISC features. – Justify the statement.	**04**
	(c)	What is inter process communication (IPC)? List down and explain methods of IPC in brief.	**07**
		OR	
Q.4	**(a)**	Explain the special features associated with GPIO port pins in MSP430 other than simple digital input output port pin characteristics.	**03**
	(b)	Sketch diagram to interface DMA with microprocessor or microcontroller	**04**
	(c)	Give difference between Multiprocessing and Multithreading.	**07**
Q.5	**(a)**	List down features of an operating system.	**03**
	(b)	What is meant by benchmarking Real time operating system (RTOS)? Why it is required?	**04**
	(c)	Draw interfacing diagram to interface 8 LEDs with MSP430. Turn-ON LEDs in ring counter fashion.	**07**
		OR	
Q.5	**(a)**	Describe Round Robin with Interrupts.	**03**
	(b)	Explain Rate-monotonic scheduling.	**04**
	(c)	Differentiate between Clock-driven and Event-driven Scheduling.	**07**

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER–VI (NEW) EXAMINATION – SUMMER 2024

Subject Code:3161009   **Date:24-05-2024**
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)**	Give classification of Embedded systems.	**03**
	(b)	What is mean by embedded systems? What are the components of it? Give examples of embedded system.	**04**
	(c)	Explain USB Protocol in detail.	**07**
Q.2	**(a)**	List the down features of Bluetooth protocol.	**03**
	(b)	What is inter process communication? How it is done?	**04**
	(c)	Compare: IrDA, Wi-Fi and ZigBee.	**07**
		OR	
	(c)	Explain following: 1. Context and the Periods for Context Switching, 2. Interrupt Latency and Deadline	**07**
Q.3	**(a)**	List down the steps executed before handling an Interrupt in an embedded system.	**03**
	(b)	Describe the information required for writing a device driver.	**04**
	(c)	What is Semaphore? Write down advantages and disadvantages of semaphore.	**07**
		OR	
Q.3	**(a)**	List down the services provided by RTOS.	**03**
	(b)	Explain Earliest-Deadline First Scheduling.	**04**
	(c)	Write down various types of states of tasks? Explain them.	**07**
Q.4	**(a)**	Write down the features of an operating system.	**03**
	(b)	Give comparison between process and thread.	**04**
	(c)	What is multitasking? Differentiate between Preemptive and Cooperative Multitasking.	**07**
		OR	
Q.4	**(a)**	Discuss watch dog timer of MSP430.	**03**
	(b)	Write down advantages and disadvantages of RTOS.	**04**
	(c)	Describe Round-robin with interrupt mechanism for embedded software.	**07**
Q.5	**(a)**	Describe low power mode of MSP430.	**03**
	(b)	Describe the various sources of clock in MSP430 processor.	**04**
	(c)	List down various registers of MSP430 processor with their functions.	**07**
		OR	
Q.5	**(a)**	Explain: 1.RPC function 2.Socket function.	**03**
	(b)	Differentiate Clock driven and Event driven scheduling.	**04**
	(c)	Explain how the timers of MSP430 can be configured for PWM generation.	**07**

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GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER–VI (NEW) EXAMINATION – SUMMER 2023
Subject Code:3161009   **Date:14-07-2023**
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.**

			MARKS
Q.1	**(a)**	Write down the skills required for an Embedded System Designer.	03
	(b)	Describe an embedded processor as (i) GPP (ii) ASIP (iii) Single purpose processor.	04
	(c)	Differentiate between serial and parallel communication. Explain USART protocol in brief.	07
Q.2	**(a)**	Describe the features associated with Bluetooth and Zigbee protocols used in wireless and mobile systems.	03
	(b)	List the features associated with AHB and ASB Buses.	04
	(c)	Explain I2C and CAN bus protocol in brief.	07
		OR	
	(c)	What is Device driver? Explain role of Interrupt in Device driver programming.	07
Q.3	**(a)**	Explain different types of interrupt sources.	03
	(b)	What is Semaphore? Explain where Semaphore can be utilized?	04
	(c)	Give advantages, disadvantages and uses of mailbox, pipe and socket functions in interprocess communication.	07
		OR	
Q.3	**(a)**	Explain the differences between Preemptive & Non-Preemptive scheduling policies.	03
	(b)	Define Interrupt Latency and Interrupt Service Deadline. Describe the parameters that govern their values	04
	(c)	Explain device, file and I/O management in RTOS.	07
Q.4	**(a)**	What is RTOS ? Describe types of RTOS with two examples.	03
	(b)	Define and explain different Benchmarking parameters for an RTOS.	04
	(c)	Explain process context switching and thread context switching in detail. Justify "threads are lightweight processes".	07
		OR	
Q.4	**(a)**	Define: Process Control Block. Which data is stored in PCB?	03
	(b)	Describe the differences between Hard Real Time and Soft Real Time System with an example of each one.	04
	(c)	Compare process, task and thread with an appropriate example. Explain multithreading mechanism in context of the display process of desktop systems.	07
Q.5	**(a)**	Explain the function of Watchdog timer in MSP430 processor.	03
	(b)	Describe the four sources of clock in MSP430 processor	04
	(c)	Explain interrupt handling process in MSP430.	07
		OR	
Q.5	**(a)**	Describe POR, PUC and BOR for MSP430.	03
	(b)	MSP430 is having an orthogonal CPU architecture supported with RISC features. – Justify the statement.	04
	(c)	Explain the use of timer for generating Pulse Width Modulated waveform using MSP430.	07

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER–VI (NEW) EXAMINATION – SUMMER 2022

Subject Code:3161009   **Date:10/06/2022**

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.**

			MARKS
Q.1	**(a)**	Define and classify the embedded systems, give few examples of such systems.	**03**
	(b)	Describe skills required for embedded design engineer.	**04**
	(c)	Describe Direct Memory Access.	**07**
Q.2	**(a)**	Define RTOS. Enlist types of RTOS with examples.	**03**
	(b)	Describe Watch Dog Timer and Brown Out Reset with example.	**04**
	(c)	Compare Wi-Fi, Blue-tooth and Zigbee algorithm	**07**
		OR	
	(c)	Compare the advantages and disadvantages of data transfers using serial and parallel ports devices. Describe SPI protocol.	**07**
Q.3	**(a)**	Describe busy wait approach for accessing IO.	**03**
	(b)	Differentiate : Process and Thread	**04**
	(c)	Describe shared data problem with example. How to solve this issue?	**07**
		OR	
Q.3	**(a)**	Describe interrupt mechanism for accessing IO.	**03**
	(b)	Describe Mailbox function for IPC.	**04**
	(c)	Describe Priority inversion and Deadlock condition. How to solve these issues?	**07**
Q.4	**(a)**	Describe Earliest Deadline First Mechanism with example.	**03**
	(b)	Differentiate : Binary Semaphore and Mutex	**04**
	(c)	Describe Round-robin with interrupt mechanism for embedded software.	**07**
		OR	
Q.4	**(a)**	Define : Process Control Block. Which data is stored in PCB?	**03**
	(b)	Describe Critical Section. How to achieve this functionality in programming.	**04**
	(c)	Describe co-operative and pre-emptive scheduling mechanism.	**07**
Q.5	**(a)**	Sketch and Describe block diagram of MSP430	**03**
	(b)	Describe low-power modes of MSP430.	**04**
	(c)	Common cathode seven-segment and push-button is connected with MSP430. Sketch interfacing diagram and write C-code to count number of times switch is pressed (Use interrupt subroutine when switch is connected)	**07**

OR

Q.5 **(a)** Describe multiplexing scheme in MSP430 processor for the port pins. **03**

(b) Describe clocking system of MSP430. **04**

(c) Describe MSP430 timer modes available for Timer-A. Write C-Program for MSP430 to generate 1KHz square wave on pin P1.0 using Timer-A. **07**

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