


Name:			
Enrolment No:			
UPES End Semester Examination, December 2023			
Course: Embedded Systems Program: B. Tech. (Mechatronics Engineering) Course Code: ECEG3039		Semester: V Time : 03 hrs. Max. Marks: 100	
Instructions: Attempt all the questions			
SECTION A (5Qx4M=20Marks)			
S. No.		Marks	CO
Q 1	What is the importance of embedded systems in mechatronics engineering? Discuss the categories of embedded system with suitable examples and list the design metrics considered while designing an embedded system.	4	CO1
Q 2	A door sensor is connected to bit 1 of PORT C and an LED is connected to bit 5 of PORT A. Write an embedded C program to monitor the door sensor and when it opens turn on the LED.	4	CO2
Q 3	Interface the PORT B of Atmega32 microcontroller with 8 LEDs and write the assembly language/ Embedded 'C' program to blink the LED in the converging manner.	4	CO2
Q 4	Elucidate the function of following instructions of ARM microcontroller: (a) LSL (b) STR (c) BCC (d) CMN	4	CO3
Q 5	What do you understand by RTOS? Differentiate hard RTOS and soft RTOS with suitable examples.	4	CO4
SECTION B (4Qx10M= 40 Marks)			
Q 6	Differentiate the following: (a) RISC and CISC (b) Timer0 and Timer1 (c) Half-duplex and Full-duplex transmission (d) Interrupt and Polling	10	CO1
Q 7	(a) A switch is connected to pin PB0 and an LED to pin PB7. Write an Atmega32 assembly language program to get the status of switch and send it to the LED.	10	CO2

	(b) Write an Atmega32 assembly language program to find the number of 1s in a given byte.		
Q 8	Design the architecture of ARM7 microcontroller and explain the function of each block.	10	CO3
Q 9	(a) What do you understand by kernel? Differentiate preemptive and non-preemptive kernel. (b) What are semaphores? Explain different types of semaphores.	10	CO4
SECTION-C (2Qx20M=40 Marks)			
Q 10	(a) A LCD is interfaced with Atmega32 microcontroller. Write an assembly language/ embedded C program to display “ RTOS ” on the LCD. (b) Explain successive approximation Analog to Digital converter with suitable diagram. Write an Atmega32 assembly language/ embedded C program to get the data from PORT A and display the result on PORT C and PORT D forever.	20	CO2
Q 11	(a) An ATmega32/ARM microcontroller is interfaced with USART. Write an assembly language/ embedded C program to transfer the letter “G” serially at 9600 baud, continuously. Assume XTAL = 8 MHz. (b) Write an ARM assembly language/ embedded C program to scan series of numbers and find the smallest number.	20	CO3