


Name:			
Enrolment No:			
UPES End Semester Examination, December 2023			
Course: Embedded Systems Program: M. Tech. (Robotics Engineering) Course Code: ECEG7003		Semester: I Time : 03 hrs. Max. Marks: 100	
Instructions: Attempt all the questions			
SECTION A (5Qx4M=20Marks)			
S. No.		Marks	CO
Q 1	What is the present role of embedded system in the field of robotics engineering? Discuss the components of embedded system and list the challenges and applications of embedded system.	4	CO1
Q 2	Write an Atmega32 assembly language program to divide two eight-bit numbers 23H by 3H and store the quotient in 0X120 and remainder in 0X121.	4	CO2
Q 3	Write an Atmega32 C program to monitor bit 5 of Port C. If it is HIGH, send 55H to Port B, otherwise send AAH to Port D.	4	CO2
Q 4	In the context of daily-life IoT examples, define “things”, “objects”, and “machines.	4	CO3
Q 5	What do you understand by RTOS? Explain different types and examples of RTOS.	4	CO5
SECTION B (4Qx10M= 40 Marks)			
Q 6	What are the advantages of interrupt over polling? How the interrupt can be enabled or disabled in the Atmega32 and on what basis the priority is given if multiple interrupt occurs at the same time. Write an Atmega32 assembly language program to toggle PORTC.2 whenever the INT0 pin goes low. Assume that the INT0 pin is connected to a switch that is normally high.	10	CO1
Q 7	The data pins of an LCD are connected to PORT B. The information is latched into the LCD whenever its Enable pin goes from HIGH to LOW. The enable pin is connected to pin 5 of PORT C (6 th Pin). Write an embedded C program to send “ATMEGA” to this LCD.	10	CO2

Q 8	What is Cyber-physical system (CPS)? Elucidate the properties of CPS with respect to IoT.	10	CO4
Q 9	Differentiate the following: (a) Preemptive and Non-Preemptive Kernel (b) First In First Out and Round Robin Scheduling algorithm OR Differentiate the following: (a) Hard RTOS and Soft RTOS (b) Binary and Counting Semaphores	10	CO5
SECTION-C (2Qx20M=40 Marks)			
Q 10	(a) Design a real-time pressure monitoring system by interfacing pressure sensor with an Atmega32 microcontroller. Draw the complete flowchart along with assembly language/ embedded C code to read the sensor and display it on PORT D. (b) An ATmega32 microcontroller is interfaced with USART. Write an assembly language/ embedded C program to receive bytes of data serially and put them on PORT C. Set the baud rate at 9600, 8-bit data and 1 stop bit.	20	CO2
Q 11	Design IoT based smart home, enlist the sensors and actuators required along with their technical description. Draw a detailed architecture/block diagram of the complete system.	20	CO3