Total number of printed pages: **Programme (D)/5th /DECE 501**

2022

Embedded Systems

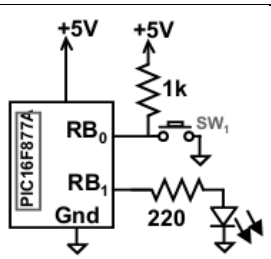
Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

1.	a)	Write a embedded C code for interfacing the PIC 16F877A with a 16×2 LCD [data bits to Port B, control at Port D] to display "Embedded" in the first row and "Systems" in the second row. Draw the diagram of interfacing.	7+3=10
	b)	What do you mean by RTOS? Mention the basic elements of an RTOS. Describe the function of a scheduler.	2+2+4 = 8
	c)	Provide two examples of embedded systems for Wearable devices.	2
2.	a)	Mention the names of various wire line onboard communication interfaces used Embedded Systems. Write a detailed description of SPI interface with proper diagram and protocols.	2+8
	b)	Write a short note on the firmware design with a super loop based approach.	6
	c)	Mention the classification of Program Memory, and give a brief description about the MROM.	4
3.	a)	Give a detailed comparison between SRAM and DRAM.	10
	b)	Write a short note on the Opto-coupler and show the relevant circuit diagram.	6
	c)	Draw the circuit for interfacing AT89C51 microcontroller to a EEPROM 24LC256 with I2C.	4
4.	a)	Describe the Zig-bee network in detail with proper diagram and protocols.	10
	b)	Mention the operational quality attributes of an embedded systems and give a detailed description of each.	10
5	a)	Write a embedded C code for the diagram shown in Fig below.	10

			
	b)	Mention the Non- operational quality attributes of an embedded systems and give a detailed description of each attribute.	
5.	a)	Define the terms : Task, Process, Thread and provide a description of each	10
	b)	FSM Draw an FSM model based on the following conditions. • If the elevator is stationary and the floor requested is equal to the current floor then the elevator remains idle. • If the elevator is stationary and the floor requested is less than the current floor, then lower the elevator to the requested floor. • If the elevator is stationary and the floor requested is greater than the current floor, then raise the elevator to the requested floor.	10
6.	a)	Draw the circuit diagram to interface a CFL bulb through a 12V relay and a driver connected to a port RB1 and the bulb is to be controlled by a push button switch connected at RC0. Write the code for this operation with PIC16F877A.	5+5
	b)	Draw a conditional data flow graph based on the requirement: If flag=1, x=a+b; else y=a-b;	5
	c)	Write a short note on OTP Memory.	5