2023

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)	Describe the functionality of a scheduler in RTOS? Mention the different types of algorithms used for scheduling.	[5+3]
	b)	Explain the concept of Mailbox in the area of inter task communication	[5]
	c)	Draw UML chart for an academic institute, which has 6 departments: ECE, CSE, CIVIL, FPT, IT, HSS. ECE department has 2 labs with several tasks performed under it, along with different salient features.	[7]
2.	a)	Draw the CDFG for the following pseudo code in C.	[5+5]

		<code>if (Condition1 == TRUE)
		LED1 = ON ;
		else
		LED2 = ON ;
		switch(Condition2)
		f
		case c1 : Buzzer1 = ON ;
		break;
		case c2 : Buzzer2 = ON ;
		break;</code> <code>for (i = 0; i < N*M; i++)
		{
		z[i] = a[i] + b[i];
		}</code>	

	b)	What do you mean by a task, draw a diagram for a generic task control block?	[2+6]
	c)	Draw an abstract model of a Critical Section used for synchronization.	[2]
3.	a)	Draw the block diagram showing the I2C interface. Explain the protocols for I2C bus.	[4+6]
	b)	Mention the salient features of CAN. Draw the interface of CAN with an example and discuss its communication steps.	[5+5]
4.	a)	Explain the several methods of inter-task communication with necessary diagrams	[5+5]

	b)	Give a comparison between SRAM and DRAM used for data memory.	10
5.	a)	Explain the use of ZigBee in embedded communication interface. Mention its speeds.	6
	b)	Explain the SPI interface. Compare it with I2C protocol.	[5+5]
	c)	Mention the features of real time kernels	4
6.	a)	Write a short note on OTP memory and mention its merits-demerits	[5+5]
	b)	(see table below)	[5+5]

Current State	Inputs	Outputs	Next State
stateA	Clk=2	out=1	stateB
stateB	Clk=5	out=2	stateC
stateC	Clk=29	out=3	stateA

I. Draw an FSM for the above table.
II. Write the pseudo code in C.