Register No.: ..... Name: .....

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

FOURTH SEMESTER B.TECH DEGREE EXAMINATION (R), MAY 2023
ROBOTICS AND AUTOMATION
(2020 SCHEME)

Course Code : 20RBT206

Course Name: Microcontrollers and Embedded Systems

Max. Marks : 100 **Duration: 3 Hours**

PART A

(Answer all questions. Each question carries 3 marks)

1. Compare microprocessors and microcontrollers
2. Describe the Program Status Word (PSW) of 8051
3. Explain the structure of TMOD register in 8051
4. List the different interrupts available in 8051?
5. Define an embedded system and give its features.
6. Explain the need of device drivers in an embedded system.
7. List out the features of Arduino Uno
8. How GPIO is configured in Arduino Uno.
9. Give the basic structure of an Embedded OS.
10. Describe the structure of I2C.

PART B

(Answer one full question from each module, each question carries 14 marks)

MODULE I

11. a) Explain the architecture of 8051 with a neat diagram (7)
    b) 5 bytes of data are stored in consecutive RAM locations starting from 30H. Write a program to transfer these bytes in the same order to memory locations starting from 40H. (7)

OR

12. a) Define addressing mode. Explain the addressing modes of 8051 with one example each. (7)
    b) Explain the RAM memory organization in 8051, with suitable diagram. (7)

MODULE II

13.	a)	Write an ALP to generate 50 ms delay using Timer 1 of 8051, while using a crystal of 12MHz.	(7)
	b)	Explain interfacing of any ADC to 8051.	(7)

OR

14.	a)	Write a 8051 program to display the digits 1,2,3 on a seven segment LED display continuously with a delay in between.	(10)
	b)	Explain the structure of SCON register in 8051.	(4)

MODULE III

15.	a)	Explain the applications of embedded systems in consumer electronics and automobiles.	(7)
	b)	Describe the embedded system 'Tool chain'.	(7)

OR

16.	a)	Explain embedded system design process in detail.	(8)
	b)	Describe the software architecture of an embedded system.	(6)

MODULE IV

17.	a)	Design a temperature monitor system using Arduino Uno. Write the sample code also.	(10)
	b)	List the features of Arduino IDE.	(4)

OR

18.	a)	Explain the interfacing of a DC motor with Arduino Uno board. How speed can be controlled using PWM.	(8)
	b)	Explain the block schematic of an Arduino uno board.	(6)

MODULE V

19.	a)	Compare general purpose OS with RTOS.	(7)
	b)	Explain different types of Kernels in OS.	(7)

OR

20.	a)	Write short notes on tasks and processes.	(7)
	b)	What are the functions of OS Kernel.	(7)

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