

Register No.: Name:

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

FOURTH SEMESTER B.TECH DEGREE EXAMINATION (Regular), JULY 2022**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. Identify the purpose of PSW in 8051. Support it with bit-wise functional details.
2. Identify any 6 important factors for selecting a microcontroller for robotic application.
3. Detail the functional significance of SCON register in serial communication of 8051.
4. For a given ADC0808, $V_{ref} = 2.56V$. Calculate D0-D7 output if analog input is 2.1V.
5. Define embedded system. Give 4 examples for applications of embedded systems from different areas of daily life.
6. Summarize the role of device driver in embedded system architecture.
7. Differentiate common anode and common cathode 7 segment displays.
8. Identify how to realize direction control of a DC motor. Support with necessary diagram.
9. List the seven layers of an operating system.
10. Compare and contrast hard and soft real time systems.

PART B*(Answer one full question from each module, each question carries 14 marks)***MODULE I**

11. a) List out 5 addressing modes of 8051 with at least 2 examples per mode. Briefly explain the working of each addressing mode. (7)
b) Write an assembly language program to find product of hexadecimal digits of an 8-bit number stored in memory location 4300H. Store the result in locations 4301H and 4302H. (7)

OR

12. a) Identify the important building blocks in 8051 with detailed architecture diagram. How these blocks functionally support the operation of 8051. (10)
b) Explain the operation of following instructions. (4)
(i) DJNZ (ii) RLA (iii) XCH (iv) DIV

MODULE II

13. a) Distinguish various operating modes of timers in 8051. How can the mode be configured? Support operating modes with necessary diagram. (8)
b) Prepare a C program to generate a stair step-ramp by interfacing DAC 0808 along with 8051. Support the answer with interfacing diagram. (6)

OR

14. a) Identify the interrupts of 8051 in the decreasing order of priority. Analyze the process of interrupt handling in 8051. (8)
- b) With the help of an interfacing diagram, write a program to display the number '9' in a common cathode seven segment display. (6)

MODULE III

15. a) Distinguish between native and cross toolchain. Examine the elements of toolchain from functional point of view. (8)
- b) Explain the structure of a System on Chip with block diagram. (6)

OR

16. a) Outline the hardware software codesign methodology with the help of block diagram. How it is advantageous over conventional methodology? (7)
- b) List and classify different types of memory used in embedded systems. Mention advantages of each type. (7)

MODULE IV

17. a) With the help of a board level block schematic diagram, recall the features of Arduino Uno. (7)
- b) Write a program to turn on an LED on first touch and turn off the same LED on next touch on same switch. The LED is connected to pin 4 of Arduino Uno. Support with interfacing diagram. (7)

OR

18. a) Detail the organization of data memory of Arduino Uno with suitable diagram. (4)
- b) Write a program for Arduino Uno to control the speed of a DC motor (using potentiometer). Support with interfacing diagram. (10)

MODULE V

19. a) Compare and contrast monolithic kernel with micro kernel. (8)
- b) Identify and explain any three Kernel services in an operating system. (6)

OR

20. a) What is 'task' in embedded OS? Identify and explain different states of tasks? (6)
- b) Examine the operation of following communication protocols. (8)
- a) I²C
- b) SPI
