

Reg No : Name :

**MAR ATHANASIUS COLLEGE OF ENGINEERING, KOTHAMANGALAM**

(Govt. Aided Autonomous Institution)

Third Semester B.Tech Degree (SAY) Examination, February, 2026

Course Code: B24EC2T02

Course Name: COMPUTER ARCHITECTURE AND MICROCONTROLLERS

Max. Marks: 100

Duration: 3 Hours

PART - A: 30 Marks (10 Qns x 3 Marks)**Answer all questions**

1. Describe the function of the Program Counter in the 8051?
2. Give the address range of the register banks in the 8051 internal RAM.
3. List any three categories of instructions in the 8051 microcontroller with example.
4. Define the Immediate addressing mode and provide an example.
5. Write the vector address of External Interrupt_0, serial communication interrupt and Timer_1 Interrupt.
6. Describe the hierarchy of interrupts based on the priority.
7. Explain the basic principle of interfacing an LED with a microcontroller. What is the role of a current-limiting resistor?
8. With XTAL = 11.0592 MHz, find the TH1 value needed to have the following baud rates. (a) 9600 (b) 2400 (c) 1200
9. Give two examples of temperature sensors commonly used in embedded systems.
10. Explain the speed control mechanism of a DC motor.

PART - B: 70 Marks (5 Qns x 14 Marks)**Answer any One full question from each module.****Module 1**

11. a) Explain the function of the following pins of 8051 microcontroller in detail: (10 Marks)
P0.0 - P0.7, P1.0 - P1.7, P2.0 - P2.7, P3.0 - P3.7, XTAL1, XTAL2, PSEN, and ALE
- b) Explain the concept of the stack in the 8051 with examples of PUSH and POP instructions. (4 Marks)

OR

12. Draw and explain the internal architecture of 8051 microcontroller. How the Harvard architecture improves its processing speed and memory utilization.

Module 2

13. a) In a semester a student has to take five courses. The marks of the student are stored in RAM locations 57H onwards. Find the average marks and output it on Port 1. (8 Marks)
b) Write an ALP to subtract 1162H from 2456H. (6 Marks)

OR

14. a) Write an 8051 C program to toggle all the bits of P0, P1, and P2 continuously with a 250 ms delay. Use the SFR keyword to declare the port addresses. Use Timer 0 to generate the delay. (9 Marks)
b) Write an 8051 C program to get a byte of data from P0. If it is less than 100, send it to P1; otherwise, send it to P2. (5 Marks)

Module 3

15. a) Explain the TCON and TMOD special function registers of 8051 microcontroller. (8 Marks)
b) Find the values of TMOD to operate as Timers in the following modes. (6 Marks)
(i) Timer 1 Mode 0
(ii) Timer 0 and Timer 1 in Mode 2
(iii) Timer 1 Mode 1

OR

16. a) Generate a square wave with an ON time of 3ms and an OFF time of 10ms on all pins of port 0 using Timer 0 in Mode 1. Assume an XTAL of 22 MHz. (8 Marks)
b) Assume XTAL = 11.0592 MHz, write a program to generate a square wave of 50 kHz frequency on pin P2.3. Use Timer 1 in Mode 1. (6 Marks)

Module 4

17. With a neat diagram, explain the interfacing of a LCD with 8051. Write a program to display the word "HELLO".

OR

18. a) Write a program to receive the data byte which has been sent in serial form and send it out to Port 1 in parallel form. Also save the data at the RAM location 50H. (8 Marks)
b) Explain the role of SBUF and SCON register in 8051. (6 Marks)

Module 5

19. With a neat diagram, explain the interfacing of a stepper motor with 8051. Write an ALP to rotate the motor continuously in counter clockwise direction.

OR

20. Explain the interfacing of a servo motor with 8051 with neat diagram. Also, write a program to rotate the shaft to 180° position.
