

Enrollment No./Seat No.:

GUJARAT TECHNOLOGICAL UNIVERSITY
Bachelor of Engineering - SEMESTER - V EXAMINATION - WINTER 2025

Subject Code: 3154105

Date: 25-11-2025

Subject Name: Microcontrollers and PLC

Time: 10:30 AM TO 01:00 PM

Total Marks: 70

Instructions

- 1. Attempt all questions.**
- 2. Make suitable assumptions wherever necessary.**
- 3. Figures to the right indicate full marks.**
- 4. Simple and non-programmable scientific calculators are allowed.**

	Marks
Q.1 (a) Explain PSW register used in 8051 micro controller.	03
(b) Write operation of the following instructions 1] SWAP A [2] MOVX A,@DPTR [3] DIV AB [4] RRC A	04
(c) Write an assembly language program to Transfer AA H in Accumulator then transfer the same in R2 and R3 Register of Bank1, R1 and R4 Register of Bank0, R6 and R7 Register of Bank2.	07
Q.2 (a) Compare AJMP, LJMP & SJMP in microcontroller.	03
(b) Draw and explain the internal ROM memory organization of the 8051 microcontroller.	04
(c) Describe PWM and also explain how can we control the speed of DC motor using the PWM?	07
OR	
(c) Write an assembly language program for complementing all bits of P1 port with 2 Khz frequency continuously, Assume crystal oscillator of 11.0592 Mhz.	07
Q.3 (a) Explain the ANL and ORL instructions of the 8051 microcontroller with examples.	03
(b) Draw the pin diagram of the 8051 microcontroller and explain the function of Port 0 and Port 3 pins.	04
(c) Write an Assembly program to generate a PWM signal of 25% Duty cycle on pin P2.1 using Timer 0 in the 8051 microcontroller. Assume a crystal frequency of 12 MHz.	07
OR	
(a) Explain the MUL and DIV instructions of the 8051 microcontroller.	03
(b) What is the function of the CJNE instruction in 8051? Explain with an example.	04
(c) Write an 8051 Assembly language program to transmit a string "HELLO" serially at a 9600 baud rate using Timer 1 in Mode 2. Assume a crystal frequency of 11.0592 MHz.	07
Q.4 (a) Explain the 8051 microcontroller Assembler directives with brief explanations.	03

(b) Differentiate between the instructions CALL and RET in 8051 assembly language. **04**

(c) Draw and explain the interfacing diagram of a stepper motor with the 8051 microcontroller, Write a program to control the direction and steps of the motor. **07**

OR

(a) Define a PLC. Explain its basic block diagram with functions of each block. **03**

(b) Explain the scan cycle operation of a PLC with the help of a neat diagram. **04**

(c) What are the advantages and disadvantages of using PLC in industrial automation? **07**

Q.5 (a) Compare PLC with microcontroller and relay logic systems. **03**

(b) Define I/O modules in PLC. Differentiate between digital and analog I/O modules. **04**

(c) Explain the working of a PLC-based pick-and-place robotic system with a neat interfacing diagram. **07**

OR

(a) Describe the role of PLC in traffic light control with a simple logic diagram. **03**

(b) Explain how PLC can be used for robotics application **04**

(c) Draw PLC ladder diagram for DC Motor speed and direction control for robotic application **07**
