

GUJARAT TECHNOLOGICAL UNIVERSITY
BACHELOR OF ENGINEERING – SEMESTER 5 – EXAMINATION – SUMMER 2026

Subject Code: 3154105

Date: 30/05/2026

Subject Name: Microcontrollers and PLC

Time: 02:30 PM TO 05:00 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.**

- Q.1**
- (a) Differentiate between microcontroller and microprocessor with suitable examples. **03**
 - (b) Explain various addressing modes of 8051 with examples. **04**
 - (c) Draw and explain the architecture of 8051 microcontroller with neat diagram. **07**
- Q.2**
- (a) Describe the interrupt structure of 8051 microcontroller. **03**
 - (b) Illustrate the internal memory organization of 8051 with neat diagram. **04**
 - (c) Develop an assembly language program to generate a square wave of 2 kHz using Timer 1. Assume suitable crystal frequency. **07**
- OR
- Q.2**
- (c) Design an assembly program to transfer a block of 10 data bytes from internal memory to external memory. **07**
- Q.3**
- (a) Explain the function of TMOD and TCON registers in 8051. **03**
 - (b) Draw and explain interfacing of ADC with 8051 microcontroller. **04**
 - (c) Design and develop an interfacing circuit of 16×2 LCD with 8051 and write a program to display “GTU EXAM”. **07**
- OR
- Q.3**
- (a) Explain serial communication in 8051 with SCON register. **03**
 - (b) Illustrate interfacing of keypad with 8051. **04**
 - (c) Develop a program to transmit string “HELLO” serially using Timer 1 in Mode 2. **07**
- Q.4**
- (a) Define PLC and explain its architecture with functional blocks. **03**
 - (b) Explain scan cycle of PLC with neat diagram. **04**
 - (c) Develop a ladder diagram for automatic bottle filling system using sensors and timers. **07**
- OR
- Q.4**
- (a) Compare relay logic and PLC control systems. **03**
 - (b) Explain ON-delay and OFF-delay timers with timing diagrams. **04**
 - (c) Design a PLC ladder logic for traffic light control system. **07**
- Q.5**
- (a) List and explain different PLC programming languages. **03**
 - (b) Differentiate between analog and digital I/O modules in PLC. **04**

- (c) Develop ladder logic for water level control system using two level sensors (LOW and HIGH). **07**

OR

- Q.5** (a) Explain up-counter and down-counter operations in PLC. **03**
(b) Illustrate the role of PLC in industrial automation with one example. **04**
(c) Design ladder diagram for motor start-stop control with interlocking and latching. **07**
