

Seat No.: \_\_\_\_\_

Enrolment No. \_\_\_\_\_

## GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-V (NEW) EXAMINATION – WINTER 2021

Subject Code:3154105

Date:20/12/2021

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) List the factors to be considered for selection of microcontroller for application. **03**
- (b) State the difference between Control and Conditional flag. Explain flag register of 8051 microcontroller. **04**
- (c) List the addressing modes of 8051 and explain register indirect and indexed addressing mode in detail with assembly language example. **07**
- Q.2** (a) Describe the functions of following 8051 pins. **03**  
(i) XTAL1 (ii) ALE (iii) RxD
- (b) Explain following 8051 instructions with an example. **04**  
(i) MOVX (ii) ANL C, /Bit (iii) CJNE (iv) DIV
- (c) Explain PC and DPTR with their significance. Write program to interchange contents of PC and DPTR. **07**
- **OR** -----
- (c) Explain in detail of timer operation in mode-2. Write program to generate delay of 0.25 mS using timer-1 in mode-2. Show necessary calculation. **07**
- Q.3** (a) Write an assembly level program for 8051 to subtract 156F83H from 24759CH save the result in RAM location starting at 50H. **03**
- (b) Explain the significance of SCON register in 8051. **04**
- (c) Explain in detail the structure and operation of port P0 of the 8051 microcontroller. **07**
- **OR** -----
- Q.3** (a) State the 8051 timers specifying related Special Function Registers (SFR). **03**
- (b) List the sequence of events that take place when an interrupt occurs on the 8051 microcontroller. **04**
- (c) Explain with interfacing diagram, a 7-segment display interfacing with 8051 and write an assembly level program for 8051 to display data accordingly. **07**
- Q.4** (a) Draw the block diagram of PLC. **03**

- (b) Explain the various programming languages in PLC. **04**
- (c) Write a PLC ladder logic equivalent for NAND and NOR as universal gates. **07**

----- **OR** -----

- Q.4**
- (a) Describe the Input Module block diagram. **03**
  - (b) Explain the ON-Delay timer. **04**
  - (c) Two feeder conveyors (F1 and F2) feed a part onto one main conveyor (M). A proximity device is at the end of each feeder conveyor. The proximity device outputs are fed as pulses to counters. Each counter then shows the count of parts being put onto the main conveyor. In addition, another proximity device at the end of the conveyor in response to parts leaving and then sends the pulses to another counter. Develop a ladder program to have a single register showing the number counter of parts on the conveyor. Assume that the register is initially set the same count as the count of parts on conveyor. **07**

- Q.5**
- (a) Name the three forms of PLC counter instructions and explain the basic operation of each. **03**
  - (b) List four factors that enter the length of the scan time and explain it. **04**
  - (c) When the lights are turned off in a building, an exit door light is to remain on for an additional 2 min, and the parking lot lights are to remain on for an additional 3 min after the door light goes out. Write a ladder program to implement this process. **07**

----- **OR** -----

- Q.5**
- (a) Describe various move instructions: BIT, BYTE, WORD DOUBLE WORD, REAL **03**
  - (b) Name the three forms of PLC counter instructions and explain the basic operation of each. **04**
  - (c) Write the ladder logic program for stepper motor control with PLC for forward and reverse direction. **07**

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