Seat No.: _____ Enrolment No._____

# GUJARAT TECHNOLOGICAL UNIVERSITY

**ME – SEMESTER II (NEW) – • EXAMINATION – SUMMER 2016**

**Subject Code: 2724702 Date: 25/05/2016**

**Subject Name: ADVANCED MICROCONTROLLER AND LOGIC CONTROLLERS**

**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.**

| | | | |
|---|---|---|---|
| **Q.1** | **(a)** | How is the power down mode option realized in MSP430 series of microcontrollers? | **07** |
| | **(b)** | Explain PLC architecture using suitable block diagram. | **07** |
| **Q.2** | **(a)** | Describe in brief Timer A module in Msp430. What is the bit pattern of TACCTL1 register? | **07** |
| | **(b)** | Explain the working of Comparator_ A in MSP430 with help of a simplified block diagram. | **07** |
| | | **OR** | |
| | **(b)** | Explain the Serial peripheral interface protocol between a single master and a single slave in MSP430. | **07** |
| **Q.3** | **(a)** | Write the sequence of steps for serial data transfer using I2C bus in MSP430? | **07** |
| | **(b)** | Explain the working of a Sigma-Delta ADC for MSP430with the help of block diagram. | **07** |
| | | **OR** | |
| **Q.3** | **(a)** | For MSP430, how can we generate center-aligned PWM using Timer_A in Up/down mode? | **07** |
| | **(b)** | For MSP430 explain the function of (i) Watchdog timer (ii) RTC (iii) Basic Timer 1. | **07** |
| **Q.4** | **(a)** | List different timer instructions in PLC and explain any one of them using timing diagram and suitable example. | **07** |
| | **(b)** | When a START (NO) pushbutton is pressed momentarily, an output X will turn ON immediately. Another output Y will turn ON 5 seconds after pressing of START. If a STOP (NO) pushbutton is pressed and if Y is running X will turn OFF. Otherwise there will be no effect of STOP. Y will be stopped automatically 10 seconds after stoppage of X. Furthermore, another output Z will turn on after 10 seconds of starting of Y only if X is running and Z will be turned off immediately when X is stopped. Design and draw PLC ladder diagram to control this operation. | **07** |
| | | **OR** | |
| **Q.4** | **(a)** | List different counter instructions in PLC and explain any one of them using suitable example. | **07** |
| | **(b)** | Two feeder conveyors (F1 and F2) feed parts to main conveyor (M). Both F1 and F2 are having normally opened light sensor to sense object fed to M. When START (NO) is pressed, F1 will start. After feeding 5 parts to M, F1 will turn off. 5 seconds later, F2 will be started. After feeding 6 parts to M, F2 will turn off. 10 seconds later M will started and will be turned off automatically after 20 seconds. Design and draw PLC ladder diagram to control this operation. | **07** |
| **Q.5** | **(a)** | Explain various JUMP operations in PLC. | **07** |

**(b)** There are two conveyors in a system. Each conveyor is having normally opened sensors at both the ends to count parts entering and leaving the conveyor. When START (NO) is pressed momentarily, both conveyors will be started. There are three indicating lights which will operate as follows: **07**

Number of parts on both the conveyors is equal -White light.
Number of parts on conveyor 1 is greater -Green light.
Number of parts on conveyor 2 is greater -Blue light.

When STOP (NC) push button is pressed, both the conveyors and all three lights will turn off. Design and draw PLC ladder diagram to control this process.

**OR**

**Q.5** **(a)** Explain close loop control using PLC with suitable block diagram. **07**

**(b)** Explain analog output card of PLC using suitable block diagram. **07**

**********