

GUJARAT TECHNOLOGICAL UNIVERSITY**BE SEM-VIII Examination May 2012****Subject code: 180908****Subject Name: Advanced Processor and Controllers (Department Elective– II)****Date: 08/05/2012****Time: 10.30 am – 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) Explain input and output module of PLC with appropriate layout. **07**
 (b) Explain the problems associated with relay logic circuits and the possible solution by Programmable Logic Controllers (PLCs). **07**

- Q.2** (a) List the different types of arithmetic and number comparison functions of PLC. Explain with example any one arithmetic and any one number comparison function. **07**
 (b) Draw the connection diagram of all devices with PLC and develop a PLC Ladder diagram for the following system. **07**

An electrical plant consists of two motors M1 and M2. Motor M2 has a lubrication pump to protect its bearing. Two push buttons START and STOP are used to start and stop the plant. Motor M1 should start immediately as the START push button is pressed. After 20 sec, motor M2 along with lubricating pump should start. When STOP push button is pressed, both the motors M1 and M2 should stop immediately and lubricating pump remain ON for a time of 10 sec.

OR

- (b) Two feeder conveyors (F1 and F2) feed a part on 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 pulses the response to parts leaving and then sends the pulses to another counter. **07**
 Draw the connection diagram of all devices with PLC and develop a PLC Ladder program to have a single register showing the number parts on the main conveyor.

- Q.3** (a) Explain the basic elements of digital signal processing. Also explain the advantages of digital signal processing over analog signal processing. **07**
 (b) Determine whether following systems are Linear Time Invariant or not. **07**
- i. $y(n) = 2x(n-5)$
 - ii. $y(n) = 2x(3n)$

OR

Q.3 (a) Determine the Z-transform of following signals **07**

i. $x(n) = a^n u(n)$

ii. $x(n) = 10 \sin(2\pi n) u(n)$

(b) Explain any two methods for obtaining inverse Z-transform and determine the inverse Z-transform of the following function using any one method. **07**

$$X(Z) = \frac{1}{(1 - z^{-1})(1 - 0.5z^{-1})}$$

Q.4 (a) Briefly explain all the peripherals of LF2407 DSP. **07**

(b) Explain the functions of CALU, Multiplier, ARAU and Scaling Shifters in LF2407 DSP. **07**

OR

Q.4 (a) Explain the memory addressing modes of LF2407 DSP with example. **07**

(b) Draw and explain the block diagram of multiplexing of a GPIO pin in LF2407 DSP. Also explain about I/O MUX control registers and data/direction control registers. **07**

Q.5 (a) Explain the interrupt hierarchical levels in LF2407 DSP and how an interrupt request signal propagates through them. **07**

(b) Explain about IFR, IMR and PIVR registers of LF2407 DSP. **07**

OR

Q.5 (a) Explain the possible modes of counting operation of General Purpose (GP) timers in LF2407 DSP. **07**

(b) Explain how PWM output is generated using Event Manager Module in LF2407 DSP with suitable waveforms. **07**
