

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER-VIII • EXAMINATION – SUMMER 2013

Subject Code: 180908**Date: 09/05/2013****Subject Name: Advanced Processor and Controller (Dept. Elect. – II)****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) Draw functional block diagram of TMS320LF2407 DSP Controller and explain the roll of event manager and memory allocation spaces in detail. **07**
- (b) Which are the subcomponents available in C2xx DSP Core? Explain CALU, ARAU and multiplier in detail. **07**

- Q.2** (a) Explain memory addressing modes supported by C2xx DSP controllers with suitable examples. **07**
- (b) Draw and explain block diagram of pin multiplexing of GPIO port pins available in C2xx DSPs in detail and also explain configuration of IO ports in brief. **07**

OR

- (b) Explain interrupt hierarchy in TMS320LF2407 with suitable diagram in detail. **07**

- Q.3** (a) What do you mean by convolution? Give the definition of convolution and find linear convolution of following signals using definition of convolution: **07**
 $x(n) = \{ 1 \}$ and $h(n) = \{ 2, 1, 2, 1 \}$

- (b) An LTI system is characterized by the transfer function, **07**

$$H(z) = \frac{3 + 4Z^{-1}}{1 + 3.5Z^{-1} + 1.5Z^{-2}}$$

Determine $h(n)$, using partial fraction expansion method, if the system is stable.

OR

- Q.3** (a) Obtain the Z transform of $x(n) = a^n \sin \theta n u(n)$ using properties of Z transform. **07**

- (b) Determine the inverse Z transform using long division method for $X(z)$ **07**

$$= \frac{Z^2}{(0.5 + 1.5Z + Z^2)}$$

if the signal is anti-causal signal.

- Q.4** (a) Which are the different PLC programming languages? Explain rules for construction of ladder diagram in detail. **07**

- (b) Explain PLC SKIP, Master Control Relay and JUMP functions with proper examples in brief. **07**

OR

- Q.4** (a) Give classifications of timers available in PLCs. Explain operations of each timer in detail with suitable examples. **06**

- Q.4 (b)** There are three machines, each with its own start & stop buttons. It is required that only two machines should run at a time. Construct a ladder diagram with appropriate interlocking. **04**
- (c)** In a system there is one start, one stop push button and a output coil A, which should be ON for a time of 2 seconds at every 5 seconds. Construct the ladder diagram for the same with proper interlocking. **04**
- Q.5 (a)** Explain operation of different kind of counters available in typical PLC with suitable examples. **04**
- (b)** An indicator light is to go ON after a count of 5 from an object sensor and it should be turned OFF, when count reaches 15. Using only 1 counter, construct the PLC ladder diagram for this scenario. **03**
- (c)** Draw the flow chart of traffic light control system for a cross road in which there is 1 green light and 1 red light on each side. The green light should remain ON for a period of 15 seconds on one side, during which red light will remain ON in remaining sides, then repeat the sequence for each side. Also draw PLC Ladder diagram for the same. **07**
- OR**
- Q.5 (a)** Two feeder conveyors A & B feed parts onto third conveyor R, at which parts are checked and rejected parts are sent out and OK parts are placed onto main conveyor M. A proximity device is at the end of each feeder conveyor (A & B) and one another proximity is at output of Conveyor R, at which rejected parts are counted. The proximity device outputs are fed as pulses to PLC. The main conveyor should be started only after a total 10 OK parts are received from the conveyor R. Assume system start, stop pushbuttons and construct the ladder diagram. **07**
- (b)** A conveyor has packs of 6 cans of soda entering it and another conveyor has packs of 8 cans of soda. Both kinds of packs are sensed by separate sensors and inputs are provided to PLC. An output indicator is to go on when a total of 200 or more cans are passed from both the conveyor. Construct the PLC ladder diagram. **07**
