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G 1225

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2009.

Sixth Semester

Mechatronics Engineering

EC 349 — PROGRAMMABLE LOGIC CONTROL

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Differentiate PLA from PAL.
2. What do you mean by Antifuse Technology?
3. Define PLC.
4. Sketch a typical analog output module.
5. When does one go for EXAMINE ON instruction?
6. What is the need for latching?
7. Sketch the timing diagram of ON DELAY timer.
8. Draw the relay ladder diagram for converting °C to °F.
9. Identify the inputs and outputs of automatic car washing application.
10. Write the sequence of operations involved in automatic control of warehouse door.

PART B — (5 × 16 = 80 marks)

11. (a) Design the logical ladder diagram for the following application with I/O connection diagram.

There are two conveyors each with sensors to count input and output of parts entering and leaving the conveyors. There are to be three indicating lights for the process as follows :

Number of parts on the conveyors equal : White light

Number of parts on conveyor 1 is greater : Green light

Number of parts on conveyor 2 is greater : Blue light

Or

- (b) Develop the physical ladder diagram for the following application.

- (i) Bottles are counted until all 12 are in position for filling.
- (ii) When in position, the 12 bottles are filled simultaneously for 6.3 seconds.
- (iii) The 12 caps are then put on and counted as they are installed.

12. (a) Sketch and explain the logic element, programmable interconnect technology of FPGA.

Or

- (b) (i) Program ROM memory for Excess 3 code converter. (6)
- (ii) Sketch the algorithm and obtain the sequence of operations involved in Traffic light controller. (10)

13. (a) (i) Sketch the architecture of PLC and explain the function of every block of PLC. (8)
- (ii) Can a PC be used as PLC? Why? (8)

Or

- (b) (i) Explain the Scan cycle of PLC. (6)
- (ii) Write short notes on :
 - (1) Programming devices. (5)
 - (2) 230V ac input module. (5)

14. (a) (i) Design electromagnetic relay based sequencer for switching on a motor when start PB is pressed and stop PB is not pressed. (6)
- (ii) A fan is to be started and stopped from any one of three locations. Each location has a start and a stop button. Develop the relay ladder diagram and convert it into PLC ladder diagram. (10)

Or

- (b) (i) Represent digital input and output devices in standard form. (6)
- (ii) A temperature control system consists of four thermostats. The system operators three heating units. Thermostats are set at 55, 60, 65 and 70°F. Below 55°F, three heaters are to be on. A temperature between 55 and 60°F causes two heaters to be on. For 60°F to 65°F, one heater is to be on. A master switch turns the system on and off. Develop the physical Ladder diagram for the above application. (10)

15. (a) (i) Develop ladder diagram for the following application.

An alarm is to sound for 17 seconds after a machine is started to alert personal in the area that the machine has been started. The alarm stays on for 17 seconds even if the input is turned off during the 17-second timing period. (8)

- (ii) Describe a typical application for cascading Timers/Counters. (8)

Or

- (b) (i) Sketch the syntax of math instructions. (+, -, ×, ÷) (6)
- (ii) A conveyor has 6-, 8- and 12- packs of canned soda entering it. Each size of an entering pack has an individual pack quantity counter feeding a PLC register. To know how many total cans are entering the conveyor, set up a program for multiplying and then adding to give a total can count. (10)
