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L 1262

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2008.

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. Classify PLDs.
2. Write the benefits of synthesizing combinational logic in ROM when compared with PAL.
3. Define PLC.
4. Sketch a typical analog input module.
5. Design relay logic diagram for starting a MOTOR using START push button switch and stopping using STOP push button switch.
6. Draw any two manually operated and mechanically operated switches.
7. How to reset the counter?
8. What are the program control instructions available?
9. Identify the input/output variables for automatic lubricating oil supplier.
10. List four process control applications where PLC is popularly used in sequential and continuous control.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Sketch the architecture of logic element of FPGA. (8)
(ii) Explain the programmable interconnect technology used in FPGA. (8)

Or

(b) Design traffic light controller using PAL.

12. (a) (i) Sketch and explain the architecture of PLC. (8)
(ii) Explain the various functions performed by Digital I/O modules. (8)

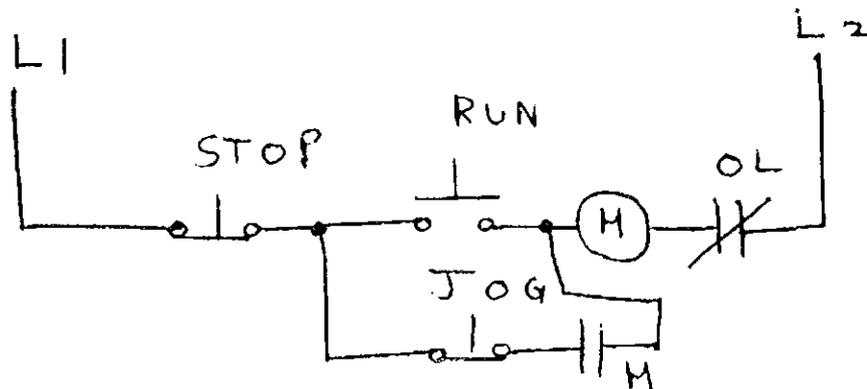
Or

- (b) (i) Write short notes on the various programming devices PLCs. (6)
(ii) Sketch the organization of a typical PLC memory and how PLC scan sequence get executed. (10)

13. (a) (i) Compare the method of operation of each of the following types of switches :
- Manually operated switch
 - Mechanically operated switch
 - Proximity switch. (6)
- (ii) Design and draw the schematic for a conventional hardwired relay circuit that will perform each of the following circuit functions when an NC push button is pressed
- Switch a pilot light ON
 - De-energize a solenoid
 - Start a motor running
 - Sound a horn (10)

Or

- (b) (i) What is the need for latching? (6)
(ii) Design a PLC program and prepare a typical I/O connection diagram and logic ladder program that will correctly execute the hard-wired control circuit shown in the Fig. 13 (b) (i). (10)



Note : STOP is wired NO

RUN is wired NO

JOG is wired NO

Fig. 13 (b) (ii)

14. (a) (i) Explain the difference between the operation of retentive and a non retentive timer. (6)
- (ii) Design a time-of-day clock measuring time in hours and minutes using cascaded timer-counters. (10)

Or

- (b) (i) Explain with timing diagram, the operation of up/down-counter. (8)
- (ii) State five pieces of information usually associated with a PLC timer instruction and explain how the accumulated count of programmed retentive and non retentive timers is reset to zero. (8)
15. (a) Explain a typical application of PLC with the required hardware and ladder program for a simple material handling process.

Or

- (b) Explain the sequence of operation involved in automatic car washing mechanism.