



B.E DEGREE EXAMINATIONS: APRIL/MAY 2016

(Regulation 2013)

Sixth Semester

MECHATRONICS ENGINEERING

U13MCT603 : Programmable Logic Controller

Time: Three Hours

Maximum Marks: 100

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. The rung $| \text{---} | / [X \text{-----}] / [Y \text{-----}] (Z \text{---} |$ would represent what Boolean equation?
 - a) $X.Y = Z$
 - b) $X'+Y' = Z$
 - c) $X+Y = Z$
 - d) $X'.Y' = Z$
2. The need for opto isolator in PLC is.....
3. The purpose of ADC in PLC is
 - a) To read analog data into PLC
 - b) To send analog data out from PLC
 - c) To read DC input
 - d) To send DC output from PLC
4. PLC modes of operations are.....,, and.....
5. Data storage capacity of MOV instruction for AB PLC is
 - a) 1 bit
 - b) 8 bits
 - c) 16 bits
 - d) 32 bits
6. The DN bit of the OFF delay timer set when
7. MAP released during the year
 - a) 1984
 - b) 1983
 - c) 1982
 - d) 1985
8. HLOI in DCS stands for
9. MCR in PLC used for
 - a) Protecting PLC from fire
 - b) Protecting PLC from malfunctions
 - c) Clear the program execution
 - d) Clear the I/O status indication
10. The BATT in the processor diagnostics LED denotes

PART B (10 x 2 = 20 Marks)

(Answer not more than 40 words)

11. Compare relay logic control with PLC.
12. List any four special I/O modules in a PLC.

13. Identify common voltage ratings for discrete I/O interface modules in a PLC.
14. List the sequence of events takes place during PLC program execution.
15. Explain the function of Done bit (DN) in the OFF delay timer.
16. Develop ladder logic diagram to control a flash light. It should ON for 20 sec and OFF for 20sec. Repeat the sequence continuously.
17. Compare the transmitting distances of RS-232 and RS-485 serial types.
18. Outline about redundancy in DCS.
19. Identify the purpose of TND and SUSPEND program control instructions in PLC program debugging.
20. Develop ladder logic program for making the robotic arm connected through double acting pneumatic cylinder extend and retract for 10 times. Reed switches RS1 and RS2 are connected at two ends of the pneumatic cylinder.

PART C (5 x 14 = 70 Marks)
(Answer not more than 400 words)

Q.No. 21 is Compulsory

21. Develop ladder logic for simple blending of water and acid in a container where we only have three level sensors(L1,L2, and L3) and two liquids flowing in through two solenoid valves, solenoid a(water control) and solenoid b(acid control)and draining out through solenoid c(blend outflow).Water After required level of blend is need to be filled until sensor L2 senses. Then stop the solenoid a and start acid to fill upto level sensor L1 detects. The mixer runs for 3 minutes by the motor. The process initiates with the drain valve open, water and acid valves closed, mixer motor is off, and the tank is empty. Refer Figure 1.

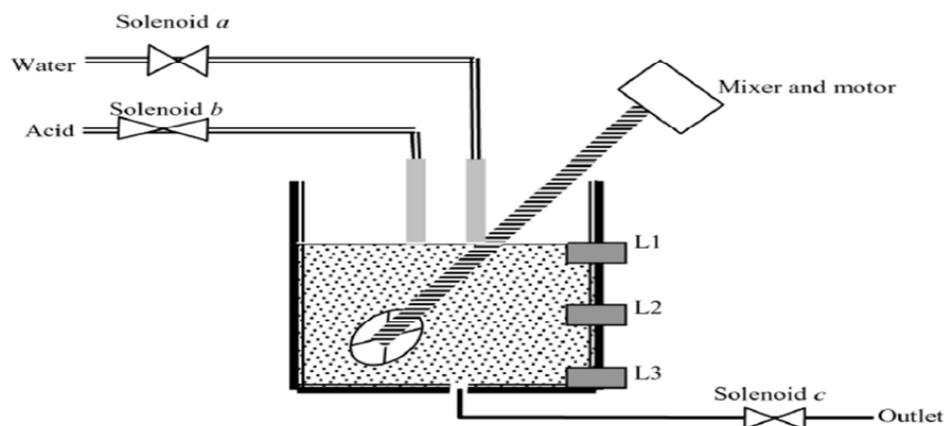


Figure 1

22. (a) (i) Classify I/O modules in a PLC. (4)
(ii) Discuss in detail about analog I/O module with neat diagram. (10)
- (OR)**
- (b) (i) Distinguish between modular and fixed PLC. (2)
(ii) Draw the architecture of PLC and explain each block in detail. (12)
23. (a) (i) Discuss in detail about operating modes of a PLC. (10)
(ii) What for program memory and data memory used in a PLC. (4)
- (OR)**
- (b) Draw the schematic of the relay. Discuss in detail about construction and working of a single point relay.
24. (a) With suitable example elaborate data manipulating instructions in a PLC.
- (OR)**
- (b) (i) Discuss a typical application in a PLC programming where subroutine instruction is used. (8)
(ii) How networking of a PLC is used in remote monitoring and control of I/O s. (6)
25. (a) Draw the building blocks of a DCS. Detail about each block.
- (OR)**
- (b) Elaborate PLC maintenance and troubleshooting procedures.
