

**GANPAT UNIVERSITY**  
**B. TECH. SEMESTER VII (MECHATRONICS) ENGINEERING**  
**REGULAR EXAMINATION NOV-DEC 2016**  
**2MC701: ADVANCE CONTROLLER**

Time: 3 Hours

Total Marks: 70

- Instruction:**
1. All questions are compulsory.
  2. Figures to the right indicate full marks.
  3. Answer to the two section must be written in separate answer sheet.
  4. Assume suitable data if necessary.

**Section – I**

Que. – 1

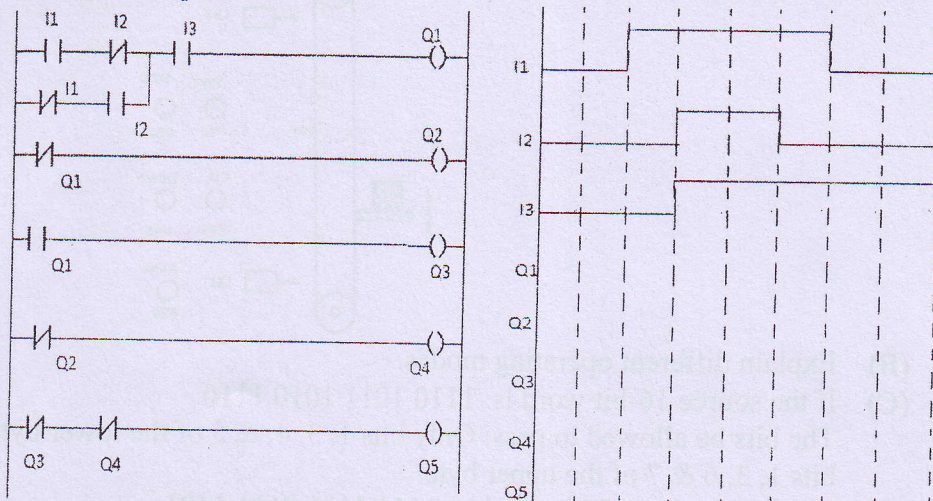
- (A) Draw a block diagram of a PLC showing the main functional items and explain each block in detail. [06]
- (B) Convert given Boolean expression into PLC ladder diagram. [04]  

$$y = (A \cdot \bar{B}) + (C \cdot (\bar{D} + \bar{E})) + \bar{F}$$
- (C) Define following terms. [02]
  1. Proportional gain
  2. Proportional band

OR

Que. – 1

- (A) Draw the timing diagram of the outputs which are shown in the below figure for the given input condition. [06]



- (B) What is controlled algorithms? & why controller needs to be tuned? [04]
- (C) What is the difference between PLC ladder diagram & electrical ladder [02]

Que. – 2

- (A) Discuss the ON DELAY timer with suitable figure and timing diagram. [05]
- (B) Construct the PLC relay logic diagram for the system in which there are three process A, B, and C. Each process has its own start – stop pushbutton, but only one process among them are running at a time even if someone try to start other process at same time it won't started until the first process is turned off. [06]

OR

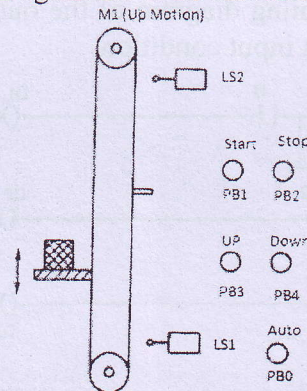


Que. - 2

- (A) Make a PLC ladder diagram for the given objectives. [06]
1. A green pushbutton is used to turn on green LED1 after 2 seconds.
  2. After 3 seconds, green LED1 is turned off & green LED2 will be on.
  3. After 2.50 seconds, green LED2 is turned off and green LED1 will be on again.
  4. Repeat this process 7 times.
  5. A red push button is used to stop whole process at any time.
- (B) Explain EN, TT and DN bit of OFF DELAY timer. & how does ON DELAY timer differ with retentive timer? [05]

Que. - 3 Attempt following questions.

- (A) Design PLC ladder program for the elevator as shown in figure. [08]
1. Start pushbutton is used to start process.
  2. Down button is used to move elevator in downward direction. (M1)
  3. When LS2 switch is energized, M1 motor stops
  4. UP button is used to move elevator in upward direction. (M2)
  5. When LS1 switch is energized, M2 motor stops
  6. When UP and Down button pressed at same time, elevator will be stopped at current position.
  7. When AUTO button is pressed it start works automatically, the elevator start to move in downward direction until LS2 switch is energized. After 20 seconds, it will go in upward direction until LS1 switch is energized. After 10 seconds, it will again move downward.



- (B) Explain different operating modes. [02]
- (C) If the source 16-bit word is: 1110 1011 1010 1110 [02]  
The bits be allowed to pass: Only bits 1, 3, 4, & 5 of the lower byte and bits 1, 3, 6 & 7 of the upper byte.  
The destination 16-bit word is: 1111 1101 0111 1101  
Then what will the mask & the destination bits after execution of MVM instruction?

### Section - II

Que. - 4

- (A) Write a note on discrete AC input module. [06]
- (B) State and explain different methods to eliminate leakage current problem. [04]
- (C) What is module addressing? [02]

OR

Que. - 4

- (A) Explain sources and sinking I/O modules with suitable figure. [06]
- (B) Explain the PLC scan cycle with figure. [04]
- (C) Construct ladder logic for NAND and X-NOR logic gates. [02]



Que. - 5

- (A) Explain the concept of SCADA with diagram in detail. [06]  
(B) List the different types of output modules of PLC. Brief any one in detail. [05]

OR

Que. - 5

- (A) What is DCS? Draw a hierarchical DCS structure and explain function of each [06]  
(B) Differentiate different types of process and types of control. [05]

Que. - 6 Attempt following questions. [12]

- (A) Discuss latch and unlatch concept with suitable example.  
(B) Make the comparison between three types of switching elements.  
(C) Explain the One shot rising (OSR) instruction with an example.

END OF PAPER