17664

16117

3 Hours / 100 Marks Seat No. | | | | | | | | |

Instructions – (1) All Questions are *Compulsory.*

(2) Answer each next main Question on a new page.

(3) Illustrate your answers with neat sketches wherever necessary.

(4) Figures to the right indicate full marks.

(5) Assume suitable data, if necessary.

(6) Use of Non-programmable Electronic Pocket Calculator is permissible.

(7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. a) **Attempt any THREE of the following:** **12**

(i) List any four benefits of automation.

(ii) Draw wiring diagram of sinking input module and sourcing output module.

(iii) List four relay type instructions of PLC with symbols.

(iv) List any four I/o module selection criteria.

b) **Attempt any ONE of the following:** **6**

(i) 1) Differentiate between relay control and PLC control (any two points)

2) Draw block diagram of PLC and explain function of CPU.

(ii) Draw block diagram of AC input module and explain function of each block.

P.T.O.

Marks

2. Attempt any TWO of the following: **16**

a) (i) State types of PLC programming languages.

(ii) Explain format of SCP (Scale with Parameters) instruction of PLC.

b) Draw ladder diagram for a two-motor system having following conditions:

(i) Start push button starts motor M1

(ii) After 10 sec. motor M1 is OFF and motor M2 is ON.

(iii) After 5 sec. motor M2 is OFF

(iv) STOP push button stops both motors M1 and M2 if pressed any time during process.

c) (i) Which start button is pressed process starts, when stop button is pressed process stops?

(ii) If level is low, SV1 is open and SV2 is closed.

(iii) When level is high, SV1 is closed and SV2 is open.

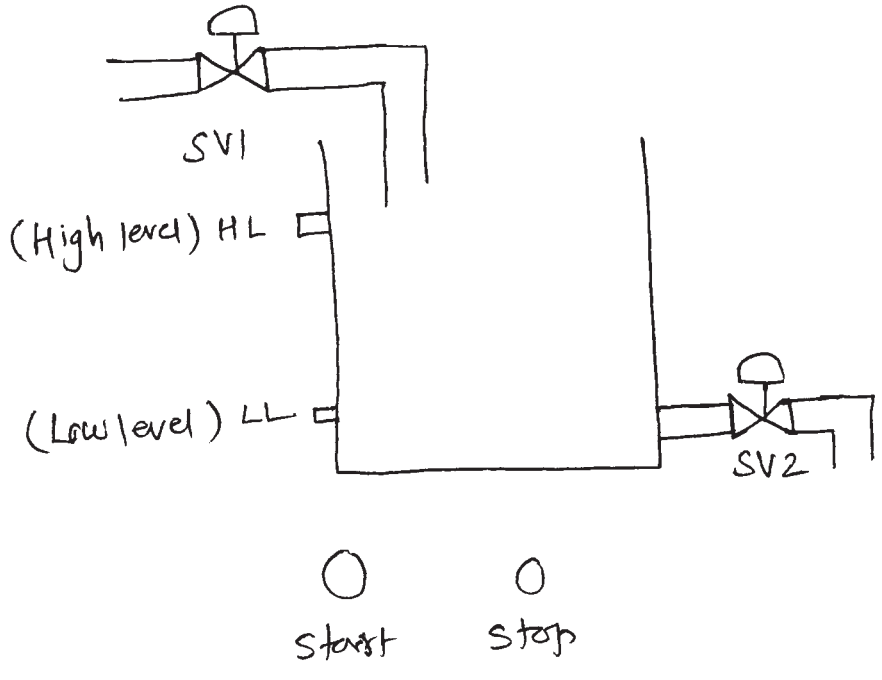


Fig. No. 1

Marks

3. Attempt any FOUR of the following: **16**

a) State classification of PLC based on type and explain.

b) Expand abbreviation of following automation tools:

(i) SCADA

(ii) PLC

(iii) DSC

(iv) CNC

c) Draw block diagram of analog input module and state function of each block.

d) Give I/O addressing format for a typical PLC, with example.

e) Explain why grounding is necessary for PLC installation.

4. a) Attempt any THREE of the following: **12**

(i) Draw format of TON instruction with timing waveforms.

(ii) List types of speciality I/o modules and explain any two.

(iii) Draw ladder diagram for boolean equation,

$$Q = I_1 \cdot I_2 + I_3 \cdot \overline{I_4} + I_5 (\overline{I_6} + \overline{I_7})$$

(iv) Explain how noise suppression is done during installation of PLC.

b) **Attempt any ONE of the following:** **6**

(i) List 3 input and 3 output devices with their symbols, which can be used with PLC.

(ii) Explain analog output module with the help of block diagram.

Marks

5. Attempt any TWO of the following: **16**

a) (i) Draw block diagram of DC output module.

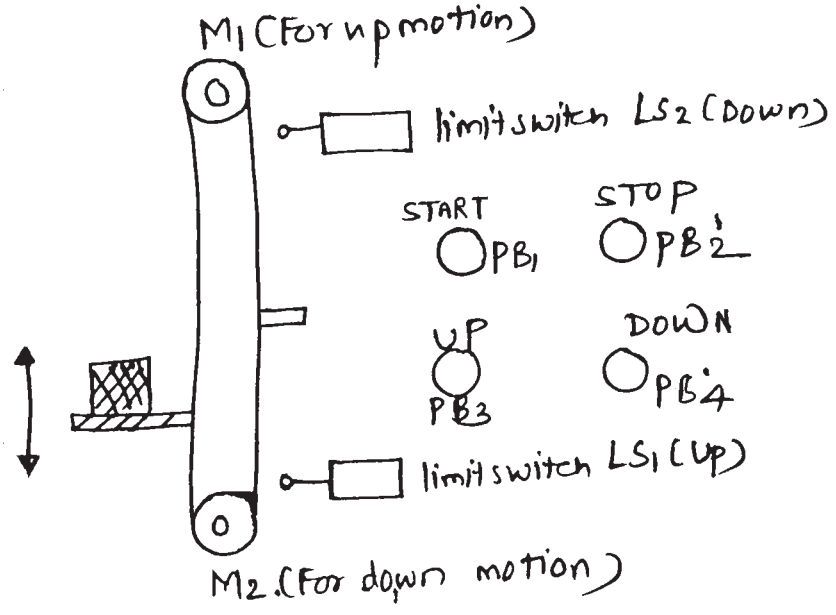
(ii) Draw wiring diagram to connect AC load to PLC and specify which type of output module can be used.

b) The elevator system shown in diagram employs platform to move objects up and down. M1 and M2 are motor to drive platform UP and DOWN respectively write ladder program for following conditions:

(i) When start push button is pushed process starts and when stop push button is pressed process stops?

(ii) When UP push button is pressed, platform carries something to UP position till L.S1 senses UP position.

(iii) When DOWN push button is pressed, platform carries something to DOWN position till LS2 senses down position.



LS_1 = NC limit switch to indicate UP position

LS_2 = NC limit switch to indicate DOWN position

START = NO push button for start

STOP = NO push button for stop

UP = NO push button for UP command

DOWN = NO push button for DOWN command

Fig. No. 2

Marks

c) Write ladder program for traffic light control system for following conditions:

(i) When start push button is pressed, RED light is ON for 5 sec?

(ii) After 5 sec. RED light goes OFF and GREEN light should become ON for next 7 sec.

(iii) After 7 sec. green light goes OFF and YELLOW light should become ON for 2 sec.

(iv) After 2 sec, YELLOW light goes OFF and again RED light should become ON and cycle should repeat till STOP push button is pressed.

6. Attempt any FOUR of the following: **16**

a) Explain the term redundancy with respect to PLC.

b) Explain DOWN counter instruction format of PLC.

c) State PLC maintenance guidelines.

d) List four compare instructions and also draw their formats.

e) Explain how troubleshooting of input and output module is done in PLC.