

22384

23124

3 Hours / 70 Marks

Seat No.

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- Instructions :**
- (1) All Questions are *compulsory*.
 - (2) Answer each Section on same / separate answer sheet.
 - (3) Answer each next main Question on a new page.
 - (4) Illustrate your answers with neat sketches wherever necessary.
 - (5) Figures to the right indicate full marks.

Marks

1. Attempt any FIVE of the following :

10

- (a) List types of Industrial Automation.
- (b) State any four needs of Industrial Automation Systems.
- (c) Draw diagram of generalized block diagram of PLC.
- (d) Describe role of PLC in automation industry.
- (e) Enlist any four control panel accessories of PLC.
- (f) Describe redundancy in PLC module.
- (g) Write the format of Timer TON Instruction.

2. Attempt any THREE of the following :

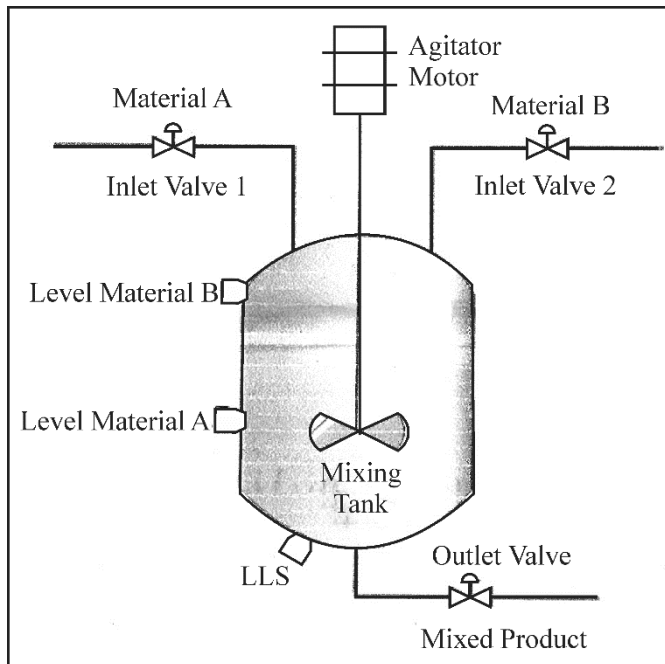
12

- (a) Explain five-layer industrial automation hierarchy model with neat diagram.
- (b) Explain memory organization in PLC.
- (c) List different specialty modules in PLC. Explain any one of them.
- (d) Compare Allen Bradley and Siemens micro-PLCs on (any four points).



- 3. Attempt any THREE of the following :** **12**
- (a) List any four Input devices and Output devices with respect to PLC.
 - (b) Explain addressing format of I/O in program of PLC. Draw symbol of XIC (examine if closed), XIO (examine if open) relay type instructions.
 - (c) Explain any two comparison instruction.
 - (d) Draw a neat wiring diagram (interfacing diagram) of following I/O devices with appropriate PLC module :
 - (i) PNP Proximity sensor,
 - (ii) Motor – 24VDC
- 4. Attempt any THREE of the following :** **12**
- (a) Explain power supply of PLC power supply with neat diagram.
 - (b) Draw ladder diagram for :
 - (i) NOR
 - (ii) NOT
 - (iii) EX NOR
 - (iv) NAND gate
 - (c) Explain the concept of sourcing and sinking wiring in PLC.
 - (d) Draw neat timing waveform for off Delay Timer.
 - (e) Compare fixed and modular type PLCs.
- 5. Attempt any TWO of the following :** **12**
- (a) Draw a ladder diagram for a two motor system having following condition :
 - (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; stop both motors M1 and M2 if pressed any time during process.
 - (b) Draw Ladder diagram for given Boolean Expression :
 - (i) $Y = \bar{A} \cdot B + C$
 - (ii) $Y = AB + CD + EF$

- (c) Material A and Material B are collected in a tank. These materials are mixed for a while. Mixed product is then drained out through Outlet valve. Implement this in PLC using Ladder Logic programming language.



List of Inputs and Outputs

I:1/14	= Start	(Input)
I:1/15	= Stop	(Input)
B3:0/0	= Master Coil Bit	(Bit)
I:1/0	= Level of Material B	(Input)
I:1/1	= Level of Material A	(Input)
I:1/2	= Low Level Switch (detects empty tank)	(Input)
O:2/0	= Inlet Valve 1 (Material A Feed)	(Output)
O:2/1	= Inlet Valve 2 (Material B Feed)	(Output)
O:2/2	= Agitator Motor(Mixing)	(Output)
O:2/3	= Outlet Valve (Product outlet)	(Output)
T4:0	= Time to mix Materials	(Timer)

- (i) When start button is pressed, process starts and when stop button is pressed, process stops.
- (ii) If low level switch is high, open inlet valve 1 and inlet valve 2.
- (iii) Close inlet valve 1 and inlet valve 2, when High level is reached.
- (iv) After High level is reached, start motor for 20 sec. and then stop.
- (v) After motor stops, open the outlet valve till low level is reached.

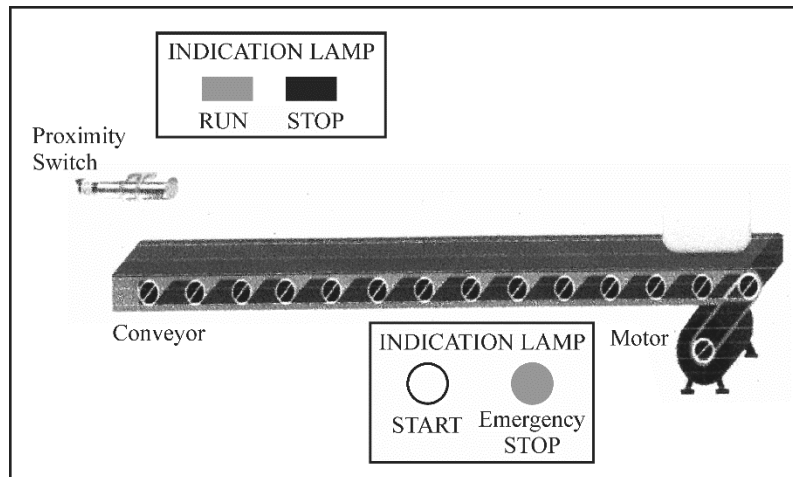
6. Attempt any TWO of the following :

12

- (a) Draw and explain Analog scaling instruction used in PLC.
 (b) Draw a ladder program for Conveyor system.

The sequential tasks as follows :

- (i) When START button pressed
 (ii) Motor will be started
 (iii) RUN (Green Lamp) indication lamp will be activated
 (iv) Motor Running, so Box will start Move
 (v) Proximity Sensor will detect when the box arrives at other end
 (vi) Motor will be stopped
 (vii) RUN (Green Lamp) indication lamp will be de-activated
 (viii) STOP (Red Lamp) indication lamp will be activated
 (ix) An Emergency stop push button will be used to stop the motor at any time.



- (c) There are four output A, B, C, D. Draw the ladder diagram for following condition :
- (i) A goes off when stop switch is pressed.
 (ii) B goes off 7 seconds after A.
 (iii) C goes off 6 seconds after B.
 (iv) D goes off 2 seconds after C.
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