17664

21415

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

Instructions : (1) All Questions are *compulsory*.

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

(3) Figures to the right indicate full marks.

(4) Assume suitable data, if necessary.

(5) Preferably, write the answers in sequential order.

Marks

1. (A) Attempt any THREE : **12**

(a) List any four benefits of automation.

(b) Draw the block diagram of analog input module.

(c) State the file no. of the following data files :

(i) integer

(ii) counter

(iii) bit

(iv) control

(d) Draw and explain PLC as a sourcing output device.

(B) Attempt any ONE : **06**

(a) (i) State relay control and PLC control on the basis of :

(1) Power consumption

(2) Maintenance

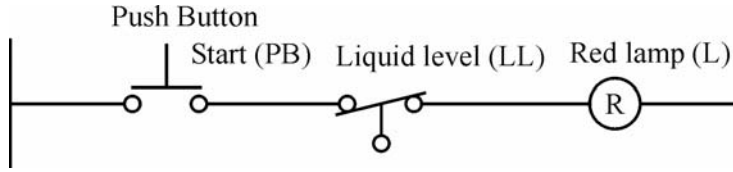
(ii) List the types of PLCs. State the number or inputs/outputs in each type.

(b) Draw the block diagram of AC input module. State the function of each block.

P.T.O.

2. Attempt any TWO : **16**

(a) (i) Draw the PLC ladder diagram for the following electrical ladder diagram.



(ii) Draw the format of SQI instruction w.r.t. PLC. Explain the terms : File, Mask, Source.

(b) Draw the ladder diagram for the following conditions :

(i) A conveyor belt has a limit switch to count the items on it.

(ii) After 50 items sensed by limit switch, it stops the conveyor and starts the wrapper motor.

(iii) The wrapper motor wraps the 50 items together in 10 seconds.

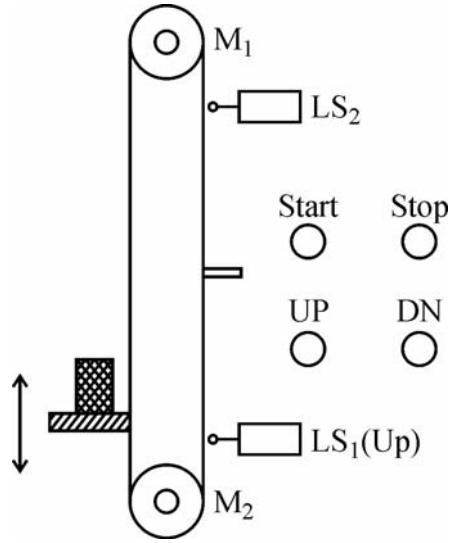
(iv) The process is started by START push button and stopped by STOP push button. It restarts by RESTART switch.

(c) Write a ladder program for an elevator system with the following conditions :

(i) START and STOP push buttons start and stop the elevator.

(ii) When UP push button is pressed, the up motion motor M_1 is ON until NC limit switch LS_1 senses up position.

(iii) Similarly DN push button starts the down motion motor M_2 that is ON until NC limit switch LS_2 senses down position.



3. Attempt any FOUR : **16**

(a) Explain the scan cycle of PLC.

(b) List tools of automation. State any two tools of (automation) it.

(c) Draw the block diagram of DC input module.

(d) Explain the instructions :

(i) XIC

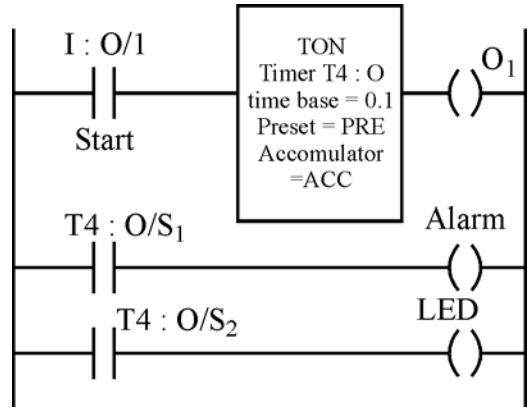
(ii) XIO

Which types of relay contacts use these instructions ?

(e) Explain why grounding is necessary for PLC during installation.

4. (A) Attempt any THREE : **12**

(a) In the given ladder diagram, the alarm is ON for 10 sec. After 10 sec the LED is ON. What will be the value of PRE and what are S_1, S_2 and O_1 bits ?

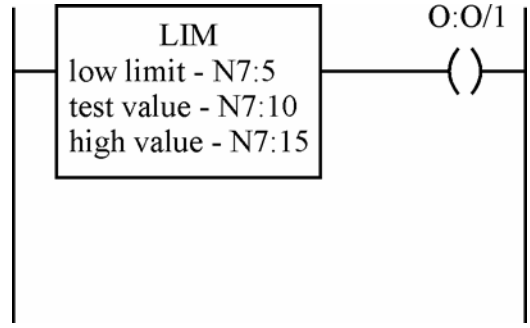


(b) Explain the following specialty I/O modules :

(i) Communication module

(ii) RTD input module

(c) Draw ladder diagram to start ‘motor 1’ when ‘start’ button is pressed. After 10 sec. motor 2 will be ON, ‘stop’ switch stops ‘motor 1’ and 5 seclater ‘motor 2’ stops.



(d) Explain how faulty LEDs of I/O modules are detected.

(B) Attempt any ONE : **6**

(a) Name any six types of switches used as input devices with respect to PLC.

(b) Draw the block diagram of analog output module and explain.

5. Attempt any TWO : **16**

(a) Draw the block diagram of AC output module. Which devices are used as switching circuit and filter and why ? Which device is used as switching device in DC output module ?

(b) (i) Write the ladder program for the following instruction list program :

LD $I_{0.0}$

OR $I_{0.1}$

ANN $I_{0.2}$

ST $Q_{0.1}$

(ii) Write a ladder program for sequential ON/OFF control of lamps.

(c) Write a ladder program for the following condition :

(i) Calculate the output $Y = \sqrt{A^B + \tan c}$

where A = N7: 0, B = N7 : 1, C = N7 : 2

(ii) If Y > N 7 : 3 switch ON red LED

If Y ≤ N7 : 3 switch ON green LED

6. Attempt any FOUR : **16**

(a) Draw the block diagram of Stepper Motor control module.

(b) Develop ladder diagram for 24 hours day time clock.

(c) What are the important guidelines for maintenance of PLC ?

(d) State any :

(i) two comparison instruction

(ii) two data handling instruction used in PLC

(e) Explain the method of detecting fault in a ladder program in PLC.

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