15162

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

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

Marks

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

(a) Define automation. State need of automation.

(b) Draw block diagram of AC input module of PLC and write function of threshold detector block.

(c) Describe functioning of NO, NC, Latch and Unlatch instructions with their symbols.

(d) Draw labelled block diagram of analog output module.

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

(a) (i) Enlist advantages of PLC over relay Logic.

(ii) Enlist any four output devices used with PLC and state their uses.

(b) Draw neat block diagram of analog input module and explain, enlist its two specifications.

2. **Attempt any TWO :**   **16**

(a) (i) Give detail classification of PLC programming languages.

(ii) Explain sequencer instruction with example.

(b) A railway station has 3 platforms A, B and C. One train is coming into station. The entry to this train is to be given to platform A if platform A is empty, if both platforms A and B are occupied then it has to be given entry to platform C, if all platforms are full then train has to wait. Design necessary ladder diagram with proper assumption and truth table.

(c) Design traffic light control program with following conditions :

(1) Two inputs – START & STOP (Both push buttons)

(2) Three outputs – Red, Green & Yellow lamps

(3) Repeat cycle given in Fig. 1 until, STOP button is pressed.
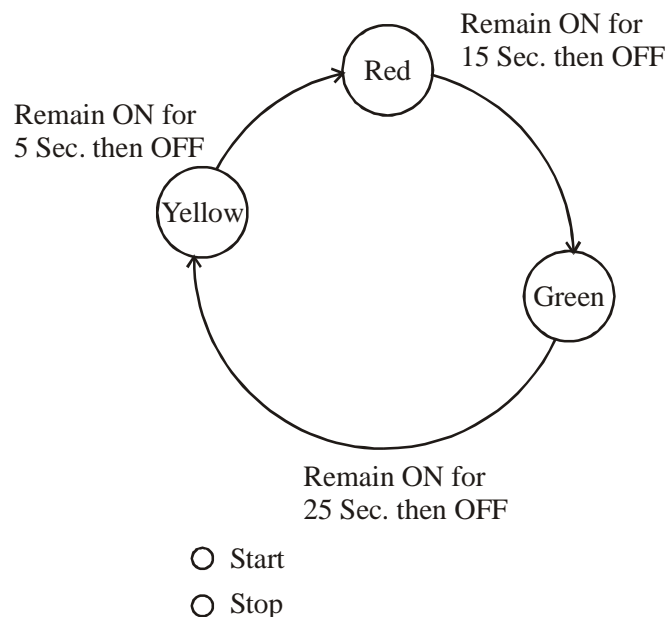
Fig. 1

3. Attempt any FOUR : **16**

(a) State classification of PLC based on type and size.

(b) Enlist any four automation tools used in process. Explain DCS.

(c) Give specifications of AC and DC input module (2 each).

(d) For timer instruction, if addressing is

T4 : 1/DN, what does T, 4, :, 1, / and DN indicates.

(e) Enlist any four parameters to be considered while PLC installation. Describe grounding.

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

    (a) Draw functional block of on-delay timer instruction, state function of

        (i) Enable bit (EN)

        (ii) Done bit (DN)

        (iii) Timing bit (TT)

    (b) Describe term Redundancy, list its types.

    (c) Draw symbol, Boolean equation, electrical and ladder diagram from given truth table.

Input		Output
A	B	Y
0	0	0
0	1	1
1	0	1
1	1	0

    (d) What are the guidelines to maintain PLC in good running conditions ?

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

    (a) Explain the term 'speed of execution' with proper example.

    (b) Describe criteria on which input/output modules are selected.

5. Attempt any TWO : **16**

    (a) Draw neatly and explain sourcing and sinking I/O modules in detail.

    (b) (i) Enlist four advantages of ladder programming.

        (ii) Write PLC ladder program to measure frequency of events using timer and counter and explain it.

    (c) (i) Draw logic diagram and PLC ladder diagram for 4 : 1 multiplexer.

        (ii) Write its Boolean equation and truth table.

6. **Attempt any FOUR :** **16**

    (a) Explain communication module in detail.

    (b) Draw and explain instruction format of up-counter with waveforms.

    (c) During PLC installation, how noise suppression is done ?

    (d) Convert following equation into ladder logic

        $A = \sqrt{Log_n\ B + \sin C}$

    (e) Illustrate fault detection techniques for LED status of input and output module.

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