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B.E. (Electronics) (Semester - II)
PROCESS AUTOMATION
(2012 Pattern)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates :

1) *Answer Q. No. 1 or Q. No. 2, Q. No. 3 or Q. No. 4, Q. No. 5 or Q. No. 6, Q. No. 7 or Q. No. 8, and Q. No. 9 or Q. No. 10.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right side indicate full marks.*
4) *Use of Calculator is allowed.*
5) *Assume suitable data if necessary.*

Q1) a) Draw the following instrument line symbols. **[5]**

     i) Pneumatic Signal

     ii) Electric Signal

     iii) Hydraulic Signal

     iv) Electromagnetic or sonic signal (guided)

     v) Electric binary signal

   b) State the significance of process control with respect to safety. quality and profits? **[5]**

OR

Q2) a) Explain with suitable example process control block diagram. **[5]**

   b) State various control system objectives and control system evaluation criteria. **[5]**

Q3) a) State the equation for a proportional integral controller. Draw a circuit diagram for a proportional integral (PI) mode controller. **[4]**

   b) What do you mean by process loop tuning? Enlist different tuning methods and explain any one method in detail. **[6]**

OR

P.T.O.

Q4) a) Define and state the formulae for the following terms. **[4]**

    i)   Valve sizing coefficient (C_v)

    ii)   Rangeability

  b) Explain two position (ON-OFF) control action with neutral zone. State applications of two position control. **[6]**

Q5) a) Explain with neat diagram architecture of a PLC? Give important specifications of a PLC. **[9]**

  b) Prepare the physical ladder diagram for the control problem shown in figure.

'The elevator shown in Figure employs a platform to move objects up and down. The global objective is that when the UP button is pushed. the platform carries something to the up position. and when the DOWN button is pushed. the platform carries something to the down position. The following hardware specifications define the equipment used in the elevator :

Output Elements

Ml = Motor to drive the platform up

M2 = Motor to drive the platform down

Input Elements
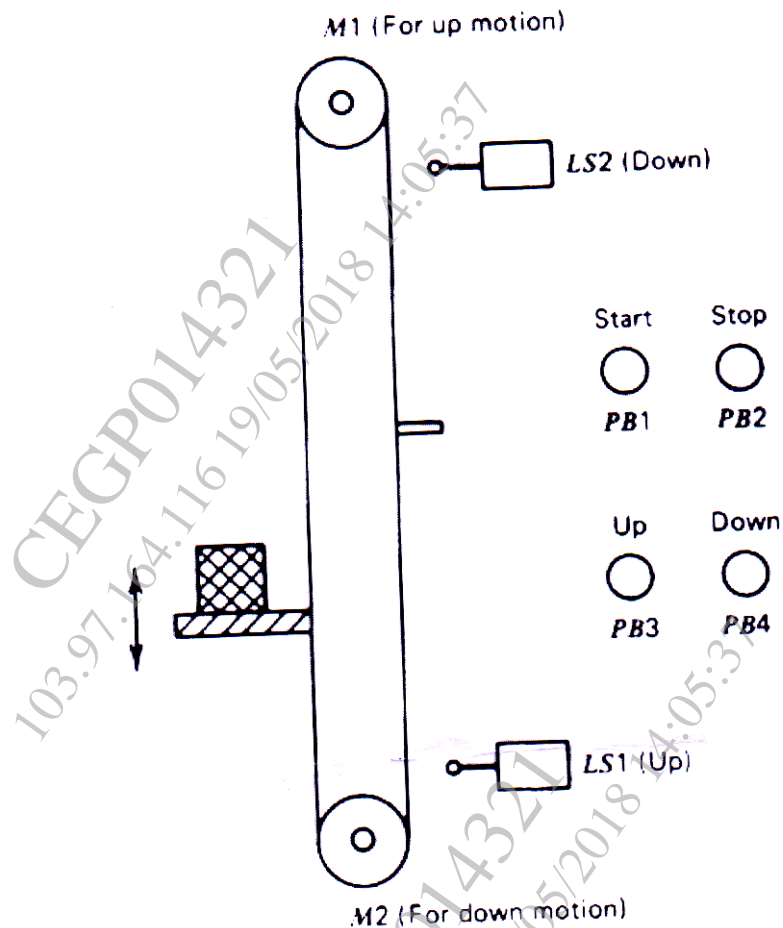
START = NO push button for START

STOP = NO push button for STOP

UP = NO push button for UP command

DOWN = No push button for DOWN command

LS1 = NC limit switch to indicate UP position

LS2 = NC limit switch to indicate DOWN position **[8]**

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M1 (For up motion)

LS2 (Down)

Start   Stop
○   ○
PB1   PB2

Up   Down
○   ○
PB3   PB4

LS1 (Up)

M2 (For down motion)

OR

Q6) a) Explain the PLC operation with respect to

    i)   I/O scan mode

    ii)   Execution mode

    iii)   Scan time

                                                 [9]

    b) Develop physical ladder diagram for a bottle filling plant.   **[8]**

Q7) a) Explain feed forward control scheme for a heat exchanger.   **[9]**

    b) Write a short note on Statistical Process Control (SPC)   **[8]**

Q8) a) Explain with neat P & I diagram instrumentation scheme for a multiple effect evaporator. **[9]**

b) Explain with block diagram the concept fuzzy logic control. **[8]**

Q9) a) Explain architecture of a typical Distributed Control System (DCS). State important features and advantages of DCS. **[8]**

b) Explain the functions of RTU and MTU in a SCADA. State applications of SCADA. **[8]**

OR

Q10) Write Short notes on

a) Strip Chart recorder **[8]**

b) Direct Digital Control system **[8]**

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