

22531

24225

3 Hours / 70 Marks

Seat No.

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- Instructions* –
- (1) All Questions are *Compulsory*.
 - (2) Answer each next main Question on a new page.
 - (3) Illustrate your answer 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. Attempt any FIVE of the following: 10
 - a) Define :–
 - i) Delay Time
 - ii) Settling Time.
 - b) Name any four PLC programming languages.
 - c) Draw electronic PI controller using OP Amp.
 - d) List any two input and output devices of PLC.
 - e) Draw general block diagram of closed loop control system.
 - f) Draw symbol of No and Nc contacts used in PLC.
 - g) Sketch and label the time response for second order system.

P.T.O.

2. Attempt any THREE of the following: 12

- a) Compare open loop and closed loop system on basis of following points.
 - i) Feedback path
 - ii) Complexity
 - iii) Cost
 - iv) Accuracy.
- b) Draw ladder logic diagram for –
 - i) Half adder
 - ii) Half subtracter.
- c) Draw and describe working of ON-OFF controller.
- d) For a given transfer function.

$$\text{T.F.} = \frac{10(S+3)}{(S+2)(S+1)(S+4)} \text{ find}$$

- i) Poles
- ii) Zeros
- iii) Characteristics equation.
- iv) Plot poles and zeros in 'S' plane.

3. Attempt any THREE of the following: 12

- a) For a system with characteristics equation.
$$s^5 + 4s^4 + 10s^2 + 5s + 24 = 0.$$
Examine the stability of system by Rouths stability criterion.
- b) State need of PLC in automation.
- c) Draw the standard test signals used in time domain analysis and state mathematical statement for each.
- d) Describe AC input module of PLC.

4. Attempt any THREE of the following:

12

- Draw PID controller and write the output equation.
- Discuss any one special case of Rouths criterion.
- Explain scanning cycle of PLC.
- Draw PLC ladder diagram for –
 - Z input OR gate logic.
 - NOR gate logic.

5. Attempt any TWO of the following:

12

- Find T.F. by using block diagram reduction rules $T.F. = \frac{C(S)}{R(S)}$
Refer Figure No. 1.

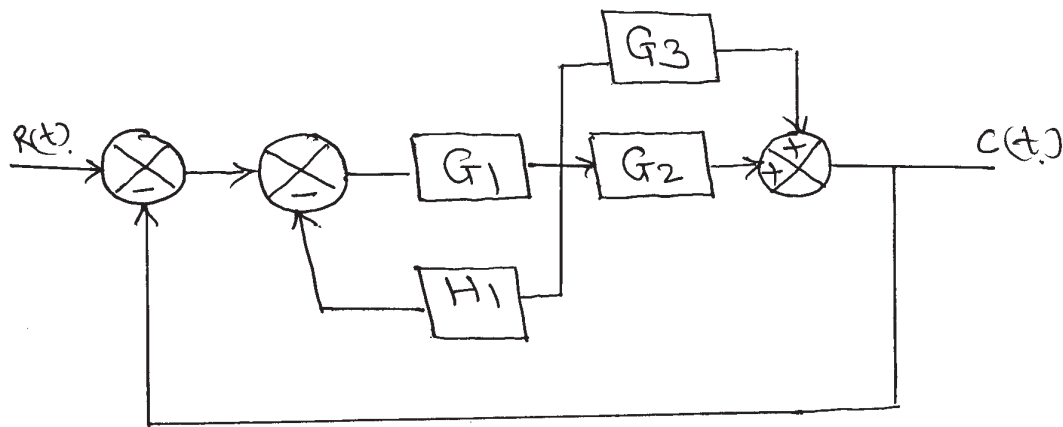


Fig. No. 1

- Draw ladder diagram for ON-OFF of lamps for following operations.
 - START push button switch ON green and RED lamp.
 - STOP push button switch OFF green lamp first and after 20 seconds red lamp.
- With respect to PLC.
 - Define speed of execution
 - Describe memory organisation of PLC.

6. Attempt any TWO of the following:**12**

- a) Illustrate PLC timer in detail with symbol and waveform.
- b) Develop ladder program for 4:1 multiplexer.
- c) For the given differential equation

$$\frac{d^2y(t)}{dt^2} + 4 \frac{dy(t)}{dt} + 8y(t) = 8x(t)$$

Find all time response specifications.
