22531

Seat No.

Instructions – (1) All Questions are *Compulsory.*

(2) Answer each next main Question on a new page.

(3) Illustrate your answers 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) List any four names of PLC programming languages.

b) Define transient response and steady state response for any system.

c) Calculate the order of following system.

$$G(S) = \frac{(S+2)(S+5)}{S(S+3)(S+4)}$$

d) List two inputs and two output devices of PLC.

e) Sketch and label the time response for second order system.

f) Draw the general block diagram of closed loop control system.

g) Draw electronic PI controller using Op-amp.

P.T.O.

Marks

2. **Attempt any THREE of the following:** **12**

a) State any four block diagram reduction rules with neat diagram.

b) Draw neat block diagram of process control system.

c) Describe Discrete AC output modules of PLC with the help of neat diagram.

d) Illustrate the steps for PLC Installation.

3. **Attempt any THREE of the following:** **12**

a) Discuss the special cases of Rourth's Criterion.

b) Draw the PLC ladder diagram for 2 input OR logic gate.

c) Draw labeled block diagram of PLC.

d) Elaborate ON - OFF controller with suitable example. State significance of neutral zone.

4. **Attempt any THREE of the following:** **12**

a) Classify Fixed and Modular PLC.

b) Describe PID controller with neat diagram, output equation and response.

c) Define the following terms related to second order system.

    (i) Damping

    (ii) Damping Ratio

    (iii) Undamped Natural Frequency.

    (iv) Damped Frequency.

d) Describe Linearity Property and Change of Scale Property of Laplace Transform.

e) Describe Relay instruction for PLC.

Marks

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

a) For a unity feedback control system
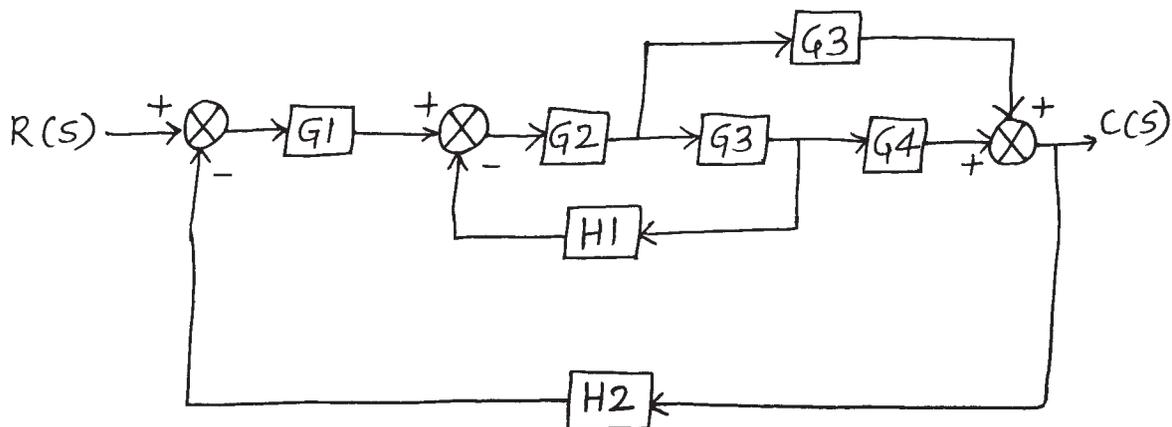
$$G(S) = \frac{100\,(S + 2)}{S^2}$$

Calculate all the Error constants.

b) Describe Operating cycle of PLC with neat diagram.

c) Develop a ladder diagram for 4:1 Multiplexer

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

a) Illustrate PLC Timer in detail.

b) Apply the block diagram reduction rules to obtain Transfer Function C(S) / R(S) of the following block diagram. (Refer Figure No. 1)

Figure No. 1

c) Describe four standard test inputs with their mathematical expression and Graphical Representation.

————