

Scheme -I
Sample Test Paper - I

Program Name : Diploma in Industrial Electronics
Program Code : IE
Semester : Fourth
Course Title : Basic Control Systems
Max. Marks : 20

22429

Time : 1 Hour

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.

Q. 1 Attempt any FOUR

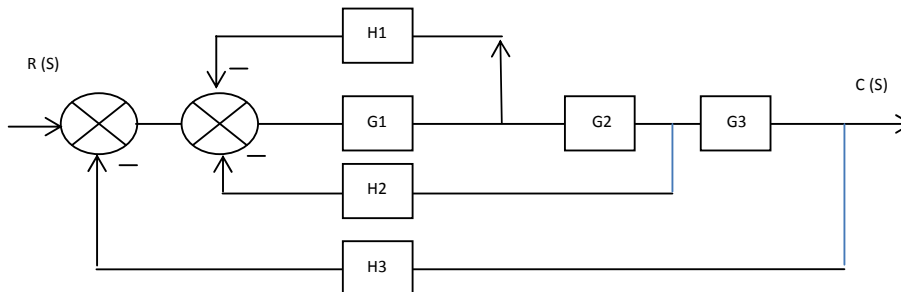
08 Marks

- a) Draw neat sketches of standard test signals :- (i) step (ii) Ramp.
- b) Define transfer function of a system.
- c) List any four rules of block diagram reduction technique.
- d) Give an example of first order & second order control system each.
- e) Define poles & zeroes of the system.
- f) Define stability of the system.

Q. 2 Attempt any THREE

12 Marks

- a) Compare open loop and closed loop control system on the basis of block diagram transfer function, examples and stability.
- b) List standard test input signals. Give their laplace representation.
- c) Derive the transfer function of following block diagram using block diagram reduction technique.



- d) Derive unit step response of 1st order system.
- e) Define (i) Relative stability (ii) Marginally stable system.
- f) State Routh's stability criterion. Explain with example.

Scheme -I
Sample Test Paper - II

Program Name : Diploma in Industrial Electronics
Program Code : IE
Semester : Fourth
Course Title : Basic Control Systems
Max. Marks : 20

22429

Time : 1 Hour

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.

Q. 1 Attempt any FOUR

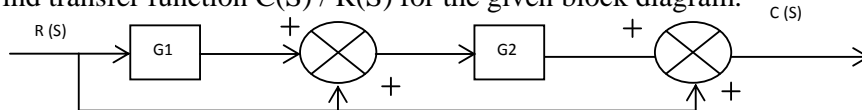
08 Marks

- a) Draw pole locations in S-plane for stable system.
- b) Draw block diagram of process control system.
- c) Compare PI & PD controller (any four points)
- d) Give the output equation of PI,PD& PID controller
- e) Draw the block diagram of servo system.
- f) Compare stepper motor with DC Servo motor (any four points)

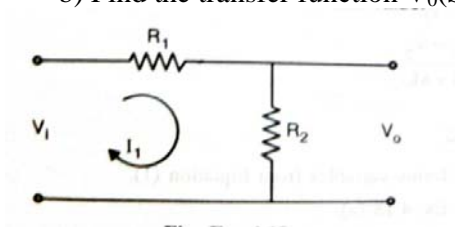
Q. 2 Attempt any THREE

12 Marks

- a) Find transfer function $C(S) / R(S)$ for the given block diagram.



- b) Find the transfer function $V_o(S) / V_i(S)$ of the circuit shown below.



- c) Describe with sketches the PID Controller
- d) Find stability of system whose characteristics equation is $S^5 + S^4 + 3S^3 + 9S^2 + 16S + 10 = 0$ use Routh's criterion
- e) Define servo system. Draw block diagram of DC servo - system.
- f) Draw electronics circuit diagram for PD Controller.

Scheme - I

Sample Question Paper

Program Name : Diploma in Industrial Electronics
Program Code : IE
Semester : Fourth
Course Title : Basic Control Systems
Max. Marks : 70

22429

Time : 3 Hours

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.

Q.1 Attempt any FIVE of the following

10 Marks

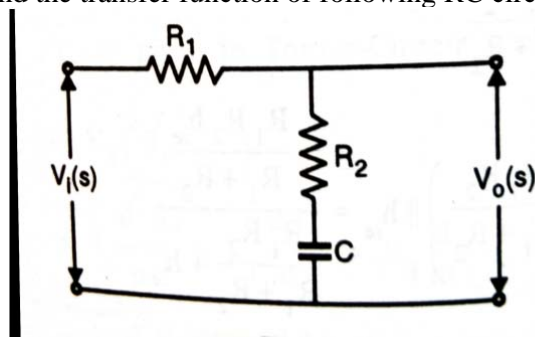
- a) Define transfer function of a system.
- b) List any four rules of block diagram reduction technique.
- c) Define poles and zeros of the system.
- d) Give laplace representation of the step and ramp function.
- e) State any four properties of transfer function.
- f) Find poles of the system :- $G(S) = \frac{3(s+3)(s+1.5)^3}{(s+4)(s+7)^2}$

- g) State the order and type of the system :- $\frac{s+2}{s^3(s^2+4s+5)}$

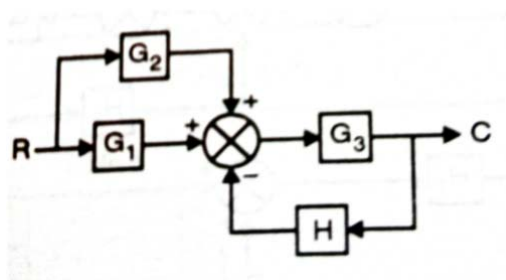
Q. 2 Attempt any THREE

12 Marks

- a) Find the transfer function of following RC circuit.



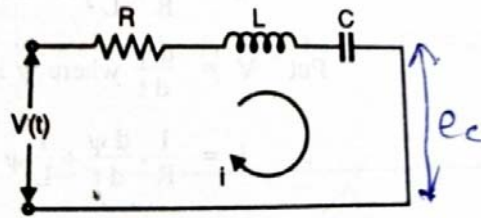
- b) Define On-OFF controller. Describe its working principle using one example.
- c) A system has poles at $S = -3$, $S = -2$ and zero at $s = -1$. Represent the system in S plane.
- d) Find the $C(s)/R(s)$ of the following system.



Q.3 Attempt any THREE

12 Marks

- a) Explain with sketch the stability of the given control system.
- b) Derive unit step response of first order system.
- c) Derive the transfer function of given RLC circuit.



- d) Explain in detail standard test signals with neat sketches.

Q.4 Attempt any THREE

12 Marks

- a) Describe with block diagram the process control system.
- b) Draw response of PID controller and give its applications. (any four).
- c) Compare PI and PD controllers.
- d) Draw and explain DC servo system.
- e) Draw block diagram of AC servo system and explain it.

Q.5 Attempt any TWO

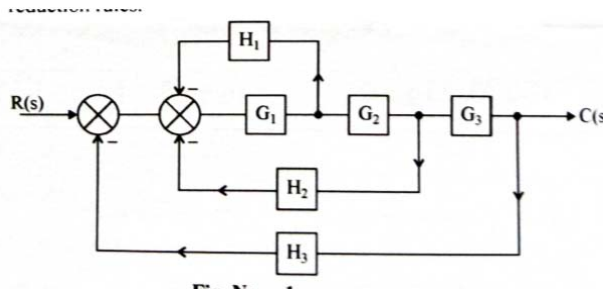
12 Marks

- a) Compare PI, PD & PID controller.
- b) Explain process control system and give classification of control actions.
- c) Describe characteristics of DC servo motor. Compare DC servo motor with normal motor.

Q.6 Attempt any TWO

12 Marks

- a) Derive the transfer function of block diagram using block diagram reduction technique.



- b) Find the stability of the fourth order system having characteristics equation :- $S^4 + 8S^3 + 18S^2 + 16S + 5 = 0$ using Routh's stability criteria.
- c) Find the roots of the following polynomial by use of the root locus method. $3S^4 + 10S^3 + 21S^2 + 24S + 30 = 0$