

B.E. Electrical VII
(3 Hours)

QP CODE : 810901
01.6.17
[Total Marks : 80]

N.B 1) Question No 1 is Compulsory.

- 2) Attempt any three questions from the remaining.
- 3) Make any suitable assumption whenever required.
- 4) Figure to the right indicates full marks.

Q1) Solve any four questions.

[04*05]

- A) Explain the start & stop interlocking circuit.
- B) Derive the expression for transfer function of lead compensator & draw pole-zero plot in s-plane.
- C) Explain the concept of observability.
- D) What do you mean by "Tustin Transformation". Why it is used?
- E) Explain the reverse acting controller.

Q2)

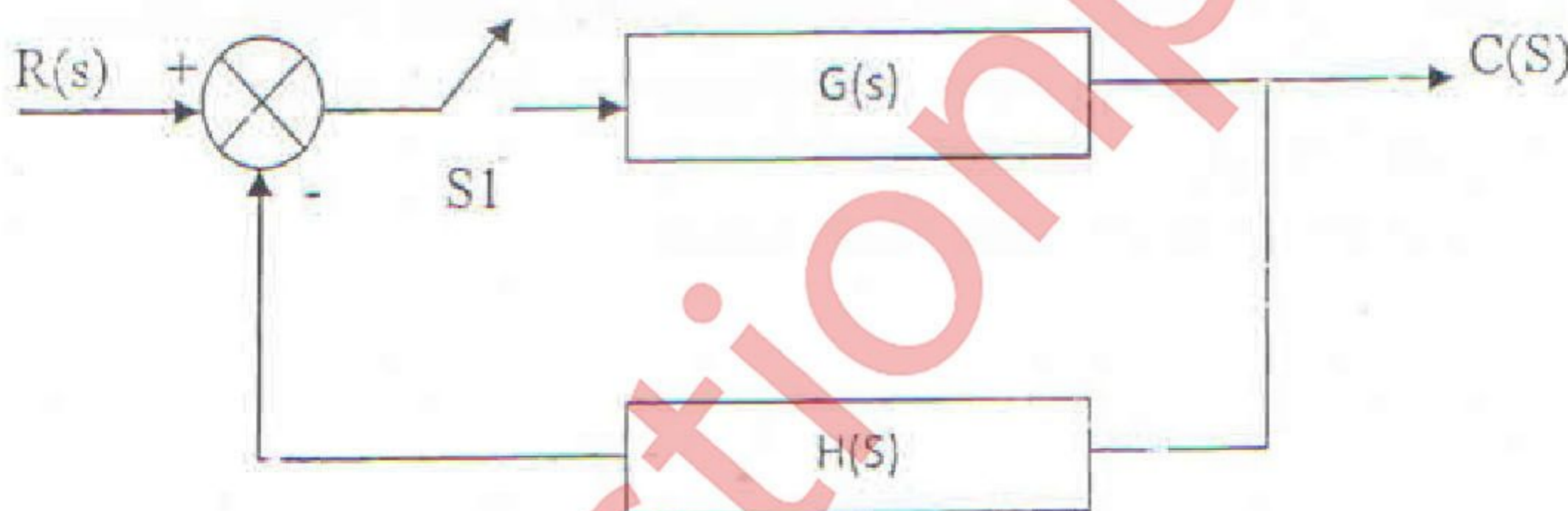
- A) Design a Lag compensator for a unity feedback system with forward transfer function $G(s) = \frac{K}{s(s+1)(0.5s+1)}$ to meet the following specification,

$$\phi_M = 40^\circ, G_M = 10db \text{ \& } K_V = 5sec^{-1}.$$

[15]

- B) Find the Z-transform of the system shown in figure,

[05]



Q3)

- A) Design a controller via transformation method for the system $\frac{C(s)}{R(s)} = \frac{24}{(s+2)(s+3)(s+4)}$ represented in parallel form to yield transient response describe by 20% O.S. & settling time of 4 seconds.

[15]

- B) Develop a flowchart for a digital compensator define by $G_C(z) = \frac{X(z)}{E(z)} = \frac{z+0.5}{z^2-0.5z+0.7}$

[05]

TURN OVER

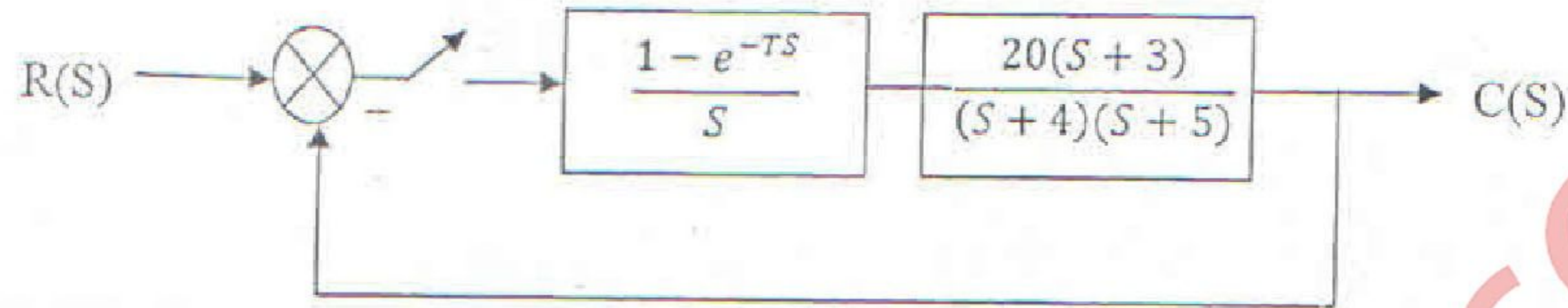
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Q4)

- A) For the step, ramp & parabolic input, find the steady state error for the unity feedback control system shown in figure, with sampling time interval "T=0.1 Seconds". [10]



- B) Explain the integral windup effect & Anti windup circuit. [10]

Q5)

- A) Develop a PLC ladder diagram to manufacture an inductor of 5 mH & 10 mH. When 5 mH inductor is produced a machine makes 400 revolutions to wind the coil. When 10 mH inductor is produced a machine makes 800 revolutions to wind the coil. [10]
- B) Explain the implementation of digital compensator. [10]

Q6)

- A) Develop a PLC ladder diagram to run the DC motor in forward/reverse direction. If forward or reverse push button is pressed motor has to run either in forward or reverse direction respectively after a delay of 25 seconds. Also provide protection for sudden change in direction of DC motor. [10]
- B) Explain the different input & output field devices of PLC. [10]