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29/05/18

BE (Electrical) Sem VIII

CBGS May 18

Control Sys - II

Q.P. Code : 27291

1/2

[Time: Three Hours]

[Marks: 80]

Please check whether you have got the right question paper.

- N.B:
1. Q. No 1 is compulsory. Attempt any three questions from rest.
  2. Make suitable assumption wherever applicable.
  3. Use of graph paper or semi log paper is mandatory wherever applicable.
  4. Write legible.

- Q. 1 Attempt any four. (20)
- a) Explain what is lag, lead and lag-lead compensators.
  - b) Why and how much compensation is required in phase margin while designing lag compensator using frequency response.
  - c) Describe the configuration of an observer. Before that answer what is an observer.
  - d) Explain briefly the phase variable form of state-space representation.
  - e) Explain stability in digital control system.

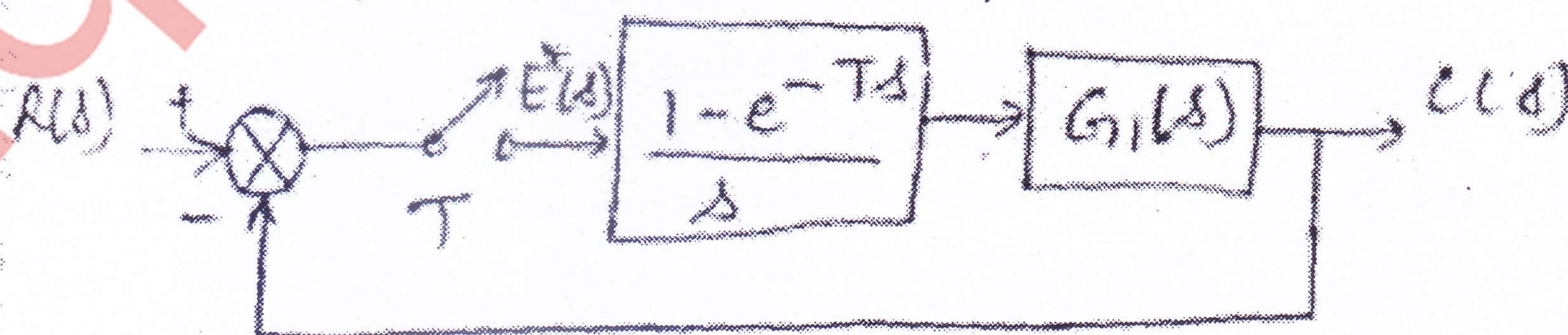
- Q. 2 a) For a unity feedback system with open loop transfer function  $G(s) = \frac{k}{s(s+7)}$  is operating (10)  
with 15 % overshoot and 2sec setting time. Using frequency response technique, design a compensator for  $K_v = 50$  with the phase margin frequency and phase margin remaining approximately same as in the uncompensated system.
- b) Design a linear state feedback controller to give 20% overshoot and a setting time of 2 (10)  
second for a plant  

$$G(s) = \frac{s+6}{(s+9)(s+8)(s+7)}$$
 that is represented in cascade form. Use transformation matrix.

- Q. 3 a) Explain how steady state error design via integral control is implemented in design via (10)  
state space model.
- b) Consider the plant  $G(s) = \frac{s+2}{(s+5)(s+9)}$  (10)  
Design an observer for  $\xi = 0.6$  and  $\omega_n = 120$  using observer canonical form only.

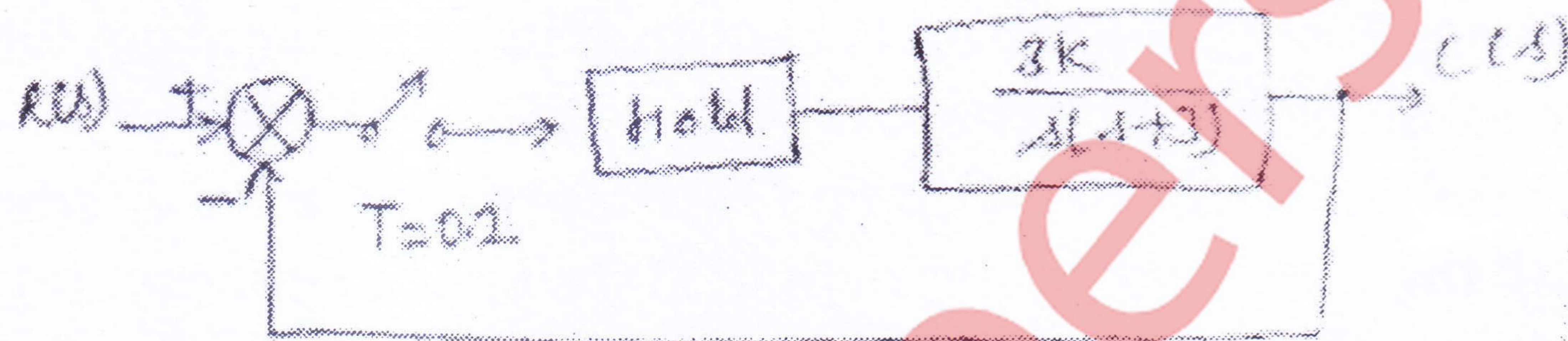
- Q. 4 a) For step, ramp and parabolic inputs, find the steady error for the feedback control system (10)  
if  

$$G_1(s) = \frac{10}{s(s+1)}$$



Let T = 0.1 sec.

b) Find the range of gain K to make the system shown in the figure stable. (03)



- Q. 5 a) Explain what is three term P/D controller. (05)  
 b) Explain what modification in D controller is done while using it in a noisy system and why. (05)  
 c) Explain following instructions used in PLC ladder programming.  
 i) MOV  
 ii) Examine OFF  
 iii) Latch and unlatch  
 iv) ADD  
 v) Return (10)  
 Explain each with the help of at least two rung ladder program.

- Q. 6 a) Write a ladder program to flash a light at a frequency of 0.05 Hz using ON delay timer instruction. (10)  
 b) Write short note on any one. (10)  
 a) Memory unit of PLC  
 b) Arithmetic instructions of PLC ladder programming  
 c) Counter instructions in PLC ladder programming

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