

II B. Tech II Semester Supplementary Examinations, November - 2019
CONTROL SYSTEMS
 (Com to ECE, EIE, ECC)

Time: 3 hours

Max. Marks: 70

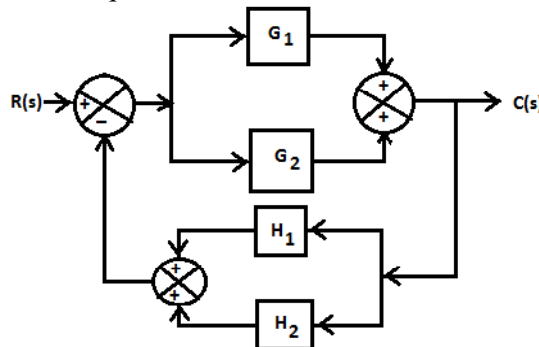
- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
 2. Answer **ALL** the question in **Part-A**
 3. Answer any **FOUR** Questions from **Part-B**

PART -A

1. a) Explain about the negative feedback of loop with examples. (2M)
- b) Explain about Mason's gain formula. (2M)
- c) Derive the response of a standard first order system for unit step input. (3M)
- d) What is the effect of addition of pole to a transfer function on Root Locus? (2M)
- e) What is Bode plot? Draw the Bode plot of $G(s)=1/(1+ST)$. (3M)
- f) What are the properties of State Transition Matrix? (2M)

PART -B

2. a) Obtain the transfer function $C(s)/R(s)$ for the block diagram below using block Diagram reduction technique. (7M)



- b) What do you mean by the sensitivity of the control system and discuss the effect of feedback on sensitivity. (7M)
3. a) Define the steady state error and error constants of different types of inputs. (7M)
- b) Derive the expressions for peak time and settling time of a standard second order under damped system. (7M)
4. A unity feedback system has an open loop function $G(s)=K/(S(S^2+3S+10))$ (14M)
 make a rough sketch of root locus plot by determining the following
 - (i) Centroid, angle of asymptotes
 - (ii) angle of departure of root loci from the poles,
 - (iii) Breakaway points if any,
 - (iv) points of intersection with Jw axis and
 - (v) maximum value of k for stability

5. The open loop transfer function of a unity feedback system is given (14M)
By: $10(S+3)/(S(S+2)(S^2+4S+100))$.
Draw the bode plot, find the gain margin and phase margin and comment on stability by bode plot.
6. a) Discuss the effect of PD and PI on performance of a control system. (7M)
b) Draw the electrical circuit diagram that represents the Lag-Lead Compensator (7M) and explain in detail.
7. The transfer function of a control system is given by: (14M)
$$\frac{Y(S)}{U(S)} = \frac{S+2}{S^3+9S^2+26S+24}$$

Check for controllability and observability.

