Code No: RT31043 **R13** SET - 1

III B. Tech I Semester Supplementary Examinations, May- 2018

CONTROL SYSTEMS

(Common to Electronics and Communication Engineering and Electronics and Instrumentation Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**
(Normal and semi & polar graph sheet are to be supplied)

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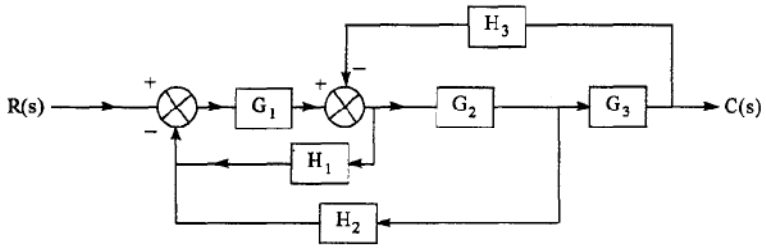
PART –A

1	a)	Explain the limitations of closed loop system over open loop system.	[3M]
	b)	Explain the advantages of signal flow graph over block diagram representation.	[4M]
	c)	What are Effects of proportional integral systems?	[4M]
	d)	What are effects by adding poles in the root locus?	[4M]
	e)	Define gain margin?	[4M]
	f)	What is Obsevability?	[3M]

PART -B

2	a)	Explain the temperature control system concepts using open loop as well as closed loop systems	[8M]
	b)	What is signal flow graph and explain the steps to reduce the system flow graph using mason gain formulae.	[8M]
3	a)	Derive the transfer function of field controlled DC Servo motor.	[8M]
	b)	Obtain the transfer function C(s)/R(s) by using Block diagram algebra for the figure given below:	[8M]



4	a)	For unity feedback system having open loop transfer function as $G(s) = \frac{K(s+2)}{s^2(s^2+7s+12)}$. Determine error constants K_p, K_v and K_a?	[8M]
	b)	A unity feedback control system has an open loop transfer function, $G(s) = \frac{10}{s(s+2)}$ Find the rise time, percentage overshoot, peak time and settling time for a step input of 12 units.	[8M]
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5 a) The characteristics equation of feedback control system is $S^3 + 3KS^2 + (K+2)S + 4 = 0$. determine the range of K for which system is stable. [8M]

b) Plot the root locus pattern of a system whose forward path transfer function is $G(s) = \frac{K(S+1)}{s^2(s+2)}$. [8M]

6 a) Find the Gain margin and phase margin of the system if the open loop transfer function is $G(s) = \frac{5}{S(S+2)}$ [8M]

b) The open loop transfer function of a feedback control system is given by $G(s)H(s) = \frac{K}{S^2+S-2}$ Plot the Nyquist plot and show that the closed loop system is stable if ≥ 2 . [8M]

7 a) What is lag compensator? [4M]

b) A unity feedback system has an open loop transfer function, $G(s) = \frac{K}{S(1+2S)}$ .design a suitable lag compensator so that phase margin is 40^0 and the steady state error for ramp input is less than or equal to 0.2. [12M]

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