ether)	
First the show argue sufficients for a ratio where the artist function in $\Omega$ on $H$ or $I$ and $I$ are in $I$ and $I$ are all and all and all and all are all and all and all are all are all and all are all and all are al	
0 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 /	
Struck is point plot for the following training fourtion and first Gain pro- over Inquency Phase mass over Sequency Gain margin and Phase margin. On Cl. 69 = 400/8 (e4 200 + 3.0).	ii.
A mility like allanch cannot be seen in the seen in an implemental months on a Control of the Co	le .
, min	
December to the matter of the set has a green of Mydrest or shifts of the whome of the control of the set of t	
, UIO	
Ollars the complete californ of rechangements state equation using itun- deman merb of	
FraM dr=8fwr) () - THA9	
For the given source. If the North the total of the mitable leg-legel and place of the surface constant of the surface of the	
referent with consideration is retained by the legislate a pure, usequies a condition to the	



Reg. No. :						POR	ejiri).	

## Question Paper Code: 50714

Exam (a) 1

## B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2017

Fifth Semester

Electronics and Instrumentation Engineering IC6501 – CONTROL SYSTEMS

(Common to Electrical and Electronics Engineering/Instrumentation and Control
Engineering)
(Regulations 2013)

Time: Three Hours

Maximum: 100 Marks

Codes / Tables / Charts to be permitted, if any may be indicated

Answer ALL questions

PART - A

 $(10\times2=20 \text{ Marks})$ 

- 1. Define open loop and closed loop control system.
- 2. What are the basic elements used for modeling mechanical translational system?
- 3. Distinguish between type and order of a system.
- 4. What is the effect on system performance when a proportional controller is introduced in a system?
- 5. List out the different frequency domain specifications.
- 6. Give the need for lag/lag-lead compensation.
- 7. What are the necessary conditions for stability?
- 8. What are the effects adding open loop poles and zero on the nature of the root locus and on system?
- 9. Write the homogeneous and nonhomogeneous state equation.
- 10. Define state trajectory.



Try CV7



PART - B

\_(5×13=65 Marks)

11. a) Find the transfer function  $\frac{y_2(s)}{f(s)}$ 

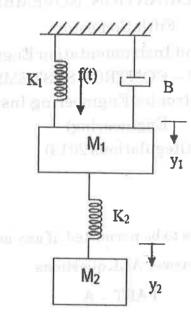


Fig. 11 a

(OR)

b) Find the overall gain C(S) / R(S) for the signal flow graph shown in Fig. 11 b.

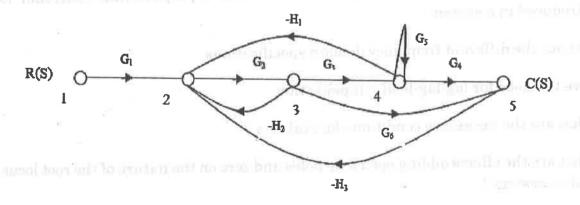


Fig. 11 b

-3- **50714** 

12. a) Derive the expressions for second order system for under damped case and when the input is unit step.

(OR)

- b) Find the static error coefficients for a system whose transfer function is, G (s). H (s) = 10/s (1 + s) (1 + 2s). And also find the steady state error for  $r(t) = 1 + t + t_{2/2}$ .
- 13. a) Sketch the Bode plot and hence find Gain cross over frequency, Phase cross over Frequency, Gain margin and Phase margin for the function

G (s) = 
$$\frac{10 (s+3)}{s (s+2) (s^2+4s+100)}$$
.

(OR)

- b) Sketch the polar plot for the following transfer function and find Gain cross over frequency, Phase cross over frequency, Gain margin and Phase margin for G(s) = 400/s(s+2)(s+10).
- 14. a) A unity feedback control system has an open loop transfer function  $G(s) = K(s+9) / s(s^2 + 4s + 11)$ . Sketch the root locus.

(OR)

- b) Determine the stability of closed loop system by Nyquist stability criterion, whose open loop transfer function is given by, G (s). H (s) = (s + 2) / (s + 1) (s 1).
- 15. a) Explain the concepts of controllability and observability.

(OR)

b) Obtain the complete solution of nonhomogeneous state equation using time domain method.

$$PART - C \qquad (1 \times 15 = 15 Marks)$$

16. a) For the given system, G(s) = K / s(s + 1)(s + 2), design a suitable lag-lead compensator to give, velocity error constant = 10 sec-1, phase margin = 50°, gain margin  $\geq 10$  dB.

OR)

b) Realize the basic compensators using electrical network and obtain the transfer function.