Roll No. | | | | | | | | | | | | | Total No. of Pages : 03

Total No. of Questions : 18

B.Tech.(Automation & Robotics) (2012 & Onward) (Sem.–4)

LINEAR CONTROL SYSTEMS

Subject Code : BTEE-402

M.Code : 57108

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

Answer briefly :

1. What are the advantages of Modern Control Theory over Classical Control Theory?
2. Why is compensation required?
3. What is the difference between absolute and relative stability?
4. Write down Mason's Gain Formula and describe each symbol.
5. Define the term Damping ratio and discuss its effects on the output of any system.
6. Describe Type of any system. Find the relation of static error constants w.r.t Type-I system.
7. Draw circuit of Phase lag network and state the advantages of using it.
8. What is the difference between Break-in and Break away Point?
9. What do you mean by Sampled Data control system?

10. Draw the F-V and F-I analogous circuit for following circuit of Fig. 1.

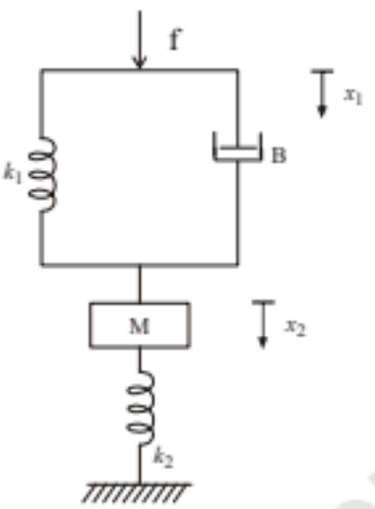

FIG.1

SECTION-B

11. A unity feedback control system having forward path transfer function $G(s) = 16/[s(s + 1)]$. Determine ω_n and ξ. If negative feedback of $(1 + Ks)$ is introduced to forward path transfer function, find the value of K to reduce Mp from 75% to 25%.

12. Derive the co-relation between Mp, Mr and ωr, ωd. Derive their relations and explain them graphically.

13. The open loop transfer function of a ufb control system is given by :

$$G(s) = \frac{K}{(s+2)(s+4)(s^2+6s+25)}$$

By applying Routh Criterion, discuss the stability of the closed loop system as a function of K. Determine the value of K which will cause sustained oscillations in the closed loop system and also find corresponding oscillation frequencies?

14. Derive mathematical model for armature controlled D.C motor.

15. Describe synchros as error detector.

SECTION-C

16. Find C/R using Block Diagram Reduction Technique. Verify your answer using SFG technique.

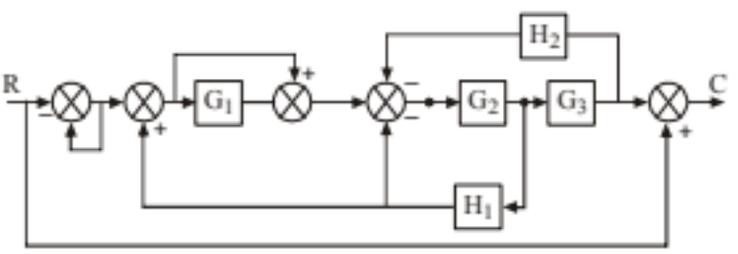

FIG.2

17. Plot the Root Locii for the closed loop control system with $G(s)=\dfrac{K}{s(s+1)(s^2+4s+8)}$.

18. Sketch the Bode Plot for the transfer function $G(s)=\dfrac{1000}{s(1+0.1s)(1+0.001s)}$.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.