KUMARAGURU
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Register Number: …….

B.E DEGREE EXAMINATIONS: MAY 2015

(Regulation 2013)

Fourth Semester

ELECTRONICS AND INSTRUMENTATION ENGINEERING

U13EIT402: Control Systems

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. The motion of mechanical elements can be described as
   a) purely rotational b) purely linear
   c) combination of (a) & (b) d) pure resistive
2. Three blocks with gains of 5, 8 and 4 are connected in parallel. The total gain of the arrangement is …….
3. The Laplace transform of impulse function is
   a) Zero b) One
   c) 1/s d) s
4. The controller which is not suitable for the control of a system which has a noisy input is ……
5. The gain margin of a system is 0 dB. It represents a
   a) stable system b) unstable system
   c) conditionally stable system d) marginally stable system
6. The two methods used to determine the closed loop frequency response from open loop responses are …… and ……..
7. The roots of the characteristics equation are the same as
   a) open-loop poles b) open-loop zeros
   c) closed-loop poles d) closed-loop zeros
8. If all the roots of the characteristics equation have negative real parts, then the system is ……..

9. The suitable compensator for a system which has pole at origin is

a) Lag b) Lead

c) Lag/Lead d) Cascade compensator

10. Write the equation related to α of lead compensator ……..

PART B (10 x 2 = 20 Marks)

(Not more than 40 words)

11. Distinguish between open loop and closed loop system.

12. Obtain the differential equation of mechanical system shown in fig-1.

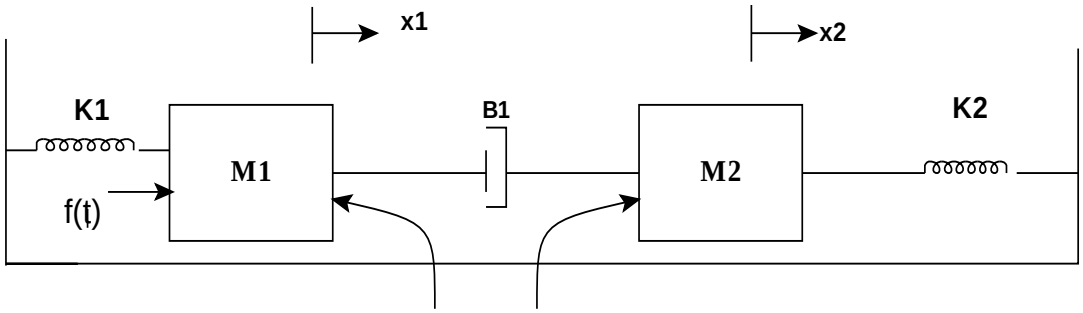


Fig-1

13. A second order system has a damping ratio of 0.6 and natural frequency of oscillation is 10 rad/sec. Determine the damped frequency of oscillation.

14. What is settling time?

15. What are the frequency domain specifications?

16. List out the advantages of Bode plot.

17. Write the necessary condition for stability of a system.

18. What are asymptotes? How will you find the angle of asymptotes?

19. When lag/lead/lag-lead compensation is employed?

20. Write the transfer function of PI controller.

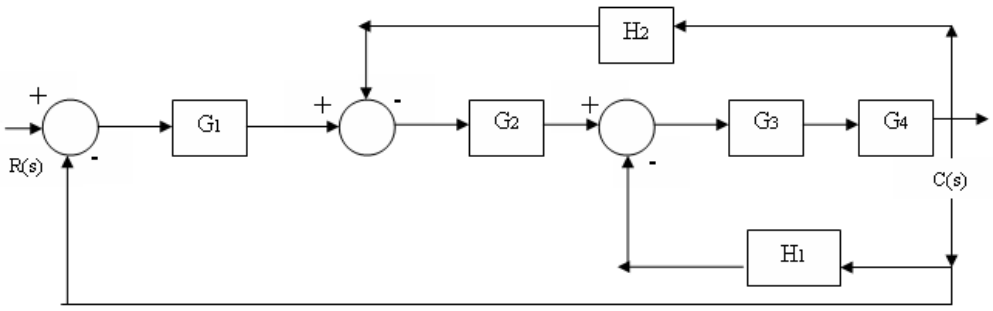
PART C (5 x 14 = 70 Marks)

(Not more than 400 words)

Q.No. 21 is Compulsory

21. i) Construct the block diagram of armature controlled dc motor (7)

ii) Using block diagram reduction circuit, obtain the transfer function for the system shown. (7)



22. a) A unity feedback control system has an open loop transfer function G(s) = 10/[s(s+2)]. Find the rise time, percentage overshoot, peak time and settling time for a step input of 12 units.

(OR)

b) A unity feedback control system has a closed loop transfer function C(s)/R(s)=25/ s^2+5s+25. Find steady state error for an input of r(t) = 1+3t.

23. a) Draw the bode plot for the system
G(s)H(s) = 5(1+2s) / [(1+0.25s)(1+4s)]

(OR)

b) Consider a unity feedback system having an open loop transfer function G(s) = K/[s(1+0.2s)(1+0.05s)].Sketch the polar plot determine the value of K so that a)Gain Margin is 18db b) Phase margin is 60°.

24. a) Determine the stability of a system whose characteristic equation is given by $s^6+s^5+3s^4+3s^3+3s^2+2s+1$ =0 using route stability criterion.

(OR)

b) A unity feedback control system has an open loop transfer function, G(s) = K/ s(s^2+4s+13).Sketch the root locus.

25. a) Give the procedure for the design of lag compensator using bode plot

(OR)

b) The transfer function of the plant to be controlled with unity feedback system is G(s)=K/$(s+10)^2$.It is specified that velocity error constant of the system be equal to 20,while damping ratio of the dominant be 0.707. Design a suitable compensation scheme to meet the specifications.

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