G 1545 (Pages : 4) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2016

Fourth Semester

Branch : Electrical and Electronics Engineering

EE 010 403—LINEAR SYSTEM ANALYSIS (EE)

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 3 *marks.*

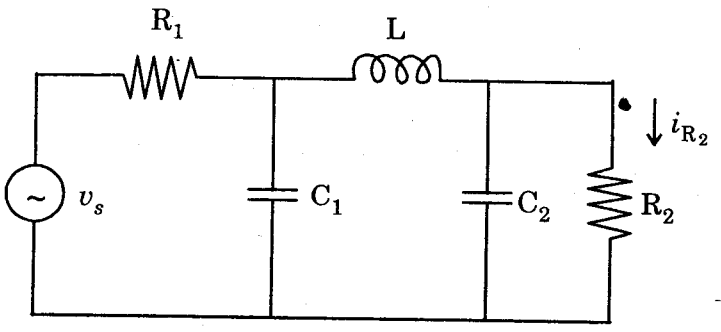
1. Distinguish between continuous time and discrete time systems.
2. What is Mason's Gain formula ?
3. What are the different standard test inputs ?
4. Define negative definiteness of a function.
5. Define transmission parameters.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*
Each question carries 5 *marks.*

6. Obtain the transfer function of the electrical network :



7. Write the state space representation of a linear time invariant system.

8. A unity feedback control system has an open loop transfer function $G(s) = \frac{10}{s(s+2-)}$. Find rise time, % overshoot, peak time, time delay and settling time for a step input of 12 units.

9. Discuss the effect of location of poles on stability.

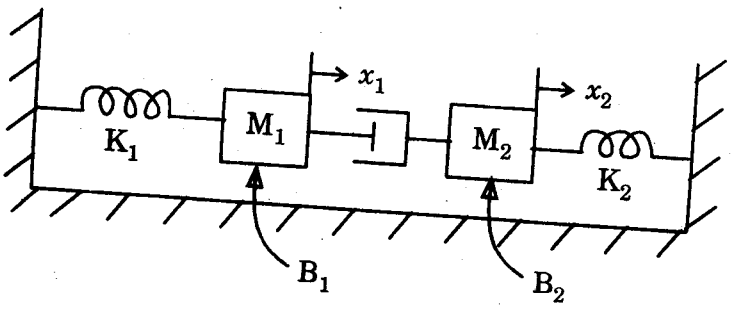
10. Discuss about driving point functions.

(5 × 5 = 25 marks)

Part C

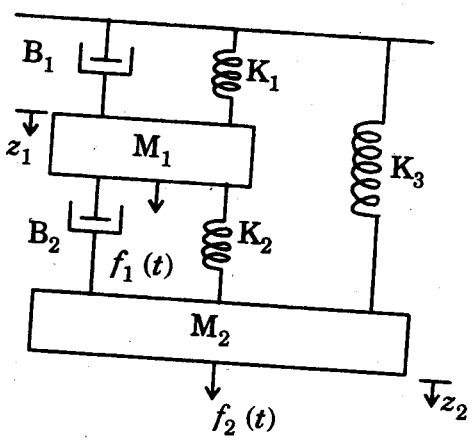
Answer **all** *questions.*
Each full question carries 12 *marks.*

11. Write the performance equation for the system shown in figure. Find the transfer function $\frac{X_2(s)}{F(s)}$.

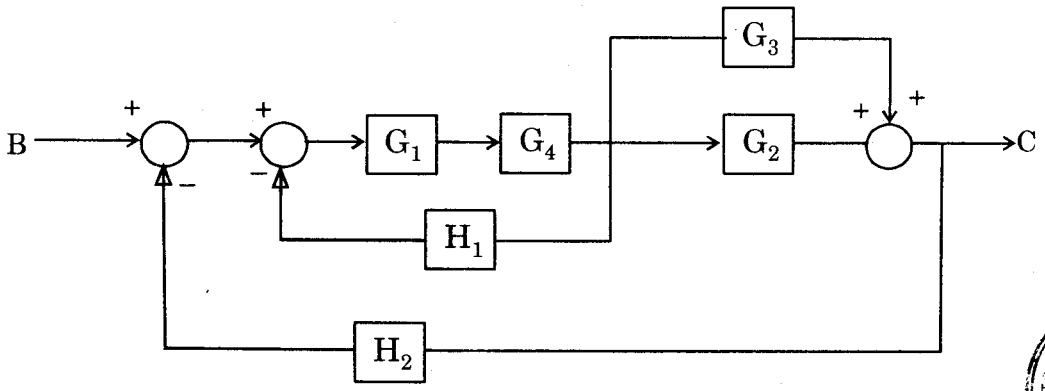


Or

12. Write the equations of motions for the mechanical system :



13. From the block diagram, determine the relationship between R and C by successive block reduction.

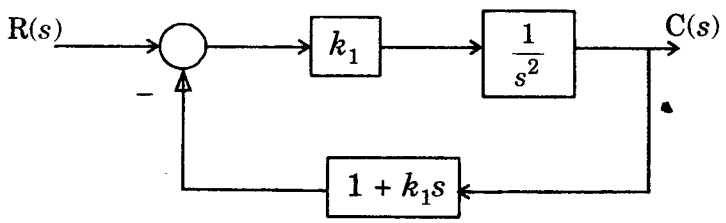


Or

14. Construct a signal flow graph representing the following system of equations :

$$X_2 = a_{12}\, X_1 + a_{22}\, X_2 + a_{42}\, X_4$$
$$X_3 = a_{13}\, X_1 + a_{23}\, X_2 + a_{43}\, X_4$$
$$X_4 = a_{34}\, X_3$$
$$X_5 = a_{35}\, X_3 + a_{45}\, X_4$$

15. For the control system shown in Fig. find the values of K_1 and K_2 so that $M_p = 25\%$ and $T_p = 4s$. Assume unit step input :



Or

16. Determine the type and order of the unity feedback control system whose open loop transfer functions are :

(a) $G(s) = \dfrac{K(1+2s)(1+4s)}{s^2\left(s^2+2s+10\right)}$.

(b) $G(s) = \dfrac{K}{s^2\left(s^2+4s+200\right)}$.

Find also static error coefficients and the errors for unit step and unit ramp inputs.

17. Examine the stability of the system having characteristic equation :

$3s^4 + 10s^3 + 5s^2 + 5s + 3 = 0$ using Routh's criterion.

Or

18. A feedback system has an open loop transfer function :

$$G(s)\,H(s) = \frac{Ke^{-s}}{s\left(s^2+2s+1\right)}.$$

Determine by the use of Routh stability criterion the maximum value of K for the closed loop system to be stable.

19. Write short notes on :

(a) Impedance converter.

(b) Gyrator.

(c) Ideal transformers.

Or

20. Write short notes on :

(a) Negative Impedance converter.

(b) Impedance, admittance, hybrid and transmission parameters.

(5 × 12 = 60 marks)