

B.TECH. DEGREE EXAMINATION, NOVEMBER 2014**Fifth Semester**

Branch : Electronics and Communication Engineering

EC 010 502—CONTROL SYSTEMS (EC)

(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. Define LTI Systems ?
2. Define Routh Hurwitz criterion ?
3. Define root locus technique ?
4. Explain Bode plot ?
5. Write state transition equation ?

(5 × 3 = 15 marks)

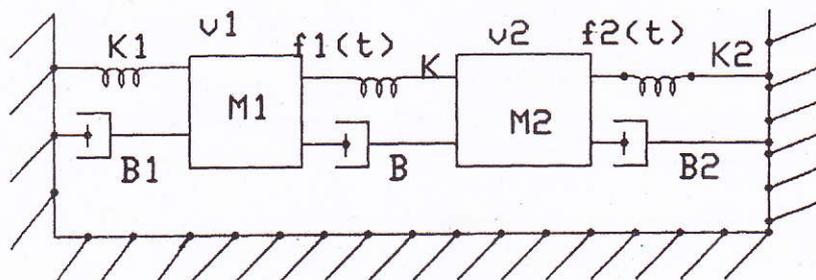
Part B*Answer all questions.
Each question carries 5 marks*

6. Explain reduction of block diagrams ?
7. Derive the relationship between characteristic equation roots and stability ?
8. Define compensator. Explain the necessity of compensators in control systems.
9. Write a short note on frequency domain specifications ?
10. Discuss about state transition matrix.

(5 × 5 = 25 marks)

Part C*Answer all questions. Each question carries 12 marks.*

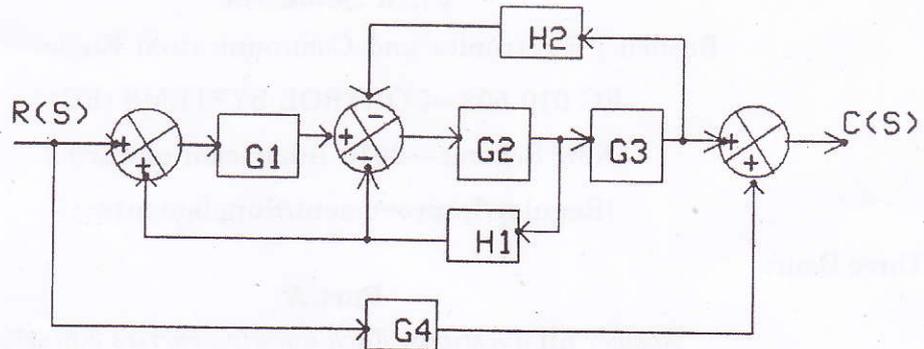
11. Write the governing differential equations of the mechanical System shown in figure :



Or

Turn over

12. Obtain the closed loop transfer function $C(S) / R(S)$ of the system whose block diagram is shown in figure. Use Block diagram reduction technique and verify the transfer function with signal flow graph technique.



13. Derive unit step response and time domain specifications of first order system.
Or
14. Explain the different stability determining methods in detail.
15. Design a phase lag compensator so that the System $G(s) H(s) = 100 / [s(s + 1)]$ will have phase margin of 15° .
Or
16. Write a short note on (i) Lead compensation ((ii) Lead compensation.
17. Discuss the effects of adding zeroes and poles to the forward path transfer function.
Or
18. Explain Nichols plot in detail.
19. Determine the Eigen values and state transition matrix for the following System :

$$A = \begin{bmatrix} 0 & 1 \\ -4 & -5 \end{bmatrix}; B = \begin{bmatrix} 1 \\ 1 \end{bmatrix}; C = [0, 1]; D = [0].$$

Or

20. Explain the state variable analysis of control Systems.

(5 × 12 = 60 marks)