PRESIDENCY UNIVERSITY, BENGALURU

SCHOOL OF ENGINEERING

Weightage: 40 % Max Marks: 80 Max Time: 2 hr. 10 May Thursday 2018

ENDTERM FINAL EXAMINATION MAY 2018

Even Semester 2017-18 Course: **ECE/EEE 205 Control system** IV Sem. ECE/EEE

Instruction:

(i) Read the question properly and answer accordingly.
(ii) Question paper consists of 3 parts.
(iii) Scientific and Non-programmable calculators are permitted

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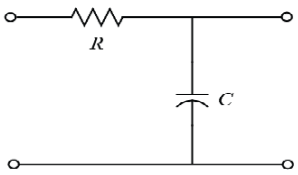
Part A

(5Q x 4 M = 20 Marks)

1. Define Root locus, Asymptotes, break away point and Centroid δ.
2. Define the compensators .Write the transfer function of all types of compensators.
3. Define bode plot and corner frequency.
4. For the given Transfer Function find the Gain K where root locus intersects imaginary axis:

$$G(s)H(S) = \frac{K}{s(s+1)(s+3)}$$

5. Consider the given RC filter shown in fig 1.1 whose transfer function is given below Find the magnitude and phase angle.



$$\frac{Eo}{Ei} = G(s) = \frac{\frac{1}{Cs}}{R + \frac{1}{Cs}}$$

Fig 1.1

Part B

(3Q x10M =30 Marks)

6. Consider the system shown in fig 1.2 with the given open loop transfer function and draw the root locus branches on the real axis.

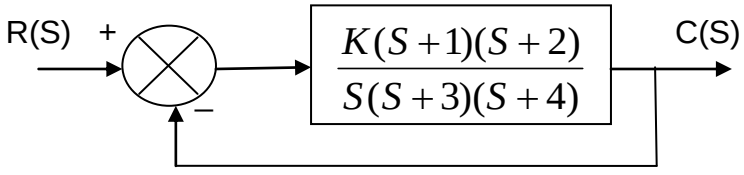


Fig 1.2

7. Derive the transfer function corresponding to the following state model.

$$\dot{X} = \begin{bmatrix} -2 & 1 \\ -3 & 0 \end{bmatrix} x + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u; Y = [1 \quad 0] x$$

8. Sketch the polar plot of the transfer function given below .Determine the frequency and corresponding magnitude at which the plot cross the real axis

$$G(s)H(s) = \frac{1}{(1+s)(1+2s)}$$

Part C

(2Q x 15 M = 30 Marks)

9. Sketch the Magnitude bode plot & determine corner frequency.

$$G(s)H(S) = \frac{100}{s(1+.005s)(1+0.0005)}$$

10. Draw the complete root locus for the given open loop system

$$G(s)H(s) = \frac{K(s+3)}{s(s+1)(s+4)}$$

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Weightage: 20% Max Marks: 40 Max Time: 1 hr. 20 Feb Tuesday 2018

TEST – 1

Even Semester 2017-18 Course: **EEE/ECE 205 Control Systems** IV Sem. EEE/ECE

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Part A

(4 Q x 5 M = 20 Marks)

1. What is the effect of feedback on stability? Explain with equations.
2. Derive the expression for the transfer function of a single loop feedback control system.
3. Justify with equations, the effect of feedback on sensitivity of a control system
4. Discuss the difference between open loop and closed loop control system.

Part B

(2 Q x 6 M = 12 Marks)

5. Using the Masons Gain Formula, obtain the overall transfer function whose signal flow graph is given in the figure 1. State the no. of forward paths, loops and the pair of non-touching loops.

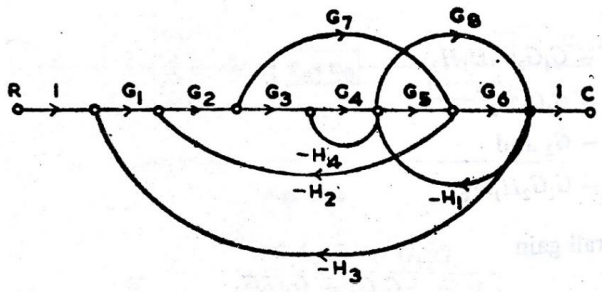

Fig .1

6. Obtain the Transfer Function for the Block diagram shown in figure 2.

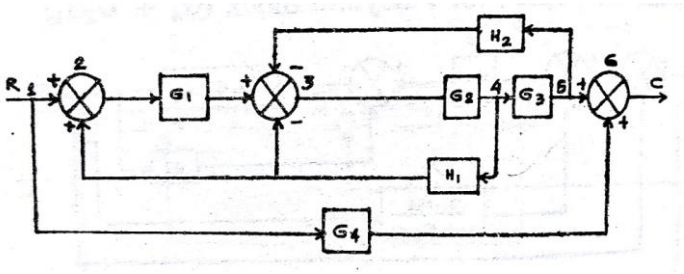

Fig .2

Part C

(1Q x 8 M = 8 Marks)

7. Refer the mechanical system shown in the figure 3.
   (i) Obtain the differential equations
   (ii) Draw the electrical network based on Force- voltage analogy

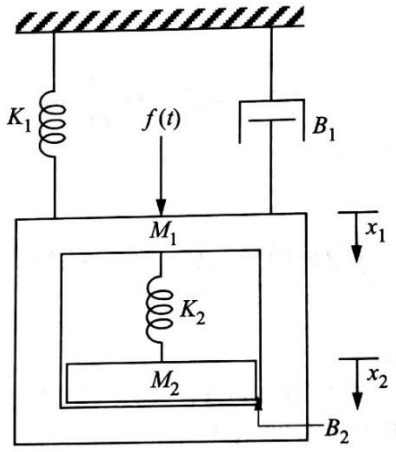

Fig .3