Seventh Semester B.E. Degree Examination, Dec.2018/Jan.2019
Control Engineering

Time: 3 hrs.   Max. Marks:100

Note: *Answer any FIVE full questions, selecting*
at least TWO full questions from each part.

PART – A

1   a.   Discuss about the open loop and closed loop control system with relevant diagrams and also list out its merits and demerits. **(10 Marks)**
    b.   Explain the following controllers and also state its characteristics:
       i)   Proportional plus integral controller. **(05 Marks)**
       ii)   Proportional plus integral plus derivative controller. **(05 Marks)**

2   a.   Derive the F-V and F-I analogies. **(10 Marks)**
    b.   Derive the transfer function of liquid level system with interaction. **(10 Marks)**

3   a.   List out the advantages and disadvantages of block diagrams. **(03 Marks)**
    b.   Describe the rules for reduction of a block diagram. **(07 Marks)**
    c.   State the properties of signal flow graph. **(04 Marks)**
    d.   Find the transfer function of the system shown in below figure, using Masons Gain formula. **(06 Marks)**
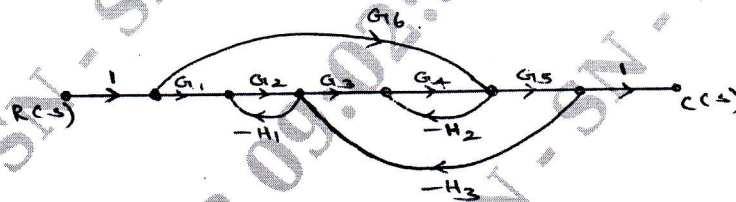

Fig.Q.3(d)

4   a.   Derive the expression for unit step response of underdamped second order system. **(10 Marks)**
    b.   Examine the stability of $s^4 + 2s^3 + 3s^2 + 8s + 2 = 0$ using Routh-Hurwitz criterion. **(06 Marks)**
    c.   Discuss about the special cases of Routh's criterion. **(04 Marks)**

PART – B

5   a.   Sketch the polar plot for the transfer function:
$$G(s)H(s) = \frac{20(s+5)}{(s+1)(s+2)(s+8)}.$$
                                                   (10 Marks)
    b.   Construct the Nyquist plot for a unity feedback control system whose open-loop transfer function is,
$$G(s)H(s) = \frac{K}{s(s^2 + 2s + 2)}.$$
      Find the maximum value of K for which the system is stable. **(10 Marks)**

6 a. Define corner frequency. (02 Marks)

b. Sketch the Bode plot and determine the gain crossover and phase-cross over frequencies for the system with,

$$G(s) = \frac{10}{s(1+0.5s)(1+0.1s)}.$$ (18 Marks)

7 Draw the root locus for the system with open loop transfer function,

$$G(s)H(s) = \frac{K}{s(s+3)(s+5)}.$$ (20 Marks)

8 a. What is meant by compensation? Discuss about the series and feedback compensation with neat diagrams. (10 Marks)

b. With neat diagram, describe about the lag-lead compensator. (10 Marks)

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