CLASS: BE   SEMESTER: VI
BRANCH: ECE /EEE   SESSION : SP/2019

SUBJECT : EE6201 CONTROL THEORY

TIME: 1.5 HOURS   FULL MARKS: 25

INSTRUCTIONS:
1. The total marks of the questions are 30.
2. Candidates may attempt for all 30 marks.
3. In those cases where the marks obtained exceed 25 marks, the excess will be ignored.
4. Before attempting the question paper, be sure that you have got the correct question paper.
5. The missing data, if any, may be assumed suitably.

Q1   (a)   What is a feedback control system? Give two examples to show the use of control   [2]
             system in our daily life.
       (b)   Explain the effect of feedback on overall gain, stability and external disturbances.   [3]

Q2   (a)   Differentiate between time variant and time invariant systems. Explain with the help of   [2]
             examples.
       (b)   Explain how the linear systems are linearized. Explain one method.   [3]

Q3   (a)   What is block diagram? What are the basic components of block diagram? Mention the   [2]
             basis for framing the rules of block diagram reduction technique.
       (b)   Using block diagram reduction, determine the transfer function of Fig. 1.   [3]

Fig-1
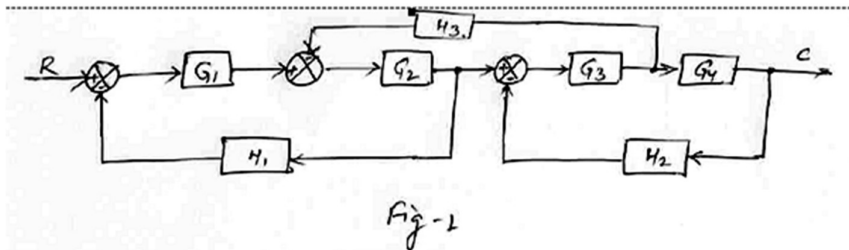
Q4   (a)   Define the terms: loop, branch, transmittance, loop gain.   [2]
       (b)   For a given SFG of Fig. 2, determine the transfer function using Mason's gain formula.   [3]

Fig-2.
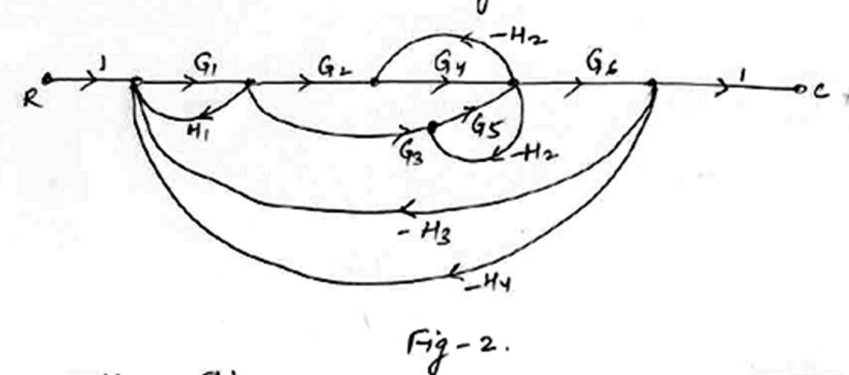
Q5   (a)   Define the following: Type and Order of a system.   [2]
             Determine the type and order of the unity-feedback systems for which the forward path
             transfer function is given by:

$$G(s) = \frac{K}{s(1+s)(1+10s)(1+20s)}$$

(b) For the control system shown in Fig. 3, determine the values of K and Kt, so that the damping ratio of the system is 0.6 and settling time of unit step response is 0.1 Sec. [3]
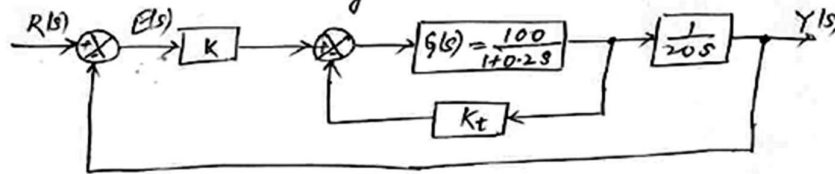

Fig-3

Q6 (a) Define the terms: absolute stability, relative stability. [2]
Determine the value of K so that the system is marginally stable and the frequency of sustained oscillations, if applicable.
$$s^4 + Ks^3 + 5s^2 + 10s + 10K = 0$$

(b) Sketch the root locus for [3]
$$G(s)H(s) = \frac{K(s+1)}{s(s+3)(s+8)} \quad , K > 0$$

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