BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION)

CLASS: BE **SEMESTER: VI/ADD**
BRANCH: ECE / EEE **SESSION : SP/2020**

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) Differentiate between linear and nonlinear system? Give one example of each. [2]
(b) Explain how feedback affects the following: gain, stability and external disturbances. [3]

Q2 (a) Differentiate between minimum and non minimum phase systems? Draw the pole-zero plot for each case. [2]
(b) Define sensitivity of a system? Discuss its importance. Show the effect of feedback on sensitivity of a system. Derive the expression for sensitivity for an open loop and closed loop system. [3]

Q3 (a) Define the following terms (i) node (ii) branch (iii) transmittance (iv) non-touching loop. [2]
(b) Determine the overall transfer function of the system given in Fig. 1. using block diagram reduction. [3]

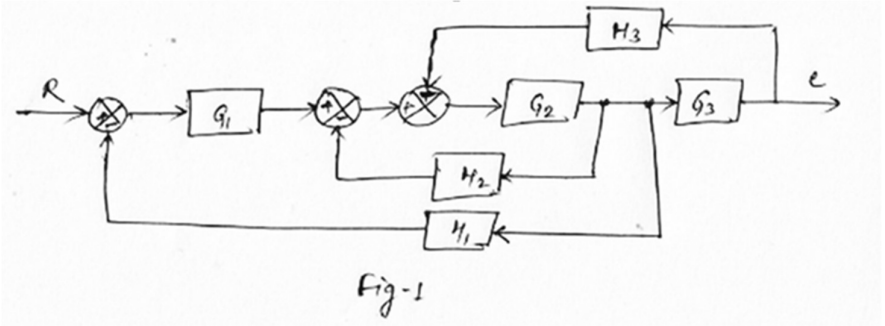

Fig-1

Q4 (a) Explain the Mason's gain formula? What is signal flow graph? Mention the properties of SFG. [2]
(b) Derive the transfer function of the system given in Fig. 2 using Mason's gain formula. [3]

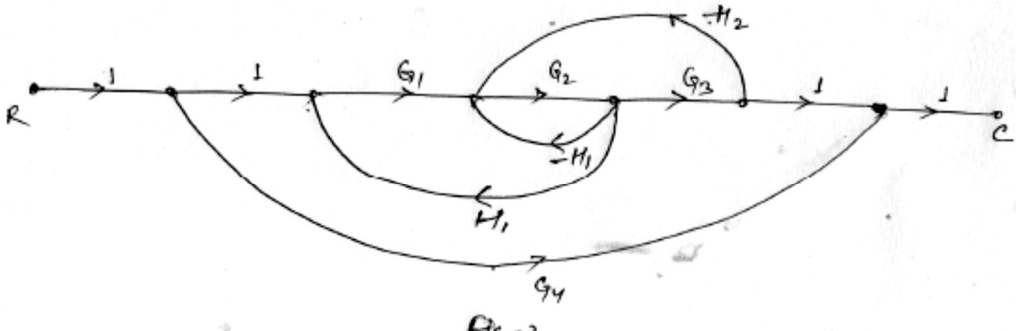

Fig-2

PTO

Q5 (a) Differentiate between transient response and steady state response of a system. Draw the time response for a system and indicate transient response and steady state response of a system. [2]

(b) Derive the expression for unit step response of second order system. Draw the response for different values of ξ. [3]

Q6 (a) Determine the step, ramp and parabolic error constants of the unity feedback control system with open loop transfer function given as [2]

$$G(s)H(s) = \frac{K}{s(1+0.01s)(1+0.025s)}$$

(b) Draw the root locus of the system whose open loop transfer function is given by [3]

$G(s) = \frac{K}{s(s+1)(s+3)(s+4)}$. Also comment on stability of the system.

:::::: 26/02/2020 ::::::M