

GANPAT UNIVERSITY
B. TECH. SEMESTER IV ELECTRONICS & COMMUNICATION ENGINEERING
CBCS REGULAR EXAMINATION, MAY / JUNE-2017
2EC 402: Control Systems

TIME: 3 HOURS]

[TOTAL MARKS: 60

INSTRUCTIONS

1. Attempt all questions.
2. Answers to the two sections must be written in separate answer books.
3. Figures to the right indicate full marks.
4. Assume suitable data, if necessary.

SECTION-I

- Que-1** (A) Explain Routh's criterion special cases. 5
 (B) A unity feedback control system has, 5

$$G(s) = \frac{K}{s(s+2)(s^2+4s+5)}$$

Determine the range of K so that system is stable.

OR

- Que-1** (A) Explain the properties of good control system. 5
 (B) The open loop transfer function of closed loop system is, 5

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

Determine stability using Nyquist plot

- Que-2** (A) State and explain the rules of Root locus plot with example. 8
 (B) Define : Absolutely stable system , Unstable system 2

OR

- Que-2** (A) The open loop transfer function of system is, 7

$$G(s)H(s) = \frac{K}{s(s+2+2j)(s+2-2j)}$$

Sketch the complete Root locus and comment on the stability of the closed loop system.

- (B) What is Servomechanism and Feed forward control system? 3
Que-3 (A) State & explain the Hurwitz criterion with suitable example. 5
 (B) Define control system. Differentiate the open loop and closed loop control system with suitable examples. 5

SECTION-II

Que-4 (A) A unity feedback control system has

6

$$G(s) = \frac{80}{s(s+2)(s+20)}$$

Draw the Bode plot. Determine G.M., P.M., ω_{gc} and ω_{pc} . Comment on stability.

(B) What is a polar plot? How to obtain G.M. and P.M. from polar plot?

4

OR

Que-4 (A) A system has

6

$$G(s) = \frac{50(1+0.1s)}{s(s+20)(0.02s+1)}$$

Draw the Bode plot. Determine G.M., P.M., ω_{gc} and ω_{pc} . Comment on stability.

(B) Consider a system with open loop transfer function as

4

$$G(s)H(s) = \frac{1}{(1+T_1s)(1+T_2s)}$$

Obtain its polar plot.

Que-5 (A) Obtain transfer function for the given system in Fig. (1) by using block diagram reduction technique.

4

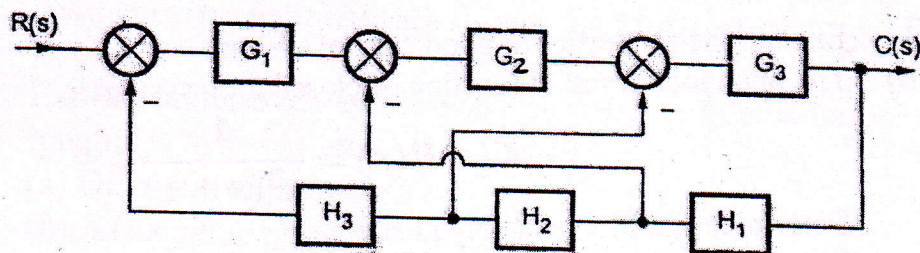


Fig. (1)

(B) Find the transfer function for the given signal flow graph in Fig. (2).

4

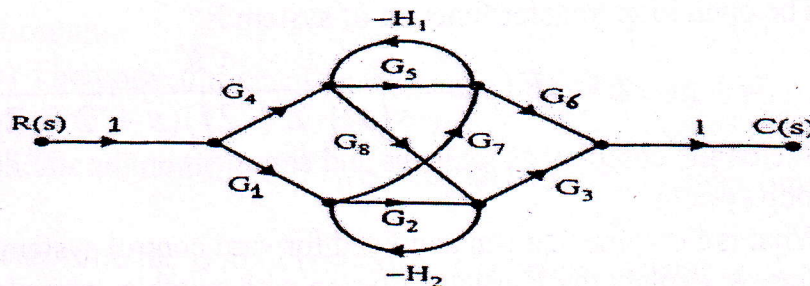


Fig. (2)

(C) Explain the derivation of analogous networks using Force-Voltage.

2

OR

- Que.-5 (A) Obtain transfer function for the given system in Fig. (3) by using block diagram reduction technique. 4

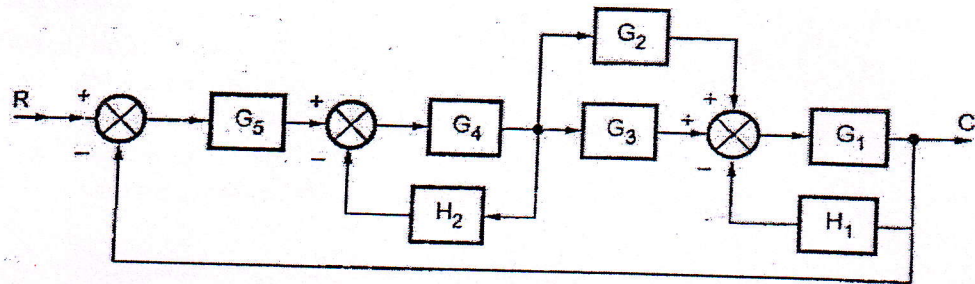


Fig. (3)

- (B) Find the transfer function for the given signal flow graph in Fig. (4). 4

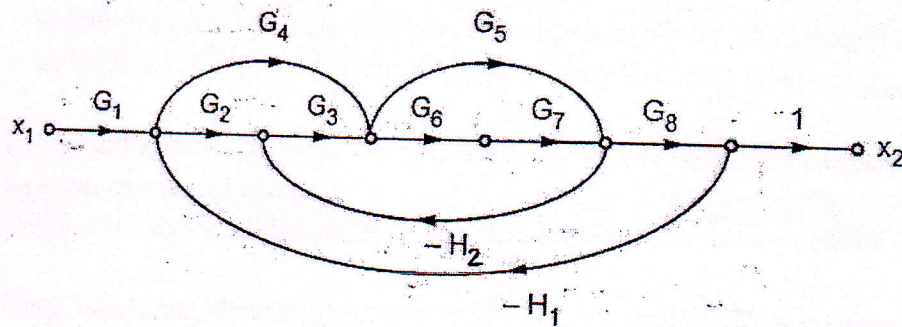


Fig. (4)

- Que.-6 (C) Explain the derivation of analogous networks using Force-Current. 2
(A) Find out Transfer function of the given network in Fig. (5). 4

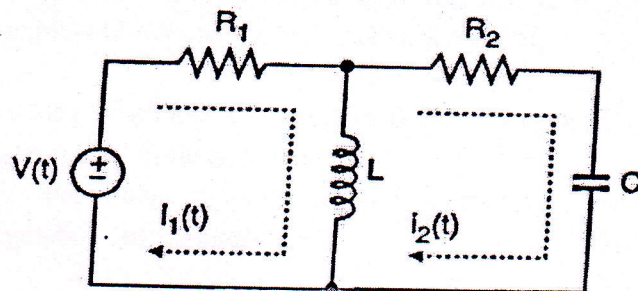


Fig. (5)

- (B) Show the locus of closed loop poles of a second order system as ζ is varied from 0 to ∞ . 3
(C) Define Steady state response and Steady state error. What is the difference between Steady state response and transient response of a control system? 3

END OF PAPER