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SHAHEED BHAGAT SINGH STATE TECHNICAL CAMPUS, FEROZEPUR

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:Total number of pages:[02]

Total number of questions: 06

B.Tech. -EE/ 4th Sem | ECE

Linear Control System

Subject Code : BTEE-402

Paper ID : M/18

Batch: 2011 onwards

(RP)

Time allowed: 3 Hrs

Max Marks: 60

Important Instructions:

- All questions are compulsory.

PART A (2×10)

Q. 1. Answer in brief:

- Define node, branch, path gain and loop gain.
- What is steady state error?
- What is techno-generator?
- Define plant and system
- What is compensating network? What is the need of it?
- What are the test signals for the transient analysis of the control system? Plot them as a function of time.
- What is characteristic equation of the control system?
- Write Force voltage analogy.
- Write down the salient feature of root locus plot.
- Define Gain margin and Phase margin.

PART B (8×5)

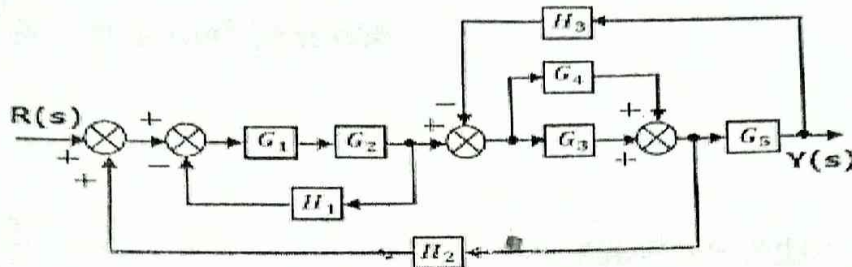
Q. 2. Derive the expression for response of first order system with

- Unit step input.
- Unit impulse input

OR

- i) Draw block diagram of closed loop control system while explaining each term.
- ii) Drive general formula for transfer function of closed loop control system.

Q. 3. Draw signal flow graph for a given block diagram and find its transfer function.



OR

Discuss all the rules of block diagram reduction technique with suitable examples.

Q. 4. a) The open loop transfer function of unity feedback system is given by

$$G(s) = \frac{100}{(1+0.5s)(s+5)}$$

Determine steady state error coefficients for position, velocity and acceleration.

b) How stability can be determined from pole zero location for any given transfer function? Explain each condition of roots from stability point of view.

OR

a) The open loop transfer function of unity feedback control system is

$$G(s) = \frac{K}{s(1+0.4s)(1+0.25s)}$$

Find the restriction of K so that the closed loop system is stable.

b) Write and prove properties of state transition matrix.

Q. 5. a) How potentiometer is used as an error detector? Explain.

b) Explain the concept of controllability and observability for sampled data control system.

OR

Write short note on a) D.C servo motor

b) Nyquist Criterion

Q. 6. A unity feedback control has an open loop transfer function

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

Sketch the root locus plot for the system.

OR

Sketch the Bode plot for transfer function given below

$$G(s)H(s) = \frac{1000}{(1+0.1s)(1+0.001s)}$$

Also determine a) gain margin b) phase margin c) stability