

Code No: 115AD

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech III Year I Semester Examinations, February/March - 2016

CONTROL SYSTEMS

(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 75

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A.

Part B consists of 5 Units. Answer any one full question from each unit.

Each question carries 10 marks and may have a, b, c as sub questions.

Part- A

(25 Marks)

- 1.a) Differentiate between linear and non linear control systems. [2]
- b) Write any three effects of feedback? [3]
- c) List out the applications of Synchro transmitter and receiver? [2]
- d) Describe Mason's Gain formula. [3]
- e) Define type and order of the system. [2]
- f) What is the effect of damping on peak overshoot in transient response? [3]
- g) Define characteristic equation. [2]
- h) Write the necessary conditions of Routh - Hurwitz criteria. [3]
- i) Find the phase angle of the transfer function $G(s) = KS^3$. [2]
- j) Mention the condition for system stability using Bode plot. [3]

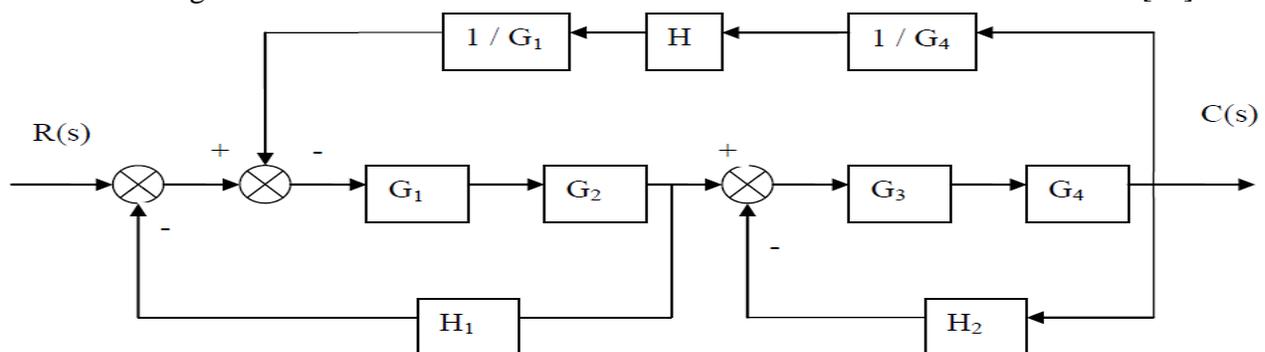
Part-B

(50 Marks)

2. Give any two real time examples for open loop and closed loop control systems and develop its block diagrams. [10]

OR

- 3.a) Define transfer function and write its limitations. [5+5]
 - b) Explain properties of spring, mass and damper elements in mechanical systems. [5+5]
4. Using Block diagram reduction technique, obtain the transfer function for the system shown in the figure. [10]



OR

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5. Derive the transfer function armature controlled DC servo motor and draw its block diagram. [10]

6. Explain the following: [2+2+2+2+2]
 a) Steady state error b) positional error constant
 c) Velocity error constant d) acceleration error constant
 e) Step response.

OR

7. Find the delay time, rise time, peak time, settling time and peak overshoot for unity feedback system with open loop transfer function. [10]

$$G(s) = \frac{16}{s(s+6)}$$

8. Sketch the Root locus for.

$$G(s)H(s) = \frac{K}{s(s+4)(s+11)}$$

Also find range of 'K' for system to be stable. [10]

OR

- 9.a) Explain the following
 i) Conditional stability ii) Relative stability
 b) What is a Routh-Hurwitz criterion? Explain its stability predicting conditions. [5+5]

10. Explain Frequency domain specifications in detail. Also write the comparison between times domain and frequency domain specifications. [10]

OR

11. Find the phase margin and gain margin for the system with open loop transfer function. [10]

$$G(s) = \frac{5(1+0.01s)}{s(1+0.1s)}$$

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