R13

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

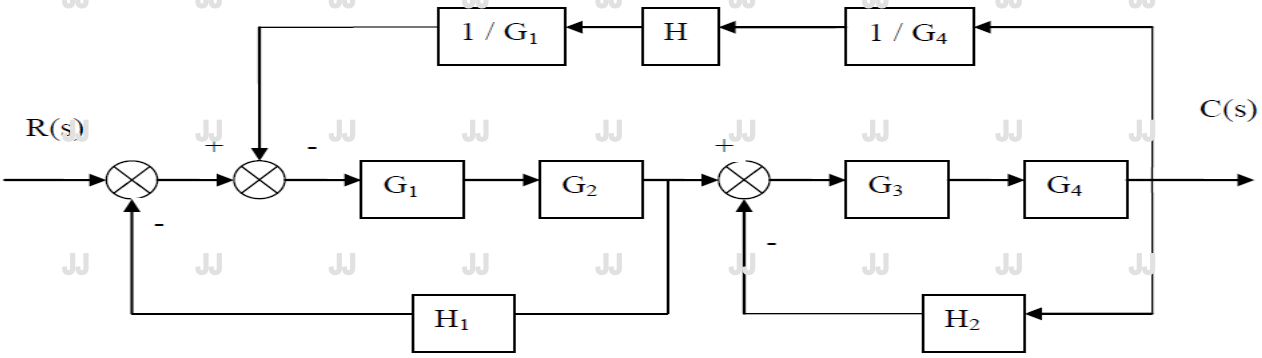
(50 Marks)

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.
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

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

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

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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