



Seat No.	
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T.E. (Electrical) (Semester - V) (New Course) Examination, 2010
FEEDBACK CONTROL SYSTEMS

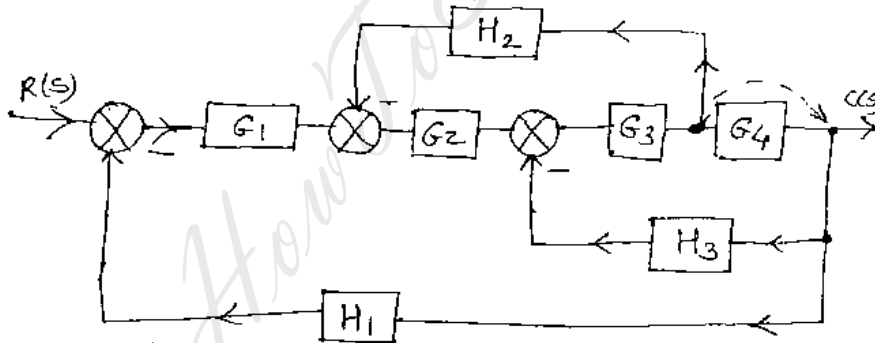
Day and Date : Friday, 3-12-2010
Time : 10.00 a.m. to 1.00 p.m.

Total Marks : 100

- Instructions:** 1) Write any three questions from each Section.
2) Neat diagrams must be drawn wherever necessary.
3) Figures to the right indicate full marks.
4) Use of pocket calculator is allowed.
5) Assume suitable data if necessary.

SECTION - I

1. a) Compare open loop system and closed loop systems and also explain simple canonical form. 8
b) Reduce the given block diagram to its canonical form and hence obtain the equivalent transfer function. 8



2. a) Explain Time Response of under damped 2nd order system and Transient Response specification. 8
b) Derive expressions of Tr, Tp and Mp. 10

P.T.O.



3. a) Find error coefficients for the given unity feedback system having :

$$G(s) = \frac{4(s^2 + 10s + 100)}{s(s + 3)(s^2 + 2s + 10)} \quad 8$$

- b) For an unity feedback system, output response is observed as $C(t) = 1 + 0.504e^{-3.07t} - 1.504e^{-218t}$. Determine its damping ratio and natural frequency of oscillations of the system. Assume unit step input. 8

4. a) State and explain controllable canonical and observable canonical form. 8

- b) Write a short notes on AC and DC servomotors. 8

SECTION – II

5. p) Explain the rules for construction of root locus. 8

- q) Sketch the root locus for the system having

$$G(s)H(s) = \frac{K}{s(s^2 + 2s + 2)} \quad 10$$

6. p) What should be values of GM and PM of a good system ? How to improve GM and PM ? 6

- q) A feedback system has $G(s)H(s) = \frac{100(s + 4)}{s(s + 0.5)(s + 10)}$. Draw the bode plot and comment on stability. 10

7. p) Classify the Non-linear system. Explain limit cycle in phase plane method. 8

- q) Explain the following terms :

- i) Saturation
- ii) Friction
- iii) Dead zone
- iv) Back-lash. 8

8. p) What are the advantages and limitations of Routh's criterion ? 8

- q) For a system with characteristic equation $F(s) = s^6 + 3s^5 + 4s^4 + 6s^3 + 5s^2 + 3s + 2 = 0$, examine stability. 8