Code No: R5212206 **R5**

II B.Tech I Semester(R05) Supplementary Examinations, May/June 2010
CONTROL SYSTEMS
(Instrumentation & Control Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Explain the effect of feedback on stability.
   (b) Explain the temperature control system concepts using open loop as well as closed loop system. [8+8]
2. (a) With the help of sketches, explain the construction and working principle of a Synchro transmitter.
   (b) Explain DC servomotor with neat sketch. [8+8]
3. (a) Derive the expressions for peak time and rise time in terms of ξ and w_n for a second order system?
   (b) Consider a unity feed ?back system with a closed T.F. $\frac{C(s)}{R(s)} = \frac{ks+b}{s^2+as+b}$. Determine the open loop T.F. G(s). Show that the steady state error with unit ramp input is given by $\frac{(a-k)}{b}$. [6+10]
4. (a) Apply RH criterion for the equation to determine the stability $S^4 + 5S^3 + 2S^2 + 3S + 2 = 0$. Find the number of roots lying in the right half of the s-plane.
   (b) According to RH Stability criteria, how can you analyzing the stability of the control system? [8+8]
5. Write short notes:
   (a) Frequency domain specifications
   (b) Stability analysis from Bode plots. [8+8]
6. (a) If the Nyquist plot of a stable system does not encircle the point (-1+j0), then the system is a minimum phase function. Explain clearly
   (b) Explain why Nyquist plots cannot be used for the relative stability analysis of open loop Unstable systems. [8+8]
7. Design a lead compensator for unity feed back system whose open loop transfer function $G(S) = \frac{K}{S(S+1)(S+5)}$ to satisfy the following specifications.
   (a) velocity error constant $K_V \geq 50$
   (b) Phase margin $\geq 20^0$. [16]
8. (a) Discuss the significance of state Space Analysis?
   (b) Define state variables.
   (c) Obtain the state variable representation of an armature controlled D.C Servomotor? [4+4+8]

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