Code No: OR411354 **OR**

**IV B.Tech I Semester Supplementary Examinations, April/May 2005**
**ADAPTIVE CONTROL SYSTEMS**
**(Electronics & Control Engineering)**

**Time: 3 hours** **Max Marks: 70**

**Answer any FIVE Questions**
**All Questions carry equal marks**

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1. Explain a typical configuration of adaptive control system with help of diagrams. Explain also the role of non-linear controller and generation of error signal form the model in the system.

2. (a) With help of suitable diagram explain the model reference adaptive system.
   (b) Consider the transfer function of a plant $G(s) = \frac{1}{s(s+b)}$ where b is an unknown parameter. Determine model reference adaptive controller that can gie the closed control system $G_m(s) = \frac{\omega^2}{s^2+2\xi\omega s+\omega^2}$.

3. (a) Explain the concept of stability and explain the BIBO stability criterion for static and dynamical system.
   (b) Explain the design procedure of model reference adaptive system using gradient approach.

4. Consider the system $G(s) = G_1(s)G_2(s),\ G_1(s) = \frac{b}{s+a},\ G_2(s) = \frac{c}{s+d}$ in which a and b are unknown parameters and c and d are known. Construct discrete-time direct self-tuning algorithms for the partially known system.

5. (a) Draw the block diagram of computer implementation of adaptive control system, which employs Braun's method for identification and activations.
   (b) Explain the generalized minimum-variance method for design of self-tuning controller.

6. (a) Define hyper stability and describe the hyper stability design procedure.
   (b) Explain the Mishkim and Hadded method for the design of adaptive control system employing combination of different functions.

7. (a) Draw the block diagram of a STR and explain the function of each block.
   (b) Consider the following system. Y(t + 1) + ay(t) = bu(t) + e(t +1) +ce(t) Where $|c| < 1$ and $\{e(t)\}$ is a sequence of independent random variables with unit variance. Derive the minimum-variance control law.

8. Write a short notes on the following:
   (a) MIT rule
   (b) Marx system
   (c) Relation between passitivity theorem and small gain theorems.

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