Code: R7411304 **R07**

IV B.Tech I Semester (R07) Supplementary Examinations, May 2012
ADAPTIVE CONTROL SYSTEMS
(Electronics & 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 merits and demerits of adaptive control system over conventional feedback control system.
   (b) Draw the block diagram of adaptive control and explain the each block.

2. (a) State the theorems which stipulate conditions for estimating parameters in least squares estimation method. Also explain the significance of Recursive Least Squares (RLS) estimation.
   (b) Explain the following modeling methods:
   (i) FIR model. (ii) Continuous transfer function models.

3. (a) Write down the algorithms for direct Self Tuning Regulator (STR) for minimum phase and non – minimum phase systems.
   (b) What is a hybrid self tuner? Write the algorithm of hybrid self tuner.

4. (a) What are the sub optional control strategies for stochastic adaptive control? Explain anyone of them.
   (b) Explain about indirect LQG – STR algorithm based on the Ricatti equation.

5. Consider the first order system y (K+1) = ay (K) + 4(K), when 'a' is an open loop pole. Describe Lyapunov's design to find the control law and adaptive law in order that the pole of 'a' is moved to a new desired position 'a_m'.

6. Consider the process G (s) = $\frac{1}{s(s+a)}$ when 'a' is unknown parameter. Determine a controller that can give the closed loop system $G_m(s) = \frac{\omega^2}{s^2+2\delta\omega s+\omega^2}$. Determine MRAS based on gradient theory.

7. (a) Explain the Zeigler – Nichols tuning methods with neat sketches.
   (b) Describe describing function method to derive the conditions for relay oscillations of the system.

8. Write concise notes on any four:
   (i) Square Root Algorithm.
   (ii) Averaging structure systems.
   (iii) Variable structure systems.
   (iv) Auto – tuning based on relay feedback.
   (v) Indirect discrete self tuners.

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