Code :R7411304 **R7**

IV B.Tech I Semester (R07) Supplementary Examinations, May 2011
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) What is an Adaptive controller? Explain any two applications of adaptive controllers.
   (b) Explain clearly about the formulation of adaptive control problem. Compare feedback control with adaptive control.
2. (a) Explain how recursive least squares (RLS) method is used to model the system with FIR filter?
   (b) Write a short note on transfer function modeling of discrete and continuous systems.
3. (a) Distinguish between direct and indirect adaptive control with the help of block diagrams.
   (b) Explain the operation of self Tuning regulator (STR)
4. Explain the design procedure of minimum variance and moving average controllers. Illustrate these controllers with suitable example.
5. Consider a first order system y(k)+dy(k-1) = -bu(k-1)+w(k)+cw(k-1). Determine the adaptive minimum variance control when a,b,c are unknowns. The control objective is regulation of a sequence ym(k), stored in the memory.
6. (a) State and explain the MIT rule in the original design approach of MRAS.
   (b) Explain the design of MRAS using Lyapunov theory, with the help of block diagram of first - order MRAS.
7. (a) What is meant by tuning of PI/PID controllers? Explain Ziegler- Nichol's transient response and closed loop methods for tuning controllers.
   (b) An open loop step response of a system shows a negative intercept of -5 units with a steady output of 0.98, delay time of 0.02 seconds and rise time of 1.2seconds. Determine the parameters of PID controller to improve the response. Use the following table:

Controller	K_c	T_i	T_d
P	1/d	-	-
PI	0.9/d	3L	-
PID	1.2/d	2L	L/2

8. Write short notes on the following:
   (a) Gain scheduling.
   (b) Auto tuning based on Relay feedback.
   (c) Robust high gain feedback control.
   (d) Dual control.

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