Code No: NR411301 **NR**

IV B.Tech I Semester Supplementary Examinations, November 2005
ADAPTIVE CONTROL SYSTEMS
(Electronics & Control Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. (a) What are the components of adaptive control systems? Explain each of them.
   (b) Explain learning in adapative systems.
   (c) Explain the algorithm for direct self tuning regulator for Non-Minimum Phase Systems. [5+5+6]

2. An integrator $G_p = \frac{q}{s}$ is to be controlled by a zero-order continuous-time controller $u(t) = -s_0 y(t) + t_0 u_c(t)$. The desired response model is given by $G_m = \frac{b_m}{s+a_m}$. Obtain a parameter update law of a model reference adaptive system guaranteeing that the error e=y-y_m goes to zero. [16]

3. Draw the block diagram of a model reference adaptive system and explain the adjustment of system parameters to satisfy the selected error criteria. [16]

4. Consider the system G(s)=$G_I(s)$ $G_2(s)$, where $G_1(s) = \frac{b}{s+a}$ $G_2(s) = \frac{c}{s+d}$ in which a and b are unknown parameters and c and d are known. Construct discrete-time indirect self-tuning algorithms for the partially known system. [16]

5. Explain the method proposed by Mishkim and Hadded for thedesign of adaptive control system employing combination of impulses, step function and ramp functions. [16]

6. (a) Draw the block diagram of a self tuning regulator and explain the function of each block.
   (b) Determine conditions in which a second order transfer function. $G(s) = \frac{b_0 s^2 + b_1 s + b_2}{s^2 + a_1 s + a_2}$ is strictly positive real. [8+8]

7. (a) Explain the generalized minimum-variance method for design of self-tuning controller.
   (b) State and explain the hyper stability. [8+8]

8. Write short notes on the following:
   (a) MIT rule
   (b) Braun's method
   (c) Pole- placement design prodecure [5+5+6]

⋆ ⋆ ⋆ ⋆ ⋆