2008 ANNA UNIVERSITY

B.E/B.TECH VII SEMESTER DEGREE EXAMINATIONS

ELECTRONIC INSTRUMENTATION AND CONTROL ENGINEERING

ADAPTIVE CONTROL

TIME: 3 HOUR

MARK: 100

NOV/DEC 2008

Answer Any All Question

PART A ---- (10 * 2 = 20 MARKS)

1. State the principal difference between adaptive control system and conventional closed loop control system.

2. Define Indices of Performance (IP) as used in Adaptive Control Systems.

3. List the methods normally used for Identification of systems.

4. Bring out the effects of measurement delay in an Identification Process.

5. State the salient features of Model Reference Adaptive Systems (MRAS).

6. Mention the features of self-tuning regulators.

7. What is the effect of cancellation of process zero in indirect self-tuner?

8. State the Lypunov's stability theorem for time varying systems.

9. What is Gain Scheduling?

10. Which tuning method is widely used in Industrial Adaptive Controllers?

PART B --- (5 * 16 =80 MARKS)

11.(a) Draw the block diagram of an IP measurement scheme and explain its importance in an Adaptive Control System.

or

(b) Briefly explain the process of Adaptive control in terms of three major functions. Discuss about any two IP standards and differentiate odd function IP and even function IP.

12.(a) Explain in detail the process of Parametric Identification by Recursive Least square estimation. Differentiate between ARMAX and ARIMAX.

or

(b) Discuss in general the difficulties encountered in Non-Linear Identification. Explain the Pseudo Random Binary sequence method of system Identification.

13.(a) Elaborate on Minimum-degree pole placement method for design of Adaptive controllers. Give the Algorithm using the above method to obtain the Self-tuning regulator.

or

(b) Give an account of various stochastic self-tuning regulators.

14.(a) Explain the procedure to obtain a model reference adaptive controller using MIT rule.

or

(b) Design a MRAS controller for a first order system by Lyapunov method. State the conditons to be met to ensure parameter convergence.

15.(a) Briefly discuss about stability problem of sinusoidal perturbation adaptive controller. Discuss the applications of gain scheduling with suitable example.

or

(b) Highlight the salient features of different Auto-tuning techniques. Write an explanatory note on different aspects of an Industrial Adaptive Controller.