

Code: 9A13801

R09

B.Tech IV Year II Semester (R09) Advanced Supplementary Examinations, July 2013

ADAPTIVE CONTROL SYSTEMS
(Electronics and Control Engineering)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 (a) Explain the auto regressive model and discuss its use in parameter estimation.
(b) Discuss about the random and periodic signals in stochastic process.
- 2 (a) Explain the Parseval's theorem and discuss its significance.
(b) Explain the autoregressive model.
- 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 Explain at least two different approaches for design of adaptive control.
- 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 (a) Explain pole placement design procedure for self tuning regulator.
(b) Discuss the properties of indirect self tuning algorithm with an example.
- 7 Explain the following:
 - (a) Augmented error.
 - (b) MRAS using Lyapunov rule.
 - (c) Kalman-Yakubovich lemma.
 - (d) Certainty equivalence principle.
- 8 (a) Explain the properties of direct self tuning algorithm with an example.
(b) Consider the discrete system $Y(t + 1) + aY(t) = b\mu(t) + e(t + 1)$, where the input signal ' μ ' and the noise 'e' are sequences of independent random variables with zero mean values and standard deviates ' σ ' and '1'. Determine the covariance of the estimate obtained for large observation sets.
