Subject Code: C9510

M.Tech - I Semester [R09] Regular/Supplementary Examinations, April - 2012
ADVANCED CONTROL THEORY
(Control Systems)

Time: 3 Hours **Max Marks: 60**

Answer any FIVE questions. All questions carry EQUAL marks.

1. a) Explain about vector spaces, linear combination and bases.
   b) Obtain the state space equation and output equation for the system defined by

   [4M+8M]

2. Obtain the transfer function of the system defined by the following state space equations.

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   [12M]

3. a) Define the controllability tests for continuous time invariant systems.
   b)

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   Is the system completely state controllable and completely observable? [4M+8M]

4. a) What is effect of pole placement by state feedback?
   b) What is a regulator control problem? With the help of a block diagram explain how is implemented?

   [4M+8M]

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5. Consider the system defined by

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Design a full order state observer assuming that desired poles for the observer are located at + (+ (+ . [12M]

6. a) Show that the duality between controllability and observability.
   b) Draw the schematic diagram of a digital system with a reduced order observer and explain the same. [4M+8M]

7. For the system

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find a suitable lyapunor function V(x).Obtain an upper bound of the response time such that it takes the system to go from a point on the boundary of the closed curve V(x)=100 to a point within the closed curve V(x)=0.05. [12M]

8. a) Explain about generation of Lyapunov functions with examples.
   b) Explain the procedural steps in problem solving for state feedback controllers. [6M+6M]

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