NR/R09

Code No: A4903, A4303/C4903, C4303,C4210,

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M.Tech I Semester Examinations, October/November-2011

MODERN CONTROL THEORY

(COMMON TO ELECTRICAL POWER ENGINEERING, POWER ELECTRONICS, POWER AND INDUSTRIAL DRIVES)

Time: 3hours **Max. Marks: 60**

Answer any five questions

All questions carry equal marks

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1.a) Define and explain Vector spaces, Linear Combinations.
b) Draw and explain state diagram for continuous-Time state models. [12]

2.a) Derive State transition matrix and write its properties.
b) Consider the state model for a system characterized by the differential equation.
$d^3y/dt^3 + 6d^2y/dt^2 + 11dy/dt + 6y = u(t)$.
Give the block diagram representation of the state model. [12]

3.a) Explain the concept of Controllability and Observability.
b) Investigate the controllability and observability of the following systems.
$dx_1/dt = x_1(t)$, $dx_2/dt = 2t\, dx_2/dt + u(t)$. [12]

4.a) Write the differences between linear and Non-linear system.
b) Explain the different types of Non-linearity's with examples of each type. [12]

5.a) Explain the phase plane analysis.
b) Draw a phase plane portrait of the system defined by
$dx_1/dt = x_1 + x_2$
$dx_2/dt = 2x_1 + x_2$. [12]

6. Describe stability analysis of the Linear Continuous time invariant systems using Lyapunov second method. [12]

7. How to design Linear Digital Regulator for finite time problem? [12]

8.a) Explain the Formulation of Optimization problems.
b) Write the comments on optimal control systems. [12]

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