Printed Pages : 3 **TEE-13**

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 0205 Roll No. | | | | | | | | | | |

B. Tech.

(SEM. VII) EXAMINATION, 2008-09
ADVANCED CONTROL SYSTEM

Time : 3 Hours] *[Total Marks : 100*

Note : *Attempt **all** questions.*

1 Attempt any **two** parts : **10×2=20**

(a) Obtain the solution of a state equation $\dot{x}(t) = Ax(t) + Bu(t)$ in the state transition matrix.

(b) Establish the relationship between state model and transfer function.

(c) Test whether the following system is controllable and observable or not :

$\dot{x}(t) = Ax(t) + Bu(t)$ and $y(t) = Cx(t)$

where

A = [0 1 1, 0 0 2, -5 0 5]

B = [0, 0, 2]

C = [1 2 3]

2 Attempt any **two** parts : **10×2=20**

(a) Express the output c (t) in the form of Zero-order Hold sampled data system of the given figure

Fig. 1

uptuonline.com

(b) Consider that the characteristic equation of a third-order discrete - data control system is given as

$$F(z) = z^3 - 1.25z^2 - 1.375z - 0.25.$$

State whether system is stable or not stable.

(c) Find the state space representation in the (i) Controllable Canonical form (ii) Diagonal canonical form for the system with transfer function.

$$C(z)/R(z) = (z+6)/(3z^2 + 5z + 1).$$

3 Attempt any **two** parts : **10×2=20**

(a) Write the statement of Cayley Hamilton theorem; also compute state transition matrix and matrix exponential.

(b) Explain the non linearity issues of Dead Zone and Relay.

(c) What is Lyapunov stability criterion ? Determine whether the following system is stable or not :

$$d^2x/dt^2 + dx/dt + (dx/dt)^3 + x^2 = 0.$$

4 Attempt any **two** parts : **10×2=20**

(a) Formulate the optimal control problem using state space approach.

(b) With the help of schematic diagram explain the principle of causality in dynamic programming.

(c) Discuss the Bang-Bang control concept.

uptuonline.com

Attempt any **two** parts : **10×2=20**

(a) What is a fuzzy-neural integrated system ? Discuss the salient features of neural network, also discuss its application.

(b) Establish the relationship between PI and Fuzzy control, PD and Fuzzy logic control.

(c) Compare PI, PD and PID controllers with the Fuzzy logic controller.
