D 51320 (Pages 2) Name.....

Reg. No.....

SEVENTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION, DECEMBER 2008

EE2K 703 / PTEE 2K 701 —CONTROL SYSTEMS—II

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*

I. (a) Discuss the advantages in using root-locus method for stability analysis.

(b) What do you meant by impulse sampling and data hold ? Discuss with an example.

(c) Discuss about the important characteristics of non-linear systems.

(d) Discuss briefly about the unit-step response of a second order system.

(e) Illustrate the concept of discrete time systems.

(f) Discuss about Liapunov's main stability theorem with examples.

(g) What do you meant by controllability and abservability of a system ? Briefly explain.

(h) Discuss the role of Reccati equation in control system.

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*

MODULE 1

II. (a) Sketch the root loci of a control system with unity feed back $G(s) = \frac{k}{s(s+1)(s+2)}$.

(15 marks)

Or

(b) With suitable examples, discuss the basic characteristics of lead, lag, and lag-lead compensation.

(15 marks)

MODULE 2

III. (a) Develope a stable space model for the electrical system below :

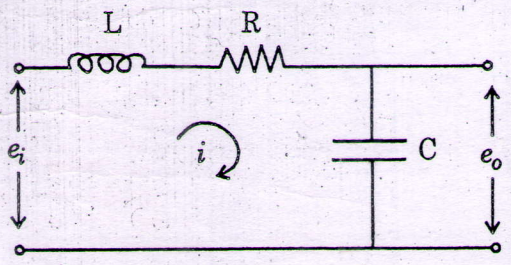

Fig. 1.

(15 marks)

Or

Turn over

(b) Obtain the state-space representation of the system shown below :

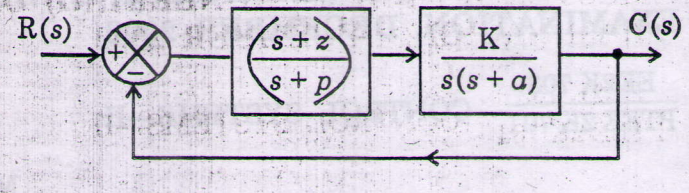

Fig. 2.

(15 marks)

MODULE 3

IV. (a) Discuss about the various approaches of Liapunov's stability analysis of linear time-invariant systems.

(15 marks)

Or

(b) A second-order control system is described by :

$$\begin{bmatrix} \dot{y}_1 \\ \dot{y}_2 \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ -1 & -1 \end{bmatrix} \begin{bmatrix} y_1 \\ y_2 \end{bmatrix}.$$

The equilibrium state is the origin, determine the stability of this state using Liapunov method.

(15 marks)

MODULE 4

V. (a) With appropriate sketches, discuss about quadratic optimal control problems. (15 marks)

Or

(b) Discuss in detail about the complete state controllability for a linear time-invariant discrete-time control system.

(15 marks)

[4 × 15 = 60 marks]