Roll No. | | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(EE) PT (Sem.–8)

NON LINEAR AND DIGITAL CONTROL SYSTEMS

Subject Code : BTEE-603

M.Code : 74388

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

1. Answer briefly :

a) What are advantages of state space representation of a control system?

b) What do you mean by observability of a control system ?

c) Mention some of the limitations of describing functions.

d) What is backlash nonlinearity ?

e) What are the requirements for a function to be valid Lyapunov function ?

f) What is Z-transform of $x(n) = \{1,0,1\}$

g) Define pulse transfer function.

h) What is aliasing of a signal ?

i) What do you mean by first order hold ?

j) For what Routh-Hurwitz criterion is used in discrete time systems ?

SECTION-B

2. Obtain a general solution for state variable model.

3. Draw phase portrait for the following system.

$$\dot{x}_1 = 2x_1 + x_2$$
$$\dot{x}_2 = 2x_1 - x_2$$

4. Discuss variable gradient method for construction of Lyapunov function $V(X)$.

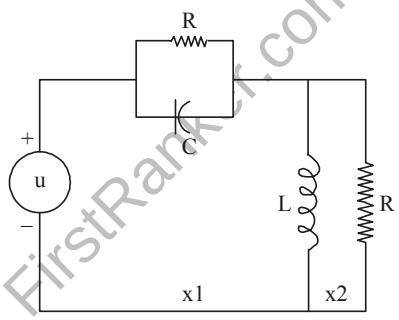
5. Discuss method of isoclines.

6. Discuss Lyapunov direct method for stability analysis.

SECTION-C

7. Derive an expression for describing function for a relay with dead-zone nonlinearity.

8. a) Consider the following circuit. Derive its state space representation.



b) Comment on controllability and observability of the circuit shown in figure above.

9. Using Jury's test, comment upon the stability of a discrete time control system with following characteristic equation.

$P(z) = z^4 - 1.2z^3 + 0.07z^2 + 0.3z - 0.08 = 0$

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.