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B.Tech. (EE/EEE) (Sem.–7th & 8th)

NON LINEAR AND DIGITAL CONTROL SYSTEMS

Subject Code : EE-404

Paper ID : [A0430]

Time : 3 Hrs. Max. Marks : 60

INSTRUCTION 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 has to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students has to attempt any TWO questions.

SECTION-A

1. **Write briefly :**

a) What are the assumptions made for driving describing functions of non linear system?

b) What is the difference between incidental and intentional non linearities?

c) Define phase portraits.

d) What is the condition for completely observable system?

e) State sampling theorem.

f) How the *s*-plane is mapped in to *z*-plane?

g) If a Liapunov function fails to satisfy the requirements of stability theorem, can a valid conclusion be reached?

h) List out the salient features exhibited by the non linear systems, which are not found by linear systems.

i) Find *z*-transform of unit step function.

j) What is a phase trajectory?

SECTION-B

2. State and explain Liapunov's second Method f non-linear system.

3. Check the Controllability of the system describe Equation :

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u$$

4. Explain phase plane method used to analyse re System.

5. Obtain the time response of the system given as

where $x = \begin{bmatrix} 0 & 1 \\ -2 & 0 \end{bmatrix}$, $x(0) = [1 \quad 1]^T$ and $y = [1$

6. What do you mean by parameter identification? block diagram.

SECTION-C

7. (i) What are the various assumptions made in de and what are the limitations of describing func

(ii) Derive the describing function of on-off linear

8. What do you mean by stability of discrete time sy criteria is to be modified before it is used to discrete systems? Explain modified Routh Hurwitz an example.

9. Write short notes on the following :

(i) Jury's stability criteria

(ii) Sampling theorem and ideal sampling.