18CC1053

M. Tech. EXAMINATION, 2020

(Third Semester)

(C Scheme) (Main & Re-appear)

EE(I & C)

MIC625C

NONLINEAR SYSTEMS AND CONTROL

Time : 2½ Hours]   [*Maximum Marks :* 75

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Four* questions in all. All questions carry equal marks.

1. (a)   What are limit cycles ? Explain in detail.

    (b)   Explain phase plane trajectories in detail.

2. (a)   What are singular points ? Give classification of singular points.

    (b)   Explain delta method of constructing phase trajectories.

3. (a)   Define describing function.

    (b)   Describe common physical non-linearities with proper illustrations.

4. Construct describing function of dead zone and hysteresis non-linearity.

5. Describe basic of Lyapunov stability analysis in detail with an example.

6. Describe variable gradient method in detail with an example.

7. (a) Give basic result of Lie Algebra.

(b) What is Chaos ? Explain its importance in control system.

8. Describe different methods to compute observability and controllability of non-linear systems.

9. (a) What are Initial Conditions ?

(b) Define Stability.

(c) Define gradient of a vector.

(d) What is Jacobian Matrix ?

(e) Define Positive Definite Matrix.

(f) Write down properties of matrix multiplication.

(g) Define Controllability.