

Day : Thursday
Date : 06/06/2019

S-2019-3414

Time : 11.00 AM TO 02.00 PM
Max. Marks : 60

N. B. :

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Answer to both the sections should be written in **SAME** Answer book.
- 4) Use of non-programmable calculator is **ALLOWED**.
- 5) Assume suitable data, if necessary.

SECTION – I

- Q. 1** Obtain the mathematical model and transfer function of simple mechanical system. (10)

OR

- Q. 1** Explain feedback and feedforward control system with the help of block diagrams. (10)

- Q. 2** Find time response specifications for closed loop transfer function $\frac{1}{s^2 + s + 1}$. (10)

OR

- Q. 2** Discuss in detail standard test signals used in control system analysis. (10)

- Q. 3** Discuss stability of the following system using Routh-Hurwitz criterion: (10)

$$G(s) = \frac{100}{s^4 + 6s^3 + 30s^2 + 60s + 100}$$

OR

- Q. 3** Find the restriction on K so that system is stable for the following characteristics equation (10)

$$s^4 + 5s^3 + 5s^2 + 4s + K = 0.$$

SECTION - II

- Q. 4** Write a short note on polar plots and bode plots. (10)

OR

- Q. 4** Explain the concept of Nyquist plots for stability in frequency domain. (10)

P. T. O.

- Q. 5** Define the following terms: (10)
- i) Controllability of linear system.
 - ii) Observability of linear system.

OR

- Q. 5** List the properties of state transition matrix. Also discuss the solution for homogeneous state equation. (10)

- Q. 6** Differentiate the following terms: (10)
- i) State Space Analysis and Transfer Function
 - ii) Optimal and adaptive Control Systems

OR

- Q. 6** Explain working of synchros used in a control system with neat sketch. (10)

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