# 422

## April 2024

*Time – Three hours*
*(Maximum Marks: 100)*

*[N.B.*    1.    Answer all questions under Part-A. Each question carries 3 marks.

2.    Answer all the questions either (A) or (B) in Part-B. Each question carries 14 marks.]

### PART – A

1.    What are the basic elements in a control system?

2.    What is transfer function?

3.    What is frequency response of a system?

4.    Write the rules for construction of bode plots.

5.    What is time response of a system?

6.    What are the types of test inputs used in control system?

7.    What is stability of a system?

8.    What is the effect of lag in a system?

9.    What is state space in control system?

10.   What is controllability?

[Turn over.....

## PART – B

11. (a) Distinguish open loop and closed loop control system.

    *(Or)*

    (b) Explain about the transfer function of single phase AC servomotor with illustration.

12. (a) Explain how to determine closed loop response from open loop response with an analogy.

    *(Or)*

    (b) Discuss about the correlation between frequency domain and time domain specifications.

13. (a) Write the step response of second order system for the given diagram.

$$R(s) \xrightarrow{+} \bigotimes \longrightarrow \boxed{\dfrac{\omega_n{}^2}{s(s + 2\delta\omega_n)}} \longrightarrow C(s)$$

    *(Or)*
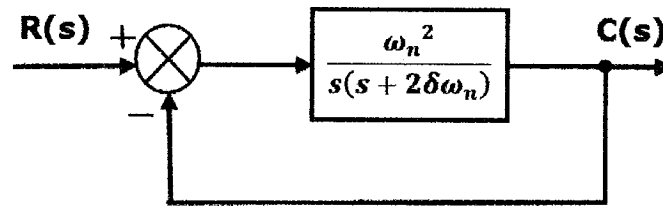
    (b) Illustrate the construction rules for root locus analysis.

14. (a) Discuss the advantages and disadvantages of Routh–Hurwitz stability criterion.

    *(Or)*

    (b) Illustrate the rules for drawing Nyquist plots to obtain gain margin and phase margin.

15. (a) Justify the need for State Space Analysis for time invariant systems with an example.

    *(Or)*

    (b) Illustrate the concepts behind controllability and observability of a non linear system.

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