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Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 90751

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2022.

Fourth Semester

IC 8451 – CONTROL SYSTEMS

(Common to: Electrical and Electronics Engineering/Electronics and Instrumentation Engineering/Instrumentation and Control Engineering)

(Regulations 2017)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define control system.
2. Draw the block diagram of closed loop control system.
3. List the parts of time response of a control system.
4. Draw the block diagram of a second order control system.
5. Write an equation for maximum overshoot.
6. For a second order system where does the resonant peak occur?
7. List the difficulties faced while applying Routh-Hurwitz criterion.
8. How does Nyquist criterion differ from Routh-Hurwitz criterion?
9. Define state variable.
10. Distinguish between state vector and state space.

PART B — (5 × 13 = 65 marks)

11. (a) Explain the poles and zeros of the transfer function.

Or

(b) Explain how you represent a continuous system by signal flow graph. List the rules for drawing signal flow graph. (9+4)

12. (a) Explain the specified input test signals applied for time response analysis of a control system.

Or

(b) Explain the time response of a first order continuous system subjected to unit step function.

13. (a) Explain the initial slope of Bode plot.

Or

(b) How do you determine gain margin and phase margin from Bode plot?

14. (a) How do you obtain closed loop frequency response of a unity feedback control system from Nyquist plot?

Or

(b) Explain the application of Nyquist criterion to determine stability of a closed loop control system.

15. (a) Explain the infinite series method to solve homogeneous state equation.

Or

(b) Explain the state space representation of n^{th} order differential equation.

PART C — (1 × 15 = 15 marks)

16. (a) Explain the important rules for block diagram reduction.

Or

(b) With suitable schematic derive the transfer function of thermal water heating system.

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