

CBCS SCHEME

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15MR82

Eighth Semester B.E. Degree Examination, Aug./Sept.2020 Control Engineering and Automation

Time: 3 hrs.

Max. Marks: 80

Note: i) For Regular Students: Answer any FIVE full questions irrespective of modules.
ii) For Arrear Students : Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Explain the various requirements of ideal control systems. (06 Marks)
- b. Draw the equivalent mechanical system and analogous system based on F-V and F-I for the given system. [Refer Fig.Q1(b)]

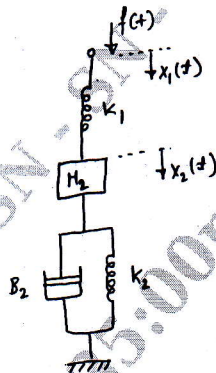


Fig.Q1(b)

(10 Marks)

- 2 a. Obtain $\frac{C(s)}{R(s)}$ using block diagram reduction rules. [Refer Fig.Q2(a)]

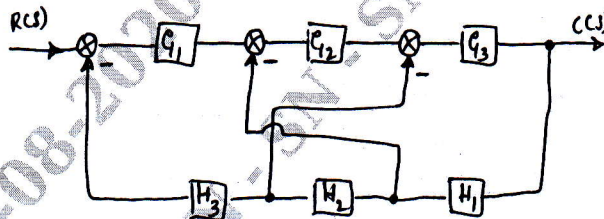


Fig.Q2(a)

(08 Marks)

- b. Find $\frac{C(s)}{R(s)}$ by Mason's gain formula. [Refer Fig.Q2(b)]

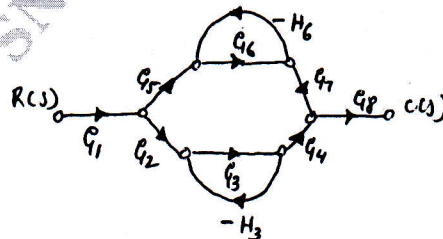


Fig.Q2(b)

(08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written e.g. 42+8 = 50, will be treated as malpractice.

Module-2

- 3 a. What do you mean by system compensation? Derive the transfer function of a lead compensator. (08 Marks)
- b. Check the stability of the given characteristic equation using Routh's method:
 $s^6 + 2s^5 + 8s^4 + 12s^3 + 20s^2 + 16s + 16 = 0$ (08 Marks)
- 4 a. Describe an integral controller. What are the characteristics of integral controller? (08 Marks)
- b. A unity feedback system has $G(s) = \frac{40(s+2)}{s(s+1)(s+4)}$. Determine:
 (i) Type of the system
 (ii) All error coefficients
 (iii) Error for r_{amp} input with magnitude 4 (08 Marks)

Module-3

- 5 For a unity feedback control system, $G(s) = \frac{242(s+5)}{s(s+1)(s^2+2s+121)}$, sketch the Bode plot. Find ω_{gc} and ω_{pc} , G.M and P.M. Comment on stability. (16 Marks)
- 6 Sketch the complete root locus of system having
 $G(s)H(s) = \frac{K}{s(s+1)(s+2)(s+3)}$ (16 Marks)

Module-4

- 7 a. Explain AVR Fault tolerance in marine control system. (08 Marks)
- b. Mention the advantages and disadvantages of jack-up barge, anchoring and dynamic positioning. (08 Marks)
- 8 a. Explain variance testing and wild point testing. (08 Marks)
- b. Write notes on:
 (i) Voting
 (ii) Weighting
 (iii) Enabling and disabling of sensors (08 Marks)

Module-5

- 9 a. Explain horizontal plane controller with roll pitch damping. (08 Marks)
- b. Explain the concept of hybrid control. (08 Marks)
- 10 a. Mention weather optimal control objectives. (08 Marks)
- b. Write a note on torque feed forward control and power feedback control. (08 Marks)
