CBCS SCHEME

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15AE71

Seventh Semester B.E. Degree Examination, Dec.2018/Jan.2019

Control Engineering

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Define control system. Compare open loop and close loop control system. **(08 Marks)**

b. Explain the various requirements of an ideal control system. **(08 Marks)**

OR

2 Find the system equation and analogous network using force voltage analog and force current analogy shown in Fig.Q.2. **(16 Marks)**

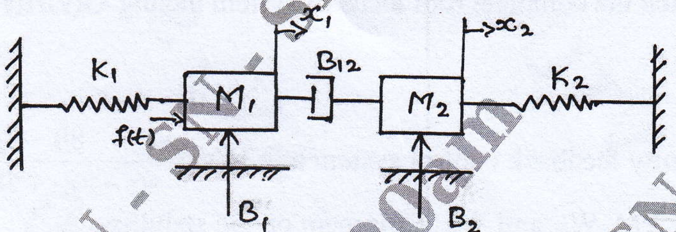

Fig.Q.2

Module-2

3 a. Reduce the block diagram shown in Fig.Q.3(a) to its simplest possible. **(08 Marks)**

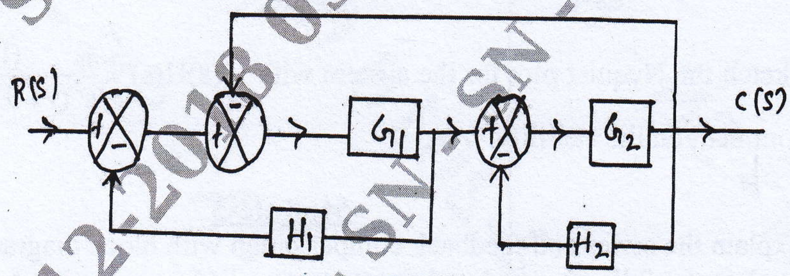

Fig.Q.3(a)

b. Find out the overall gain using Mason's gain rule shown in Fig.Q.3(b). **(08 Marks)**

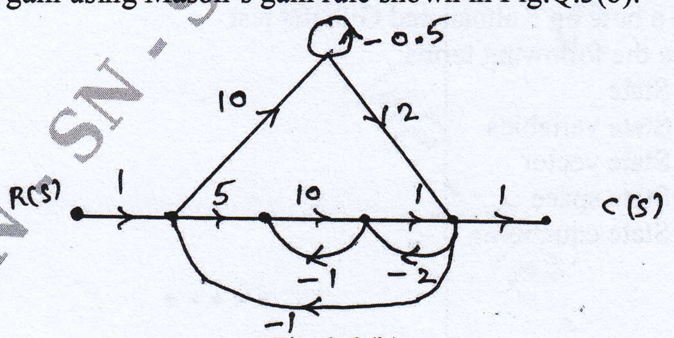

Fig.Q.3(b)

OR

4 For a spring mass damper system shown in the Fig.Q.4(i) a force of 9.6 Newtons is applied to the mass. The response C(t) is as shown in Fig.Q.4(ii). Find the value of M, B and K. **(16 Marks)**

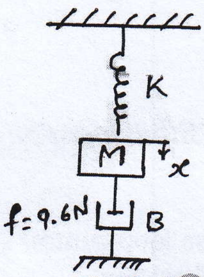

Fig.Q.4(i)

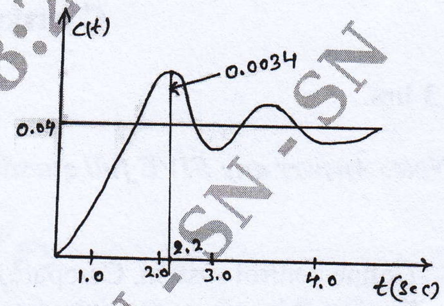

Fig.Q.4(ii)

Module-3

5 Sketch the complete root locus of system having $G(s)H(s) = \dfrac{K}{s(s+1)(s+2)(s+3)}$. **(16 Marks)**

OR

6 A unity feedback control system has $G(s) = \dfrac{80}{s(s+2)(s+20)}$. Draw the bode plot. Determine GM, PM, W_{gc} and W_{pc}. Comment on the stability. **(16 Marks)**

Module-4

7 Define frequency response. Derive the expressions for resonant peak M_r and resonant frequency W_r for a standard second order system interms of ξ and W_r. **(16 Marks)**

OR

8 Sketch the Nyquist plot for the system with $G(s)H(s) = \dfrac{(1+0.5s)}{s^2(1+0.1s)(1+0.02s)}$. Find GM and comment on the stability. **(16 Marks)**

Module-5

9 a. Explain the series and feedback compensation with block diagram. **(08 Marks)**

b. Explain the following: i) Lead compensator ii) Lag compensator. **(08 Marks)**

OR

10 a. Write a note on Kalman and Gilberts test. **(06 Marks)**

b. Define the following terms:
- i) State
- ii) State variables
- iii) State vector
- iv) State space
- v) State equation. **(10 Marks)**

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