



P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belgaum)

Seventh Semester, B.E. - Mechanical Engineering

Semester End Examination; Dec. - 2015

Automatic Control Engineering

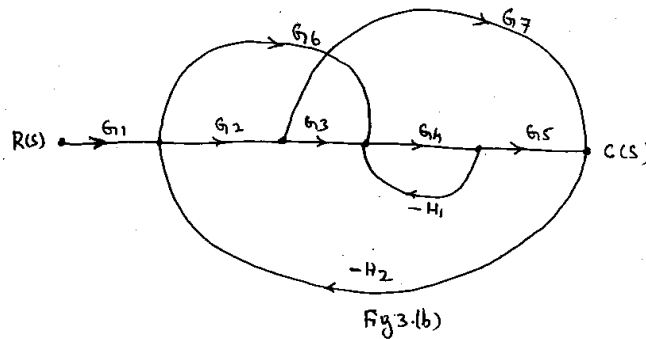
Time: 3 hrs

Max. Marks: 100

Note: Answer any FIVE full questions, selecting at least TWO full questions from each part.

PART - A

- 1 a. Explain open loop and closed loop control system with block diagrams. What are the advantages and disadvantages of open loop control system? 10
- b. With the help of block diagram explain human body temperature control system and traffic control system. 10
- 2 a. Obtain transfer function for on armature controlled D.C. motor on load. 10
- b. For a second order mechanical system, obtain force – voltage analogy and force – current analogy. 10
- 3 a. Explain with neat sketches block diagram reduction Techniques. 10
- b. Using Masons gain formulae obtain closed loop transfer function for the signal flow graph shown in Fig. 3(b). 10



- 4 a. Derive the complete response for a I order Mechanical system given a step input. Also define time constant and practical time of response for the same. 10
- b. The characteristic equation for a system is given by $S^5 + S^4 + 2S^3 + 2S^2 + S + 1 = 0$ comment on stability. 10

PART - B

- 5 a. Sketch the rough nature of polar plot for system with $G(s)H(s) = \frac{10}{s(s+1)(s+2)}$. 10
- b. Explain principle of arguments and Nyquist stability criterion. 10
- 6. Draw the Bode Plot for $G(s)H(s) = \frac{K}{s(s+1)(s+4)}$ for $K = 100$ 20

Determine from it;

- i) gain cross over frequency
- ii) Phase cross over frequency
- iii) Gain Margin
- iv) Phase Margin
- v) Closed loop stability of the system.

7. Sketch the root locus plot for the system, whose open loop transfer function is given by,

$$\frac{K}{s(s+2)(s^2+6s+3)}$$

Mark salient point on it. Comment on stability. 20

8 a. Define controller, Explain PID controller listing its characteristics. 10

b. Explain various types of compensating devices. 10

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