

# FACULTY OF ENGINEERING

B. E. 4/4 (Prod.) I-Semester (Old) Examination, July 2010

Subject : **Control System Theory**

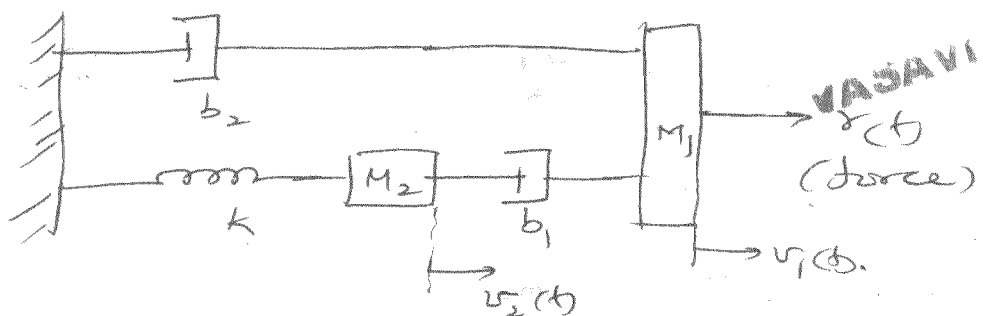
Time : 3 Hours

Max. Marks: 75

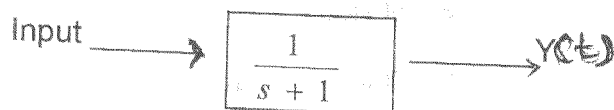
**Note:** Answer all questions from Part-A. Answer any Five questions from Part-B.

## Part – A (25 Marks)

1. Find the transfer function of the following system.



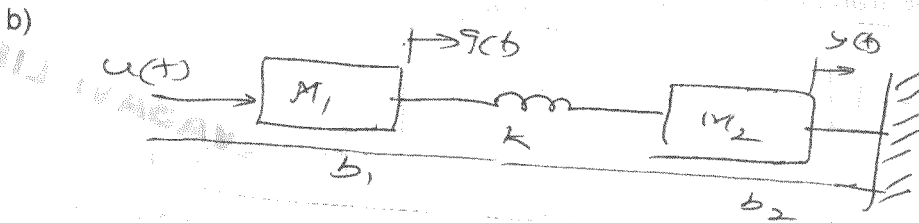
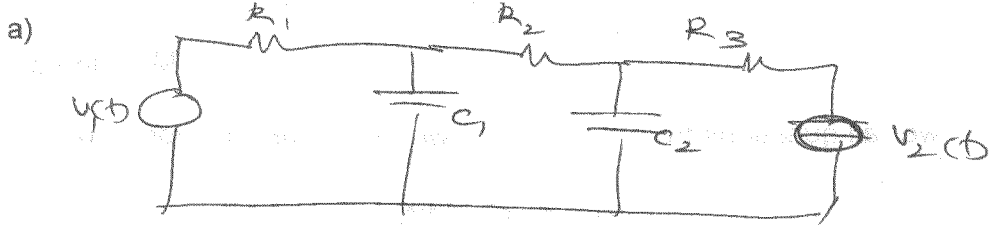
2. What is a signal flow graph? Explain. 3
  3. Define 'steady state error'. 3
  4. Define 'gain margin' and phase margin. 3
  5. Distinguish between PI and PID controller. 3
  6. Mention the uses of 'Bode plot'. 2
  7. Write down Ruth's table for the following characteristic polynomial and state the range of 'k' for which the system would be stable : 2
- $$9(S) = S^3 + 2S^2 + 4S + K$$
8. Define the term : Observability. 2
  9. What is meant by root sensitivity? 2
  10. Find the step response  $Y(t)$  for the following system : 2



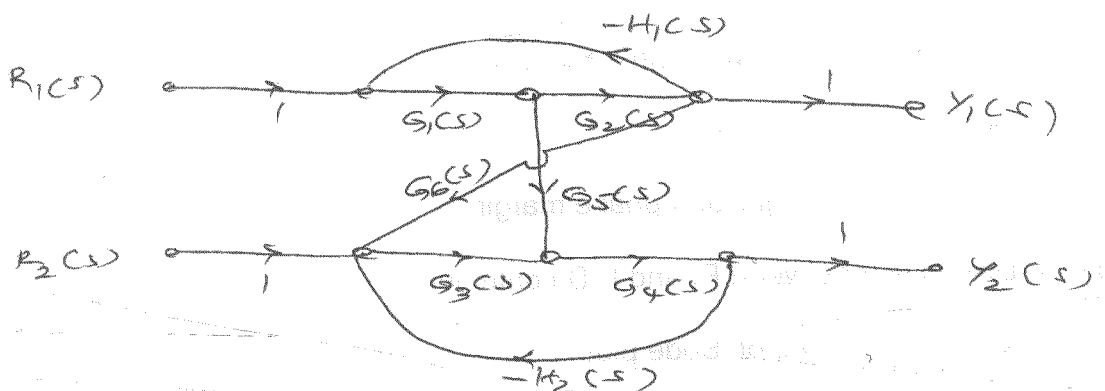
... 2

## Part - B (50 Marks)

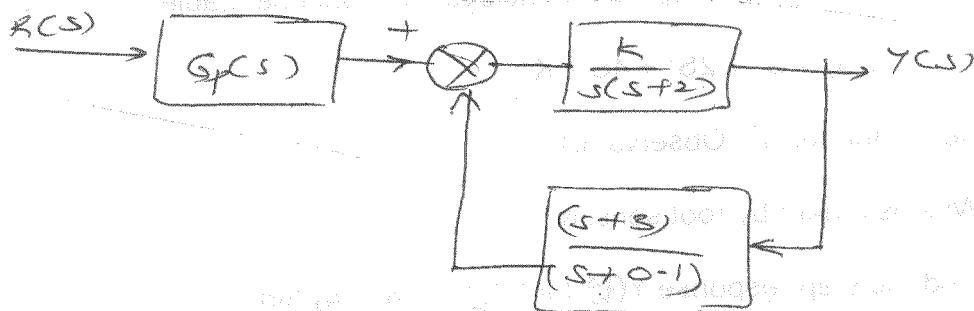
11. Find the transfer function of the following systems.



12. A system has a signal flow diagram as shown below. Determine transfer function :



13. A feed back system is shown in following fig :



- Determine the steady state error for a unit step with  $k = 0.4$ ,  $G_p(s) = 1$ .
  - Select an appropriate value for  $G_p(s)$  so that the steady state error is equal to zero for unit step input.
14. Sketch the root locus for the following open loop transfer function of the system.

