

**EI - 605**  
**B.E. VI Semester**  
 Examination, June 2015  
**Control Systems**  
*Time : Three Hours*

**Maximum Marks : 70**

- Note:** i) Answer five questions. In each question part A, B, C is compulsory and D part has internal choice.  
 ii) All parts of each questions are to be attempted at one place.  
 iii) All questions carry equal marks, out of which part A and B (Max.50 words) carry 2 marks, part C (Max.100 words) carry 3 marks, part D (Max.400 words) carry 7 marks.  
 iv) Except numericals, Derivation, Design and Drawing etc.

rgpvonline.com

1. a) Define non-linear Control System.
- b) What are the advantages of negative feedback Control System
- c) Differentiate between feed forward and feedback control.
- d) Determine the transfer function  $C/R$  for given block diagram in Fig.1

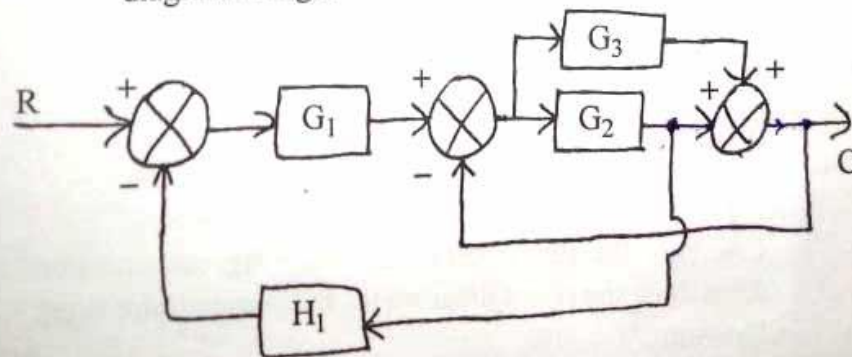


Fig.1

[2]

rgpvonline.com

OR

Define the different terms, used in signal flow graph, i.e loops, path gain, sink, source etc. with a suitable diagram.

2. a) Define the system sensitivity.
- b) What is Ramp signal, Give its mathematical representation.
- c) Illustrate the effect of feedback on bandwidth.
- d) Derive the mathematical equation for rise time, peak overshoot of a second order system.

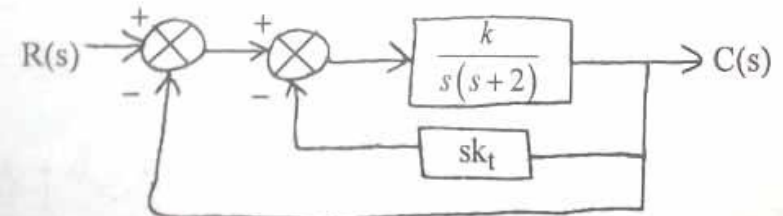
OR

Explain the effect of adding a zero to a system.

3. a) Define absolute and relative stabilities.
- b) Define the gain and phase margins.
- c) What do you understand by cascade compensation networks.
- d) The open loop transfer function of a unity feedback control system is given by.

$$G(s) = \frac{k}{s(s+2)}$$

The system is to have 25% maximum overshoot and peak time 1.0 second. Determine the value of  $k$  and tachometer feedback constant  $k_t$ .



OR

Fig. 2

Compare the Phase lead and Phase lag compensator. Also draw the block diagram for PD compensator using Op-Amp.

rgpvonline.com

4. a) What are the advantages of state space analysis.
- b) Explain illustrate the correlation between state models and transfer function.
- c) Define controllability and observability.
- d) Write the steps and also drive the transfer function from a state mode. Assume suitable data.

rgpvonline.com

OR

Derive the equation for state space representation for given electrical network.

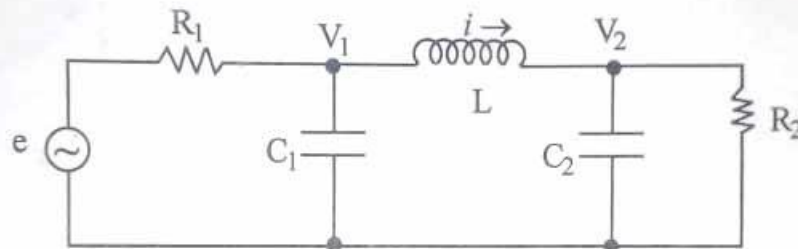


Fig. 3

5. a) What is roots function in MATLAB explain.
- b) What is series function, explain its meaning.
- c) Compare MATLAB and simulink packages.
- d) Write Matlab script to obtain Kp, Kv, Ka for open loop unity feedback system.

$$G(s) = \frac{10}{s^2 + 6s + 10}$$

OR

Write down the steps and draw the flow chart for simulating a problem using simulink, with a suitable example.

\*\*\*\*\*

rgpvonline.com