

B.TECH SEM – V (2007 COURSE) (ELECTRICAL ENGG.) :
SUMMER - 2018

SUBJECT: LINEAR CONTROL SYSTEMS

Day : **Monday**

Date : **21/05/2018**

S-2018-2664

Time :

10.00 AM TO 01.00 PM

Max. Marks: 80

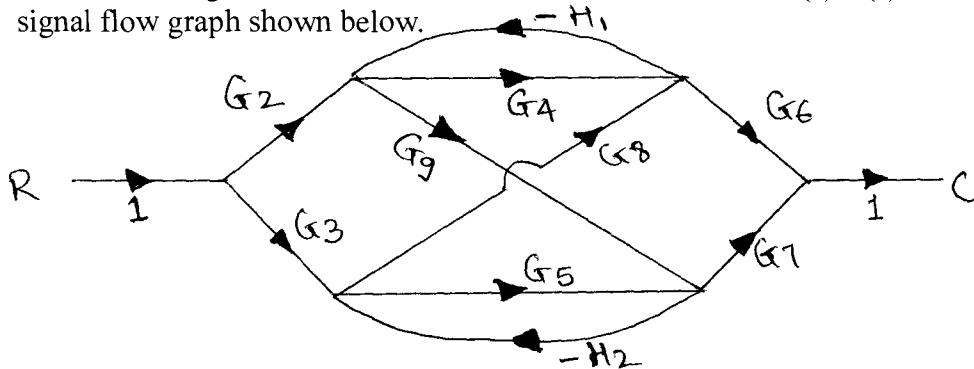
N. B.:

- 1) **Q.No.1 and Q.No.5 are COMPULSORY.** Out of the remaining attempt **ANY TWO** questions form section – I and Section – II.
- 2) Figures to the right indicate **FULL** marks.
- 3) Answers to both the sections should be written in **SEPARATE** answer books.
- 4) Draw neat and labeled diagrams **WHEREVER** necessary.
- 5) Assume suitable data, if necessary.

SECTION - I

- Q.1**
- a) Explain AC servo motor working characteristics features and its transfer function. **(05)**
 - b) Draw standard test signals and write their mathematical representation and Laplace transform. **(05)**
 - c) What is the effect of addition of poles and zeros on Root locus? **(04)**

- Q.2**
- a) Use Mason's gain formula to find the transfer function $C(s)/R(s)$ for the signal flow graph shown below. **(07)**



- b) Explain DC positional servomechanism and derive its transfer function. **(06)**
- Q.3**
- a) Sketch step response of a second order system with different values of damping. Show all parameters on it. **(07)**
 - b) Draw block diagram and discuss: **(06)**
 - i) PD controller
 - ii) PI controller
- Q4**
- a) Sketch the root-locus of $G(s) = \frac{K}{(s^2 + 10s + 100)}$ **(07)**
 - b) With the help of Routh's Hurwitz criterion comment upon the stability of the system having the following characteristics equation. **(06)**

$$s^6 + s^5 - 2s^4 - 3s^3 - 7s^2 - 4s - 4 = 0$$

(P.T.O)

SECTION - II

- Q.5** a) Correlate time domain and frequency domain performance specifications. (04)
b) Sketch Bode plot of lag compensator. (04)
c) If maximum phase lead of 30° is obtained at 10rad/sec. Determine the parameters of lead compensator. (06)

- Q.6** State Nyquist's stability criteria. Sketch polar plot of (13)

$$G(s) = \frac{80}{s(s+2)(s+1)}$$

- Q.7** Draw bode plot on semi log graph paper of the following system (13)

$$G(s) = \frac{100}{s(s+10)(s+5)}$$

- Show i) Gain cross over frequency and phase margin
ii) Phase crossover frequency and gain margin.

- Q.8** a) Write down stepwise procedure for lead compensator design using bode plot. (08)
b) What are the effects of Lead compensator on performance of system? (05)

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