

B.TECH SEM - III (2007 COURSE) (ELECTRONICS) : WINTER - 2017

SUBJECT: FUNDAMENTALS OF INSTRUMENTATION & CONTROL

Day: **Wednesday**
Date: **17/01/2018**

Time: **10.00 AM TO 01.00 PM**
Max Marks: **80**

W-2017-2372

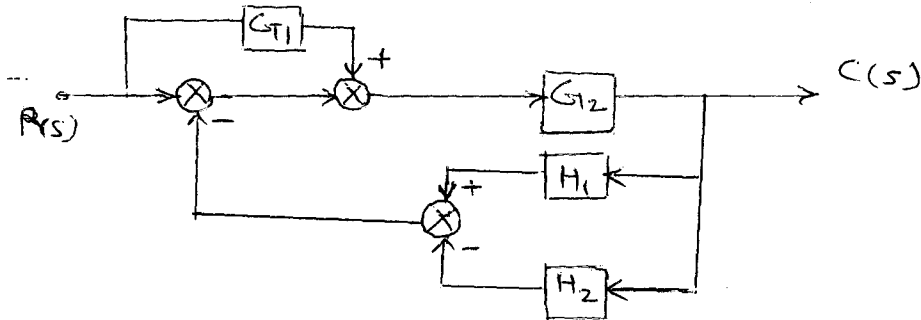
N.B:

- 1) **Q. No. 1 and Q. No. 5 are COMPULSORY.** Out of remaining questions answer **ANY TWO** questions from each section.
- 2) Figures to the right indicate **FULL** marks.
- 3) Both the sections should be written in the **SEPARATE** answer books.
- 4) Draw neat and labeled diagram **WHEREVER** necessary.
- 5) Assume suitable data if necessary.

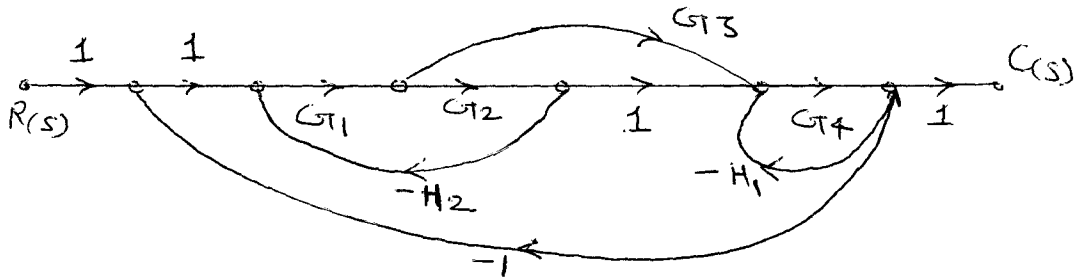
SECTION-I

- Q.1**
- a) Write any four rules of block diagram reduction technique. (04)
 - b) Using Routh's criteria determine stability of $F(s) = s^6 + 2s^5 + 8s^4 + 12s^3 + 20s^2 + 16s + 16$. (06)
 - c) Define: i) Gain crossover frequency (04)
ii) Phase crossover frequency

- Q.2** a) Obtain transfer function, of the block diagram shown below. (07)



- b) Find transfer function using Masson's gain formula. (06)



- Q.3** a) Sketch the root locus $G(s)H(s) = \frac{k(s+2)(s+3)}{(s+1)(s-1)}$. (07)

- b) Draw and explain standard test signals. Also find value of K_p , K_v , K_a for unity (06)
feedback systems given by,

$$G(s) = \frac{50}{(1+0.1s)(1+2s)}$$

- Q.4** a) Sketch bode plot for a system given by (13)

$$G(s)H(s) = \frac{10}{s(s+1)(s+10)}$$

P.T.O

SECTION-II

- Q.5** a) A strain gauge has a gauge factor of 4. If the strain is attached to a metal bar that stretches from 0.25m to 0.255m when strained. What is the percentage change in resistance? If the unstrained value of gauge is 120Ω , what is the resistance value of gauge after application of strain? (06)
- b) Explain the need of signal conditioning in instrumentation system. (04)
- c) Describe the operation of proportional control action using block diagram. (04)
- Q.6** a) What is gauge factor? Derive expression for gauge factor of strain gauge. (07)
- b) Explain construction and working of thermocouple. (06)
- Q.7** a) Describe construction and working of synchro transmitter & receiver. (07)
- b) Draw signal conditioning circuit for displacement transducer (LVDT). (06)
- Q.8** a) Draw and explain integral and derivative control action with the help of block diagram. (07)
- b) Draw block diagram of PLC and explain it in detail. (06)

* * * *