

(3Hours)

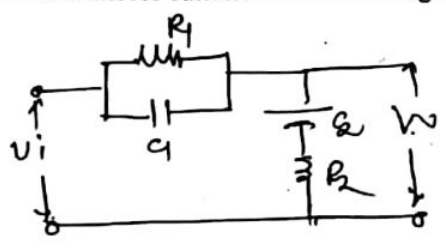
Total Marks:

80

- Instructions** – i) Questions 1 is Compulsory  
 ii) Out of remaining questions attempt any three questions  
 Iii) Assume suitable additional data if required.  
 iv) Figures in the bracket to the right hand side indicate full marks.

**Q.1 Solve any five**

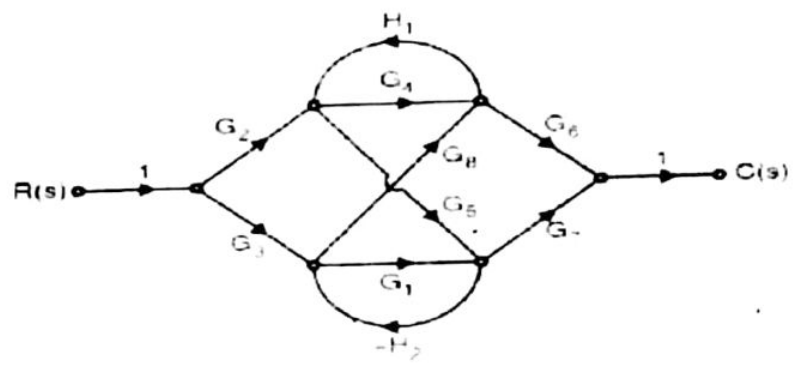
- a) Describe how Q Meter is used for measurement of low impedance. **(04)**
- b) Explain various criteria for selection of transducers. **(04)**
- c) Give basic block diagram of telemetry system and explain each component. **(04)**
- d) Find transfer function for following system **(04)**



- e) Explain concept of stability, absolute stability and conditional stability. **(04)**
- f) Draw polar plot of **(04)**

$$G(s)H(s) = \frac{14}{s(s+1)(s+2)}$$

**Q.2 a) 1) Find C(s)/R(s) using Mason's gain formula **(10)****



- 2) A unity feedback system has **(05)**  
 $G(s) = \frac{K}{s(s+2)(1+0.5s)}$ . Find steady state error if  $r(t)=3t$  and  $K=4$ . Also calculate  $K$  for  $e_{ss}=0.4$ .

Q.2 b) What are the various sources of errors in Q meter?

Q.3 a) A unity feedback system has

$$G(S) = \frac{K}{S(S+1)(S+2)(S+4)}$$

Find the following using Routh -Hurwitz's criterion

- 1) the range of K for stability
- 2) The value of K for marginal stability

Q.3 b) Explain with neat diagram principle of operation of LVDT. An LVDT produces output of 5V; when the core displacement is 20mm from zero position. Calculate core displacement when the output is 2.5V.

Q.4 a) Draw the Bode Plot for a system having

$$G(s)H(s) = 100/s(s+1)(s+2)$$

Find-

- (a) Gain Margin
- (b) Phase Margin
- (c) Gain Crossover freq.
- (d) Phase crossover freq.

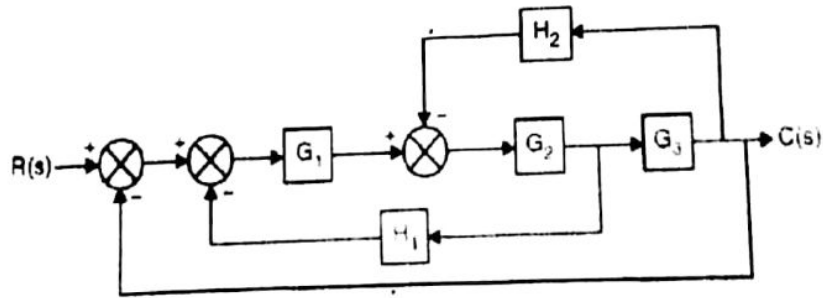
Q.4 b) Derive expression for inductance measurement using Hey Bridge.

Q.5 a) Sketch root locus for the following transfer function

$$G(S)H(s) = \frac{K}{S(S+4)(S+6)}$$

Q.5 b) Explain Kelvin's double bridge and its application in low resistance measurement and derive expression for unknown resistance.

Q.6 a) Find C(s)/R(s) for the given system



- Q.6 b)
- 1) Define accuracy, precision and sensitivity with the help of examples.
  - 2) Draw generalized block diagram of data acquisition system and explain the blocks.

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