

- N. B. :** (1) Question No. 1 is **compulsory**.  
 (2) Attempt any **three** questions from **remaining** questions.  
 (3) Assume suitable **data** if **necessary**.

1. (a) Define static characteristics of an instrument. 4  
 (b) Compare open loop and closed loop control system with block diagram 4  
 (c) Derive an expression for the resistance using Wheastone bridge for balanced condition. 4  
 (d) Compare analog and digital data acquisition system. 4  
 (e) Explain Hurwitz stability criterion. 4
2. (a) Mention the sources of error in Q meter. Explain how Q meter is used to measure the high impedance 10  
 (b) A second order system is given by 10

$$\frac{C(S)}{R(S)} = \frac{25}{S^2 + 5S + 25}$$

Find delay time, rise time, peak time, peak overshoot, settling time. Also find expression for its output response.

3. (a) The open loop transfer function of a unity feedback system is given by 10

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

Sketch the Root locus of the system.

- (b) Draw the bode plot for the given transfer function with unity feedback 10

$$G(S) = \frac{0.75(1 + 0.2S)}{S(1 + 0.5S)(1 + 0.1S)}$$

Calculate gain margin, phase margin and comment on stability.

**TURN OVER**

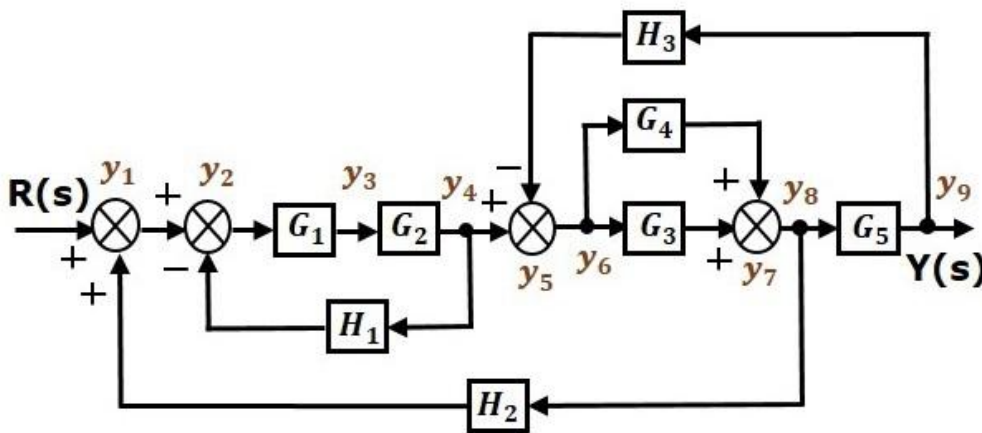
4 (a) I) Explain basic telemetry system 5

II) Using Routh stability criterion determine the stability of the system whose characteristic equation is 5

$$S^6 + 2S^5 + 8S^4 + 12S^3 + 20S^2 + 16S + 16$$

(b) Explain the working principle of LVDT with neat diagram and explain advantages and disadvantages of LVDT 10

5 (a) Draw signal flow graph for the system shown below. Find overall transfer function  $C(S)/R(S)$  using Mason's gain formula. 10



(b) Define power and energy. Explain the working of Electrodynamometer wattmeter. 10

6 (a) I) Explain digital data acquisition system. 5

II) Define the following parameters 5  
 i. Transient response  
 ii. Steady state response  
 iii. define Type 0, Type 1, Type 2 system

(b) I) Compare temperature transducer with respect to their characteristics and measurement range. 5

II) What are the advantages of polar plot. Draw the polar plot of the given transfer function 5

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

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