

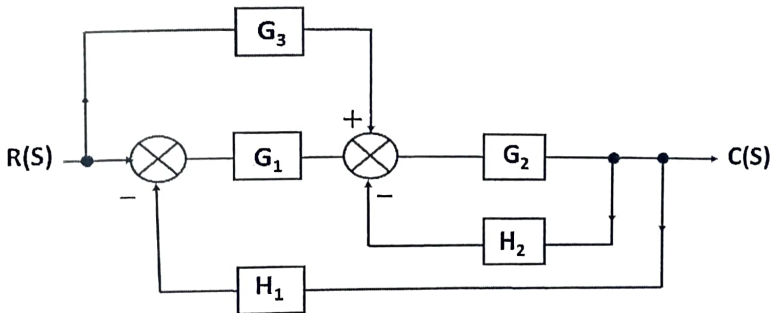
Time: 3 Hours

Total Marks: 80

- N.B:
- 1) Question No. 1 is compulsory.
 - 2) Attempt any **THREE** questions out of remaining **FIVE** questions.
 - 3) Assume suitable data wherever necessary.
 - 4) Use of Graph paper is allowed.
 - 5) Figures to the right indicate full marks.

1. Answer of the following questions (any Four).

- Define wavelength standard and state the significance of using it. 20
 - Explain different types of fits with suitable examples and sketches
 - Differentiate between roughness and waviness.
 - Define and explain i) Resolution; ii) Threshold; iii) Hysteresis
 - Briefly explain the construction and working of a strain gauge load cell.
 - Using Routh's criterion examine the stability of a control system whose characteristic equation is $S^5 + S^4 + 2S^3 + 2S^2 + 3S + 15 = 0$
- Define Interferometry. Explain Laser Interferometer with neat sketch. 10
 - Reduce the given block diagram to a it's canonical form and hence obtain equivalent transfer function, $\frac{C(s)}{R(s)}$. 10



- Explain generalized measurement system elements with block diagram. Describe functions with suitable examples. 10

- A unity feedback system has $G(s) = \frac{K}{s(2+s)(4+s)}$ 10

- If $r(t) = 2t$ and $K = 4$, find steady state error.
- If it is desired to have steady state error to be 0.4, find corresponding value of "K"
- Find steady state error if input is changed to $2+6t$, and value of K to 10.

4. (A) Explain principle, construction and working of *Parkinson Gear Tester* 10
(B) Draw the root locus and comment on the stability of the control system having open loop transfer function as follows: 10

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

5. (A) What are encoders? With a neat sketch, explain the working of an incremental and absolute optical encoder. Give examples of their use. 10
(B) Design a general type of Go and No Go plug gauge for inspecting a hole 25 d8. Given that: 10

$$i = 0.40 D^{1/3} + 0.001D \text{ micron}$$

$$\text{Tolerance for hole} = 25 i$$

$$\text{Fundamental deviation of the hole} = 16 D^{0.44}$$

Wear allowance 10% of gauge design

6. Write short note on (*any Four*) 20
- i) Floating Carriage Micrometer
 - ii) Repeatability and Reproducibility
 - iii) Ultrasonic Flow Meter
 - iv) Capacitive Pressure Transducer
 - v) Types of Measurement System Inputs
 - vi) Frequency Domain specifications
