

22/11/2023

Paper / Subject Code: 32621 / Mechanical Measurements & Controls  
TE Sem V (R-2019) "C Scheme" Mechanical

Dec/23 sem V Total Marks: 80  
Nov '2023  
updated 04-11-23

Time: 3 Hours

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.

20

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

i) What is Metrology? Explain different types of standards.

ii) With respect to surface roughness parameters explain the following terms:

i) Ra; ii) Ry; iii) Rz

iii) Define:

i) Sensitivity

ii) Precision

iii) Threshold

iv) Explain the working of LVDT with a neat sketch.

v) Distinguish between open loop and closed loop control systems.

vi) Using Routh's criterion examine the stability of a control system whose characteristic equation is  $4S^5 + 2S^4 + 4S^3 + 8S^2 + 2S + 10 = 0$

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2. (A) Explain with a neat sketch the N.P. L. flatness interferometer.

(B) Design a general type of Go and No Go plug gauge for inspecting a hole 25 D8. Given that:

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$$i = 0.40 \sqrt[3]{D} + 0.001D \text{ micron}$$

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

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

$$\text{Wear allowance } 10\% \text{ of gauge design}$$

05

3. (A) Explain the term clearance fit with respect to limit fit diagram

(B) Derive necessary expression to calculate the best wire diameter.

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(C) Draw the Root-Locus of the system having

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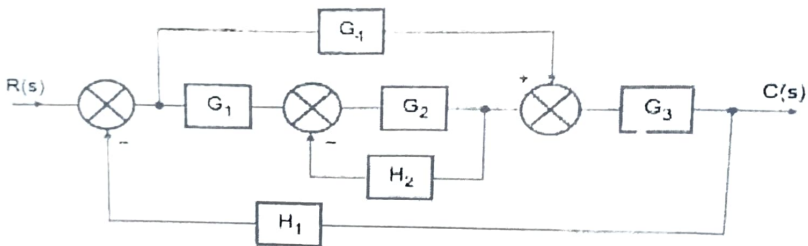
$$G(s)H(s) = \frac{K}{s(s+1)(s+4)}$$

4. (A) Define gauge factor of strain gauges. Derive an expression for gauge factor.  
 (B) Briefly, discuss drift  
 (C) A system has transfer function given by

$$G(s)H(s) = \frac{100(s+2)}{s(s+1)(s+4)}$$

Determine:

- Type of system
  - Error constants  $K_p$ ,  $K_v$  and  $K_a$
  - Steady state error for input magnitude 2
5. (A) Explain generalized measurement system elements with block diagram. Describe its function with suitable examples.  
 (B) Reduce the given block diagram to a its canonical form and hence obtain equivalent transfer function,  $\frac{C(s)}{R(s)}$ .



6. Write short note on (any Four)

- Mc-Leod Gauge
- RTD
- Magnetic Flow Meter
- Frequency Domain Specifications
- Parkinson's Gear Tester
- Range and Span