B.E. / B.Tech. Mechanical Engineering (Model Curriculum) Semester-IV

PCC-ME206 - Instrumentation and Control

P. Pages : 2 **GUG/S/25/14065**

Time : Three Hours * 2 3 8 2 * Max. Marks : 80

Notes : 1. All questions carry equal marks/marks as indicated
2. Due credit will be given to neatness and adequate dimensions.
3. Assume suitable data wherever necessary.
4. Diagrams and Chemical equation should be given wherever necessary.
5. Illustrate your answers wherever necessary with the help of neat sketches.
6. Use fo slide rule, Logarithmic Tables, Steam Tables, Moldier's Chart, Drawing
7. Solve Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6, Q. 7 or Q. 8, Q. 9 or Q. 10.

1. a) Explain Generalized measurement system with block diagram. **8**

b) Define the term error. Describe in detail systematic, random, static and dynamic errors. **8**

OR

2. a) Distinguish between **8**
i) Range and span
ii) Accuracy and precision

b) Explain static characteristics and dynamic characteristics. **8**

3. a) Define steady state error. Derive an expression for the steady state error. **8**

b) An unity feedback system has **8**

$$G(s) = \frac{10(S+1)}{S(S+2)(S+5)}$$

determine :
i) Type of system
ii) Step, Ramp, Parabolic error coefficient
iii) Steady state error.

OR

4. a) Find steady state error and error constant for the system whose **8**

$$G(s) = \frac{49}{S^2(S+7)} \text{ And } H(S) = 1$$

b) Discuss in detail about Time domain Response. **8**

5. a) Enlist various types of dynamometers and explain with neat sketch rope brake dynamometer. **8**

b) Explain construction and working of LVDT with its advantages and limitations. **8**

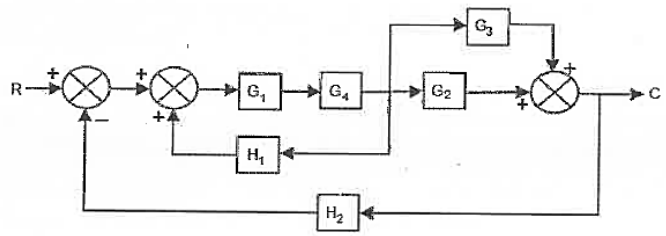
OR

6. a) Enlist the various transducers used in speed measurement and explain any one of them. **8**

b) Following data refers to the test on an engine with rope brake dynamometer **8**
Mass attached to rope = 75 kg
Spring balance reading = 1N
Flywheel radius = 0.2 meter
Rope diameter = 2 cm
Speed = 480 rpm. Obtain the power of the engine.

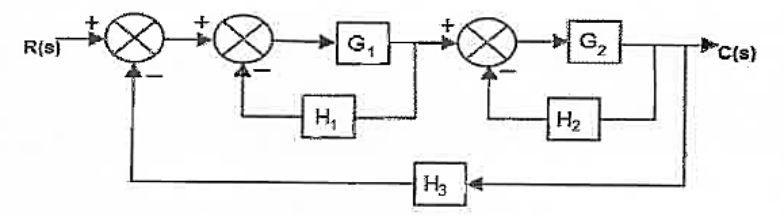
7. a) Explain open loop and closed loop system with examples. **8**

b) Find out Transfer function **8**

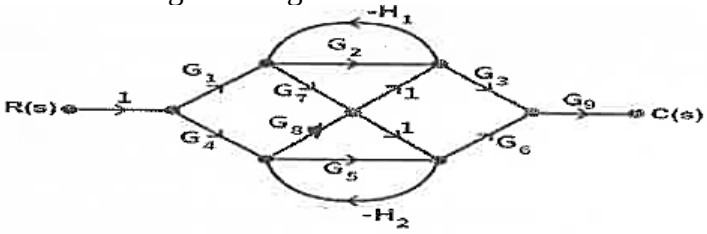


OR

8. a) Reduce the multiple loop control system to a single block diagram and determine the overall transfer function between the referred input R(s) and the controlled output C(s) in fig. **8**



b) Find out Transfer Function using Mason gain formula. **8**



9. a) Draw the root locus for the system. **8**

$$G(s).H(s)=\frac{k}{S(S+3)(S+6)}$$. Obtain value of k when $\xi = 0.6$ from root locus.

b) Explain **8**
1) Routh's stability Criterion 2) Application of Routh's criterion

OR

10. **16**

The control system has $G(s).H(S)=\frac{25(S+4)}{S(S+1)(S+10)}$ Sketch Bode plot.

Determine
i) Gain margin ii) Phase Margin

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