

4E2054

Roll No. _____

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B. Tech. IV Semester (Main/Back) Examination 2012
Mechanical Engineering
4ME6 Mechanical Measurements and Control
Common for Mech., and Automobile Engineering

Time : 3 Hours

Maximum Marks : 80

Min. Passing Marks : 24

Instructions to Candidates:

Attempt any five questions selecting one question from each unit. All questions carry equal marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly).

Use of following supporting material is permitted during examination (Mentioned in form No 205)

Graph paper

Unit - I

1. a) What is calibration and why is it necessary for an instrument? (8)
- b) Specify different temperature compensation techniques used in a resistive strain gauge. (8)

OR

1. a) Name the various types of strain gauges for different applications. (8)
- b) Explain the construction of wire wound strain gauges and derive the expression for the gauge factor. (8)

Unit - II

2. Describe the construction, theory and working of thermocouples. Describe the different types of compensations used and also the methods of measurement of their output voltage. (16)

OR

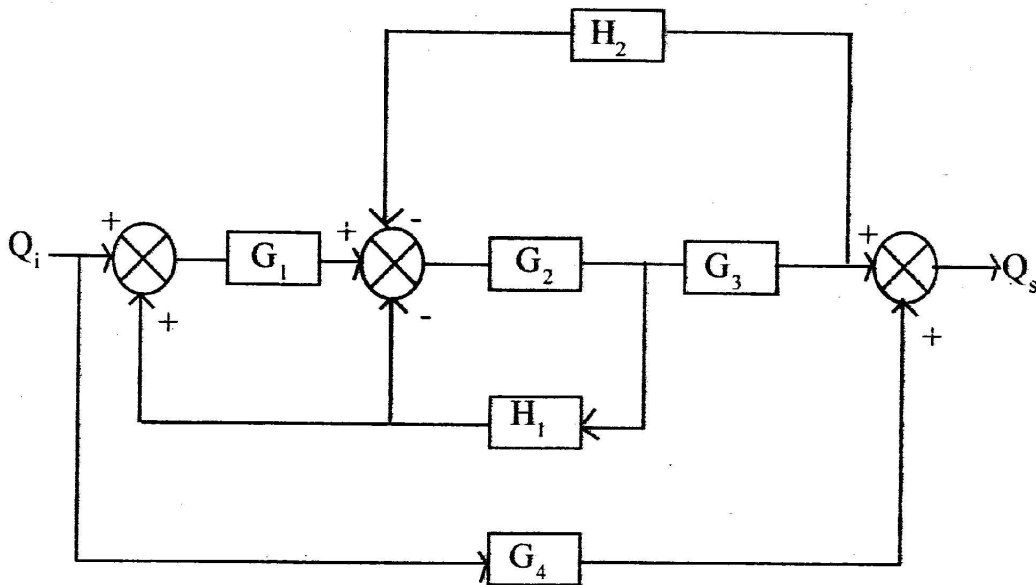
2. a) What are thermistors? Explain their different forms of construction. Also write their applications. (8)
- b) Briefly explain the principle employed in manometers used for the measurement of pressure. (8)

Unit - III

3. a) Distinguish between open-loop and closed loop control systems with the help of a suitable diagrams. (8)
- b) What do you mean by interfacing? Explain in detail. (8)

OR

3. a) Explain the multi channel data acquisition system. (8)
b) Obtain the signal flow diagram of the multiple loop control system whose block diagram representation has been shown in fig. (1) and obtain the closed-loop transfer function by mason's rule. (8)



Unit - IV

4. a) Define a system and distinguish between the following terms applied to the control systems. Physical model and mathematical model. (8)
b) Define the feedback characteristics of control systems. (8)

OR

4. a) Derive the transient response of a unit input first order system. (8)
b) Specify the time response specifications with the help of a neat sketch. (8)

Unit - V

5. a) Using Hurwitz criterion, determine if the characteristic equation given below represents a stable or an unstable system. $s^3 + 6s^2 + 12s + 15 = 0$ (8)
b) Sketch the root locus $G(S)H(S) = \frac{k}{s(s+1+j)(s+1-j)}$ ($K > 0$) (8)

OR

5. a) A unity feedback control system has $G(S) = \frac{20}{s(s+2)}$ Draw the Bode plot. (8)
b) Find the polar plot of $G(S) = \frac{8}{[(s+1)(s+2)]}$ (8)