

Roll No. ....

Total Pages : 03

BT-7/D-19

37166

MEASUREMENT AND CONTROL

ME-401N (Group i) Opt. (i)

Time : Three Hours]

[Maximum Marks : 75

**Note :** Attempt *Five* questions in all, selecting at least *one* question from each Unit. Unless stated otherwise, the Symbols have their usual meaning in context with the subject. All questions carry equal marks.

**Unit I**

1. Differentiate between Primary, Secondary and Tertiary types of measurements. Also, cite suitable examples for each of the case. 15
2. What are the different sources of errors in measurements and measuring instruments ? Also, explain (a) Hysteresis, (b) Accuracy, (c) Repeatability and (d) Drift. 15

**Unit II**

3. Describe the method of measuring torque of rotating shafts using strain gauges. Also, explain how elastic sensing elements can be used for measurement of force. 15

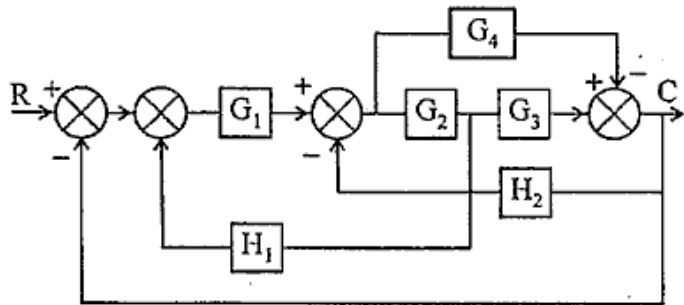
4. Derive an expression for Gauge Factor of Strain Gauge when change in resistivity due to strain is almost negligible. Also describe the construction of foil type strain gauges. 15

**Unit III**

5. An electromagnetic flow meter is used to measure the average flow rate of a liquid flowing through a pipe of diameter 50 mm. The velocity profile is symmetrical and can be assumed uniform. The flux density in the liquid has a peak value of  $0.1 \text{ Wb/m}^2$ . The output from the flow meter electrodes is taken to an amplifier of gain 1000 and impedance between the electrodes is 250 kilo-ohms. The input impedance of the meter is 2.5 mega-ohms. Determine the average velocity of the liquid when peak to peak voltage at the amplifier output is 0.2 V. 15
6. A thermometer with a time constant of 50 seconds has been used for measuring temperature cycling with 500 s time period. Calculate the amplitude attenuation (ratio of output to input), the phase angle and the corresponding time lag. 15

### Unit IV

7. Define open and closed loop control system with the help of example. Also state their advantages and disadvantages. 15
8. Draw the signal flow graph and determine C/R for the block diagram shown below : 15



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