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BT-7/M-13 **8752**

MEASUREMENTS AND CONTROL

Paper–ME-403-E

Time Allowed : 3 Hours] [Maximum Marks : 100

Note : Attempt **five** questions in all, selecting at least **one** question from each Unit. Assume any missing data.

UNIT–I

1. (a) Discuss functional elements of a generalized measurement system with the help of a block diagram. Identify the various elements and the functions performed by each element. 12

   (b) Compare mechanical systems with electrical measuring systems. 8

2. (a) What do you mean by Errors? Discuss different types of errors with relevant examples. 10

   (b) Distinguish between the followings with suitable examples:

   (i) Accuracy and Precision

   (ii) Backlash and Drift

   (iii) Threshold and Resolution.

UNIT–II

3. Derive the equations for time response of a first order system when subjected to

   (i) Unit step input

   (ii) Unit ramp input.

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A temperature sensing device can be modeled as a first order system with a time constant of 6 seconds. It is subjected to a step input of 25°C – 150°C. What temperature will be indicated in 10 seconds after the process has started? 20

4. The table given below lists a sample of experimental data:

Values	3	4	5	6	7	8	9	10	11
Frequency of Occurrence	1	2	3	6	7	6	4	2	1

Calculate (a) Arithmetic mean, (b) Mean Deviation, (c) Standard deviation, (d) Probable error of one reading, (e) The standard deviation and probable error of the mean, (f) Standard deviation of the standard deviation. Is there any reading that can be discarded on the basis of three sigma? If so, specify. 20

UNIT–III

5. (a) Explain how electromechanical types of transducers can be used in conjuction with elastic pressure elements for measurement of pressure. 12

   (b) Discuss some adhesive along with their properties used in making of Strain gauge. 8

6. Discuss the (i) null and (ii) deflection mode of a Wheatstone bridge circuit as used for measurement of resistance and small changes of resistance occurring in temperature and strain measuring systems. 20

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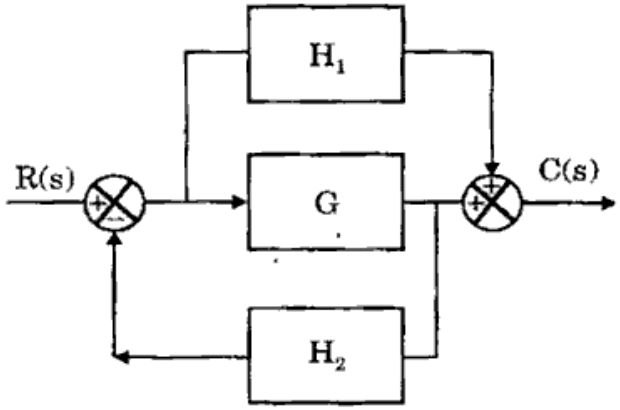
UNIT–IV

7. What is a block diagram? Describe its components. Simplify the block diagram shown in figure given below: 20



8. Write a short notes on the following:
   (a) Characteristics of Hydraulic fluids.
   (b) Hydraulic v/s Pneumatic control.

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