

Roll No.

8753

Printed Pages : 3

BT-7 / M12

MEASUREMENT AND CONTROL

Paper-ME-403-E

Time allowed : 3 hours] [Maximum marks : 100

Note : Attempt any five questions, selecting at least one question from each unit. Assume any missing data.

Unit-I

1. (a) Differentiate between Primary, Secondary and Tertiary types of measurements. Cite suitable examples for each case. 10
- (b) Describe with examples the applications of Measurement systems. 10
2. (a) What are the different sources of errors in the measurements and measuring instruments ? Explain. 10
- (b) Define the following terms :
 - (i) Repeatability
 - (ii) Accuracy
 - (iii) Hysteresis
 - (iv) Drift. 10

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Unit-II

3. Show that, when a step input is applied to a first order system, the output reaches 0.63 of the step value after time equal to time constant of the system.

A thermometer has been suddenly plunged into a steaming water bath whose temperature remains steady at 100° C. It takes 10 seconds for the thermometer to reach the equilibrium condition which occurs at five time constant ($t = 5\tau$). Calculate the time constant and the time taken by the thermometer to indicate half of the temperature difference. The initial thermometer temperature can be considered to be zero. 20

4. The following data are expected to follow a linear relationship of the form $y = ax + b$. Obtain the best linear relation in accordance with a least square analysis. Calculate the standard deviation of the data from the result.

x	0.9	2.3	3.3	4.5	5.7	6.7
y	1.1	1.6	2.6	3.2	4.0	5.0

20

Unit-III

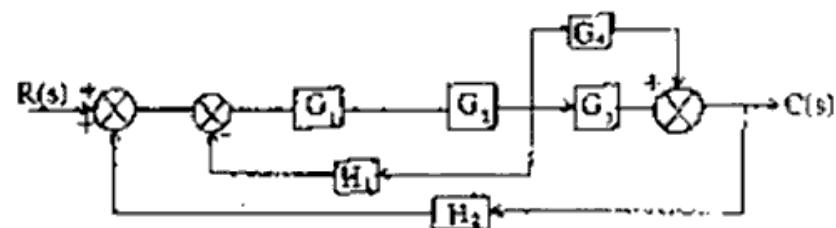
5. (a) Describe the principle of operation of a piezo-electric transducer. Identify the input and output of the system. 10

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- (b) Mention some natural and synthetic materials that exhibit piezo-electric effect. 5
- (c) Explain why it is desirable that piezo-electric transducers should be used for the measurement of dynamic quantities only ? 5
6. (a) What are Proving rings ? Explain how they can be used for measurement of force using a vibrating reed and a micrometer. 10
- (b) What are Load cells ? Explain the working of Load cell using strain gauges. 10

Unit-IV

7. What do you mean by 'Transfer function' ? Determine the transfer function for the following block. 20



8. Write short notes on :
- (a) Pneumatic nozzle
- (b) Hydraulic pump. 20