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BT-7/M–19

MEASUREMENTS AND CONTROL

Paper–ME-403-E Opt. I

Time allowed : 3 hours]   *[Maximum marks : 100*

Note :   *Attempt only five questions, selecting one question from each unit.*

Unit–I

1. (a) List and explain various applications of measuring instruments.   10

   (b) Differentiate between mechanical and electrical loading.   10

2. (a) Differentiate between mechanical and electrical measuring systems.   10

   (b) Write note on following terms :

   (i) Propagation of uncertainties in compounding quantity.   5

   (ii) Linearity and Hysteresis.   5

Unit–II

3. (i) Discuss the dynamic response of a first order mechanical systems with step input.   10

   (ii) Explain Chauvenet's criteria of rejecting a dubious data.   10

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4. (a) Describe generalized mathematical model of measuring systems. 10

   (b) Write short notes on the following :

   (i) Dynamic error and speed of response 5

   (ii) Overall uncertainty estimation of measuring systems. 5

Unit–III

5. (a) Write the working principle, types, advantages and limitations of electrostatic transducers. 10

   (b) Discuss measurement of load, force and thrust using resistant strain gauges. 10

6. (a) Compare the characteristics of ballast and DC Wheatstone bridge circuits. 10

   (b) Discuss measuring of torque in transmission shaft under bending loads in varying ambient conditions. 10

Unit–IV

7. (a) Draw SFGs for the following sets of algebraic equations. These equations should be arranged in the form of cause-and-effect relations before SFGs can be drawn. Show

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that there are many possible SFGs for each act of equations : 10

$$2x_1 + 3x_2 + x_3 = -1$$
$$x_1 - 2x_2 - x_3 = 1$$
$$3x_2 + x_3 = 0$$

(b) Write short notes on the following :

(i) Classification of control systems. 5

(ii) System stability. 5

8. (a) Define transfer function. Also explain servomechanism. 10

(b) Write short notes on the following :

(i) Hydraulic pump. 5

(ii) Advantages and disadvantages of Pneumatic control systems. 5

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