(Following Paper ID and Roll No. to be filled in your Answer Books)

Paper ID : 2289985 Roll No.

B.TECH.

Regular Theory Examination (Odd Sem - V), 2016-17

TRANSDUCER AND SENSORS

Time : 3 Hours **Max. Marks : 100**

Section - A

Note: Attempt all parts of the following. All parts carry equal marks.

Write answer of each part in short (10×2=20)

1. a) Discuss basic elements of an instrument.

b) Define sensor. Differentiate between sensor and transducer.

c) Specify how speed is measured by tachometer?

d) What is least square calibration curve?

e) Explain dead time, Input Impedance.

f) Discuss the working principle of Hot wire anemometer.

g) What do you mean by static characteristics?

h) What are total immersion and partial immersion thermometers?

i) Explain loading effect in force measurement.

j) Brief Bonded strain gauge transducer.

Section - B

Note : Attempt any 5 questions from this Section. (5×10=50)

2. Draw the block diagram of Pressure type thermometer with the blocks of functional element of a basic instrumentation system & also explain the element.

3. Explain any non contact type of displacement transducer with proper circuit diagram and suggest its advantages over Contact type Displacement transducer.

4. What is the basic principle of capacitive transducer? A capacitive transducer uses two Quartz Diaphragm of area 750 mm^2 separated by a distance of 3.5 mm. A pressure of 900 KN/m^2 when applied to the diaphragm produces a deflection of 0.6 mm the capacitance is 370 pf when no pressure is applied to the diaphragm. Find the value of capacitance after the application of pressure 900 KN/m^2.

5. a) With proper diagram, explain Eddy current drag cup rotational velocity measurement.

b) Name some of the piezoelectric crystals. Discuss about the piezoelectric transducer for weight measurement.

6. Explain the working principle of monochromatic brightness radiation thermometers with proper diagram.

7. Define the term gauge factor and derive the expression. Write in brief about semiconductor type strain gauge.

8. Discuss the working principle and characteristics of LVDT? What is importance of Phase sensitive demodulator in LVDT output?

9. Explain moving magnet pickup for velocity measurement.

Section - C

Note : Attempt any 2 questions from this section. **(2×15=30)**

10. a) For a wheatstone bridge with a unknown resistance

Rx = R2.R3/R1 where R1 = 1000 Ω 2%, R2 = 500 1%, R3 = 2000 0.5%.

Determine unknown resistance and limiting error.

b) What are the various methods of connection of interfacing and modifying input? Explain high gain feedback method.

11. Attempt any three :

a) Classify the different types of transducers on basis of their operation.

b) Define Resolution and linearity.

c) Define pressure. Give its SI units also.

d) Name the measurement instruments based on Seebeck effect.

12. Write a short note on the following :

a) What does the gauge factor of a strain gauge indicates?

b) Sketch the functional elements of measurement system.

c) Why digital thermometers are used and preferred?

d) Explain the operating principle of Yaw tube.