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

PAPER ID : 3096 Roll No. | | | | | | | | | | |

B.Tech.

FIFTH SEMESTER EXAMINATION, 2006-07

TRANSDUCERS AND DISPLAY SYSTEMS

Time : 3 Hours *Total Marks : 100*

Note : *(i) Attempt ALL questions.*

(ii) All questions carry equal marks.

(iii) In case of numerical problems assume data wherever not provided.

(iv) Be precise in your answer.

1. Attempt *any four* parts of the following : **(5x4=20)**

(a) Define the terms accuracy, error, precision, resolution and sensitivity.

(b) The value of a resistance is 4.7 kΩ while measurement yields a value of 4.63 kΩ calculate.
(i) The relative accuracy of measurement.
(ii) % accuracy.

(c) What is the difference between active and passive transducers ?

(d) A multimeter having a sensitivity of 2000 Ω/V is used for the measurement of voltage across a circuit an output resistance of 10 kΩ. The open circuit voltage of the circuit is 6 V. Find the reading of the multimeter when it is set to its 10 V scale. Find the % of error.

(e) Define the following with reference to transducer :
   (i) Sensitivity error
   (ii) Hysteresis error
   (iii) Cross sensitivity

(f) Differentiate between the following with suitable example :
   (i) Primary and Secondary Transducers.
   (ii) Output and Inverse Transducers.

2. Attempt *any four* parts of the following : **(5x4=20)**

(a) An ac LVDT has the following data input = 6.3V, output = 5.2V, range ±0.5 in. Determine :
   (i) The output voltage Vs core position for a core movement going from +0.45 in. to −0.30 in.
   (ii) The output voltage when the core is −0.25 in. from the centre.

(b) Explain the working principle of LVDT with neat sketch.

(c) Explain Piezo Electric Transducer with mathematical formula of charge sensitivity and voltage sensitivity.

(d) Explain the different principle of working of capacitive transducer.

(e) A resistance wire strain gauge with a gauge factor of 2 is bonded to a steel structural member subjected to a stress of 100 MN/m^2. The modulus of elasticity of steel is 200 GN/m^2. Calculate % change in the value of gauge resistance due to applied stress.

(f) Explain the different types of Electrical Strain Gauges.

3. Attempt *any two* parts of the following : **(10x2=20)**

(a) Differentiate between Mechanical and Resistance type temperature sensors.

A thermo couple circuit uses a chromel alumel thermocouple which gives an emf of 33.3 V when measuring a temperature of 800°C with reference temperature 0°C. The resistance of the meter coil, Rm is 50 Ω and a current of 0.1 mA gives full scale deflection. The resistance of junctions and leads, Re. is 12 Ω. Calculate.

(i) Resistance of the series resistance. If a temperature of 800°C is to give full scale deflection.

(ii) The approximate error due to rise of 1 Ω in Re.

(b) (i) Describe the method for measurement of temperature with RTO.

(ii) Describe the advantages and limitations of Thermistors.

(c) Write a short notes on the following :

(i) Temperature measurement by Radiation Methods.

(ii) Optical Pyrometer.

4. Attempt *any two* parts of the following : **(10x2=20)**

(a) Explain the classification of Flow Meters.

(i) Write a short note on the following :

(a) Ultrasonic flow meter

(b) Vortex flow meter

(b) (i) Define various elastic elements for pressure measurements.

(ii) Write a short notes on the following :

(1) Piezoelectric Pressure Transducers.

(2) Pressure Multiplexer.

(c) Write a short note on the following :

(i) Various level detectors

(ii) Radar level gauges, level transmitter

5. Attempt *any four* parts of the following : **(5x4=20)**

(a) Draw the block diagram of a general purpose CRO.

(b) Explain the working of an LED and give its advantages.

(c) Describe various gas discharge plasma devices.

(d) Draw a neat sketch and explain the working principle of liquid vapour displays.

(e) Explain various LCD systems with their applications.

(f) Give an Overview of Digital Display Devices.

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