B.Tech. / B.E. Instrumentation Engineering (Model Curriculum) Semester-III
302 / IN302M - Sensors & Transducers

P. Pages : 2

Time : Three Hours

Max. Marks : 80

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Notes : 1. All questions carry marks as indicated.
2. Due credit will be given to neatness and adequate dimensions.
3. Illustrate your answers wherever necessary with the help of neat sketches.
4. Same answer book must be used for each section.

1. a) Describe the functional elements of an instrument with its block diagram. **8**

b) Compare accuracy and precision. **8**

OR

2. a) Give brief description of following with an example of each. **8**
a) Primary and secondary transducers.
b) Passive and active transducers.

b) Define an inverse transducer. Give an example. **8**

3. a) State the working principle of strain gauge. Describe the construction and working of Different types of strain gauge. **8**

b) A resistance wire strain gauge uses a soft iron wire of small diameter. The gauge factor is +4.2. Neglecting the piezoresistive effects, calculate the Poisson's ratio.
List various types of material used for construction of strain gauge and write their gauge factor. **8**

OR

4. a) Illustrate with neat sketches basic elastic elements used for force measurement. **8**

b) Discuss with neat sketch servo control dynamometer. **8**

5. a) What is inductance transducer? Mention three principles of inductance transducer. **8**

b) A linear resistance potentiometer is 50mm long and is uniformly wound with a wire having a resistance $10,000\,\Omega$. Under normal conditions, the slider is at the center of the potentiometer. Find the linear displacement when the resistance of the potentiometer as measured by a Wheatstone bridge for two cases is : (i) $3850\,\Omega$, and (ii) $7560\,\Omega$. Are the two displacements in the same direction? **8**

OR

6. a) Define Hall Effect, draw and explain the Hall Effect sensor. **8**

b) Select proper transducer for measurement of thickness paper or sheet. **8**

7. a) Give the construction and working principle of electromagnetic and photoelectric tachometer. **8**

b) Discuss the seismic transducer with diagram and explain the operation in the displacement mode and acceleration mode. **8**

OR

8. a) Describe the setup of measurement of the speed with the help of photo pickups. **8**

b) While measuring the speed of a steam turbine with stroboscope single line images were observed for stroboscope setting of 3000, 4000 and 5230 rpm. Evaluate the speed of turbine. **8**

9. a) Illustrate the working principle of capacitive and inductive proximity sensors. **8**

b) Explain the working and construction of displacement-type densitometers. **8**

OR

10. a) Compare Saybolt and rotary type viscometers in terms of principle of operation. **8**

b) Draw the block diagram of sound level meter and explain its working principle. **8**

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