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Question Paper Code : 21421

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2013.

Fourth Semester

Electronics and Instrumentation Engineering

EI 2252/EI 42/EI 1252/10133 EI 403/080300010 – TRANSDUCER ENGINEERING

(Common to Instrumentation and Control Engineering)

(Regulation 2008/2010)

(Common to PTEI 2252 Transducer Engineering for B.E. (Part-Time)

Third Semester–Electronics and Instrumentation Engineering – Regulation 2009)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define standards.
2. List out the factors to be considered for selection of transducer for a particular application.
3. What is sensitivity and linearity of an instrument?
4. A thermometer, modeled as a first order system with a time constant of 2.2 s, is suddenly given an input of 160°C from 0°C. What will be the thermometer reading after 1.2 s?
5. Enumerate the applications of Strain Gauge.
6. Write the principle of operation of hot-wire anemometer.
7. What is an EI pick up transducer?
8. State the types of capacitance transducer.
9. Give any two examples for MEMS sensors.
10. Write the principle of Piezo-electric transducer?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain in detail the calibration methods for instruments. (8)
- (ii) In a temperature test, measurements of temperature were made 100 times with variations in apparatus and procedures. After applying the corrections the following results were obtained:

Temperature	197	198	199	200	201	202	203	204	205
Frequency	2	4	10	24	36	14	5	3	2

Calculate the arithmetic mean, the average deviation, the standard deviation and the probable error. (8)

Or

- (b) (i) Describe the types of errors with instruments. (10)
- (ii) Explain the classification of transducers with respect to operating principles. (6)
12. (a) (i) Explain the static characteristics: Accuracy, Precision and Resolution. (12)
- (ii) Derive the time response of a first order transducer for a unit ramp input. (4)

Or

- (b) (i) For a first order instrument system is subjected to a sinusoidal input $I_i = 0.35 \sin 25t$. If the instrument has time constant of 0.3 second, develop an expression for corresponding output. (8)
- (ii) Discuss about the time response specifications of transducers. (8)
13. (a) (i) Explain the principle of operation and compensation of Strain Gauge. (12)
- (ii) Explain the principle of Peizo-resistance sensor. (4)

Or

- (b) (i) Describe the principle of operation, of humidity sensor. (6)
- (ii) Explain the construction and operation of two types of hot-wire anemometer. (10)

14. (a) (i) Explain the principle of operation and construction of variable reluctance transducer. (8)
- (ii) Describe the principle of operation of capacitor microphone. Also explain its Frequency response characteristic. (8)

Or

- (b) Describe the principle of operation, Construction details, characteristics and applications of LVDT.
15. (a) (i) Describe the principle of operation of Hall Effect sensor. What are the applications? (8)
- (ii) Describe the role of MEMS in Instrumentation. (8)

Or

- (b) Briefly Discuss the working and principle the following sensor
- (i) Fibre Optic Sensor (8)
- (ii) SQUID sensor. (8)
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