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Question Paper Code : 60528

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2016.

Fourth Semester

Electronics and Instrumentation Engineering

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

(Common to Instrumentation and Control Engineering)

(Regulations 2008/2010)

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. Define accuracy and precision.
4. Sketch impulse response of I and II order transducers.
5. Mention any four applications of strain gauge in measurements.
6. How is resistance of metals related with temperature? Write the equation for the relation.
7. Draw the frequency response of capacitor microphone.
8. Mention any four applications of LVDT.
9. What is the acceptance angle and the numerical aperture of fiber with a core index of reflection 1.47 and cladding index of refraction of 1.45?
10. Write short notes about Nano sensors.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain in detail about the classification of errors in instruments and also explain the causes and remedies for them. (10)
- (ii) Differentiate fundamental and derived units with examples. (6)

Or

- (b) In a test, temperature is measured 100 times with variation in apparatus and produces the following results.

Temp °C	397	398	399	400	401	402	403	404	405
Frequency	1	3	12	23	37	16	4	2	2

Calculate

- (i) Arithmetic Mean,
- (ii) Standard Deviation,
- (iii) Probable of error of one reading,
- (iv) Standard Deviation.
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 constructional, details and applications of strain Gauge. (10)
- (ii) Explain the construction and operation of variable resistance humidity sensor. (6)

Or

- (b) (i) Describe the principle of operation, constructional details of resistance thermometers. Also explain the characteristics of different metals for resistance thermometers. (10)
- (ii) Explain the construction and operation of hot-wire anemometer. (6)

14. (a) Obtain the transfer function of LVDT with equivalent circuit and explain any two adjustment circuits for LVDT.

Or

- (b) (i) List the merits, demerits and typical applications for capacitive transducer. (8)
(ii) Describe the functioning of capacitor microphone. (8)
15. (a) Explain in brief the measurement of linear displacement, angular displacement, force and level of liquid in a tank using optic sensors. (16)

Or

- (b) (i) Explain the function of digital displacement transducers. (8)
(ii) Explain any two types of smart sensors. (8)
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