

2016

**TRANSDUCER ENGINEERING**

Paper : IE 502

Full Marks : 100

Time : Three hours

**The figures in the margin indicate full marks for the questions.**

Answer **any five** questions.

1. (a) Discuss about the odds and uncertainty. 6
- (b) The following values were obtained from the measurement of current 8  
12.35A, 12.71A, 12.48A, 10.24A, 12.56A and 12.64A. Calculate :  
(i) Arithmetic mean, (ii) Average deviation, (iii) Standard deviation and (iv) Variance.
- (c) What are the Fundamental Elements of a Measurement System? 6

Contd.

2. (a) Describe the factors to be considered in the selection of a transducer. Explain it. 6
- (b) Distinguish between accuracy and precision. 4
- (c) Derive the time response of a second order undamped measuring system for a unit step input. Draw the response. 10
3. (a) Define the term gauge factor and derive its expression. 10
- (b) If the strain gauge is having the gauge resistance  $200\Omega$ , gauge factor 5 and the strain  $25 \times 10^{-6}$ , how much will be the resistance of the strain gauge change? 2
- (c) Describe the procedure for measuring humidity using hair hygrometer. 8
4. (a) Explain in detail about constant temperature anemometer and constant current anemometer. 12

- (b) Explain the construction, working and signal conditioning circuits of resistance thermometers with temperature compensation. 8
5. (a) Explain the operation of capacitor microphone. 8
- (b) Explain how the capacitive transducer can be used for level measurement. 8
- (c) A resistive position transducer with a resistance of  $6k\Omega$  and a shaft stroke of  $8cm$  is applied with a voltage of  $5V$ . When the wiper is  $3cm$  from the reference, what is the value of the output voltage? 4
6. (a) Describe the principle of operation and construction of LVDT. 10
- (b) Mention *any four* applications of LVDT. 4
- (c) What are the principles of inductance transducer? 3
- (d) What is meant by PT-100? 3

7. (a) Discuss in detail how the pressure can be measured by using piezoelectric transducer. 10
- (b) Write short notes on the following : 10
- (i) Magnetostrictive Transducer
  - (ii) Fibre optic transducer.
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