

Roll No.

2311

B. E. 6th Semester (Mech. Engg.)

Examination – May 2009

Measurement & Instrumentation

Paper : ME-310-E

Time : Three hours]

[Maximum Marks : 100

Before answering the question, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt any *five* questions. All carry equal marks.

1. (a) What are the basic parameters for classifying Instruments. Draw block diagrams of a feedback type measurement system. 10
(b) Explain various methods of calibrations. 10
2. (a) Derive the expressions for overall internal uncertainty in compound quantities. 10
(b) What are the various types of errors in performance parameters. 10
3. (a) A volt meter with internal resistance of 200 kw is connected across a resistance. It reads 250 v. A

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milli ammeter (with very small resistance) connected in series of the same resistance reads 10 mA. Determine apparent resistance, actual resistance and loading error. 10

(b) Explain the working principle of Piezo Electric transducer. 10

4. (a) Explain Digital Encoders. What is the working principle of optical encoder. 10

(b) A first order instruments is to measure signals with frequency context up to 100 Hz with an amplitude inaccuracy of 5%. What is the maximum allowable time const. What will be the phase shift at 50Hz? 10

5. (a) Explain working principle of mechanical Amplifying element. 10

(b) Give an arrangement of an opamp to produce an o/p eo such that $e_o = 2 + 3e_i$, e_i is i/p voltage. 10

6. (a) Explain the working principle of manometer. Derive the expression for inclined tube manometer. 10

(b) For a certain thermister $\beta = 3140$ k and resistance at 27°C is 1050 v. Thermister resistance is 2330. Find the temp. measured. 10

7. (a) Explain Hot wire Anemometer for flow measurement. 10

(b) The table shows the frequency distribution of a resistor manufacturer. 10

R(Ω)	93-95	96-98	99-101	102-104	105-107
F	4	15	33	21	7

Determine :

- (i) arithmetic mean
- (ii) median
- (iii) modal value

8. Write short notes on : 20

- (a) Pyrometer
- (b) Electromagnetic Flow meter
- (c) Load cell
- (d) Impulse function