

**B.E. 6th Semester (Mech. Engg.) Examination,
May-2010**


MEASUREMENTS AND INSTRUMENTATION

Paper-ME-310-E

Time allowed : 3 hours]

[Maximum marks : 100

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

1. (a) Enlist functional elements of the Instruments.
Give five examples of transducer elements. 10
- (b) Explain various methods of calibrations. 10
2. (a) Derive the expression for overall internal uncertainty in compound quantities. 10
- (b) Explain various considerations for selection of instrumentation. 10
3. (a) Explain step response of a first order system. 10
- (b) A voltmeter with internal resistance of $200\text{ k}\Omega$ is  connected across a resistance. It reads 250 V.

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

4. (a) Explain the working principle of capacitive type transducer. 10

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

5. (a) Explain the working principle of pneumatic amplifying element. 10

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

6. (a) Explain Data Acquisition System. 10

(b) Explain Torsion Dynamometer. Enlist various Torque and Power measurement techniques. 10

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7. (a) The table shows the frequency distribution of a resistance manufacturer : 10

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

(b) Explain any one method to measure high pressure. Derive the expression for sensitivity of hot wire pressure transducer. 10

8. Write short notes on :

(i) Thermocouple

(ii) Pilot-static tube meter

(iii) Galvenometric records

(iv) Photovoltaic transducer.

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