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

Examination, May–2011

MEASUREMENT AND INSTRUMENTATION

Paper–ME-310-E

Time allowed : 3 hours]   *[Maximum marks : 100*

Note : *Attempt any* **five** *questions.*

1. (a) Explain classification of Instruments. Enlist advantages and disadvantages computer based instrumentation systems.   10

   (b) Enlist static performance parameters. Explain hysteresis.   10

2. (a) A voltmeter with Internal resistance of 200 KΩ is connected across an unknown resistance. It reads 250 V and milliameter connected in series with the same resistance reads 10 mA. Determine the apparent resistance, actual resistance and loading error due to voltmeter.

                                            10

   (b) A capacitive transducer consists of two plates of diameter of 2 cm each, separated by an air gap of 0.25 mm. Find the displacement sensitivity.   10

3. (a) Explain Dynamic characteristics of piezo electric transducer. 10

   (b) Explain position type data transmission elements. 10

4. (a) Explain the working of magnetic tape recorders. 10

   (b) Explain force balance type seismic device. 10

5. (a) Explain working principle of Mc Leod Gauge for low pressure measurement. 10

   (b) For measuring the torque transmitted by a shaft 4 resistance gauge of 120Ω each are used at $45°$ to the shaft axis. These form the 4 arms of Wheat-stone bridge, output resistance is 1000Ω. Find the O/P voltage of the bridge. Bridge supply is 9V power is 5 HP, speed = 900 rpm, diameter = 2 cm, modulus of rigidity of shaft material = 8×10^{10} N/m^2, gauge factor = 2.5. 10

6. (a) Explain working principle of Radiation Pyrometer. 10

   (b) Explain Pilot static tube. Derive the expression for flow velocity. 10

7. (a) Find the temperature for following setup :

thermistor $\beta = 3140K$, Resistance at 27°C

$= 1050\Omega$. $R_T = 2330\Omega$.   10

(b) Ten samples of a steel wire were tested on a universal test machine. The breaking strengths in tonnes was 4.3, 4.5, 4.7, 4.2, 4.5, 4.6, 4.4, 4.6, 4.9, 4,5. determine :

(i) mean value

(ii) standard deviation

(iii) best estimate of precision of apparatus and uncertainity of data.   10

8. Write short notes on :   20

(a) Bimetallic Thermometer

(b) Hot wire Anemo meter

(c) Mano meters

(d) CRO.