A 255

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2005.

Third Semester

Textile Technology

EE 251 — BASIC INSTRUMENTATION

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — ($10 \times 2 = 20$ marks)

1. Determine the error produced by a zero offset Z_0 if it is not taken into account in determining the output quantity Q_0.

2. Explain the difference between systematic errors and random errors.

3. Define absolute pressure and gauge pressure.

4. Define volumetric flow rate and mass flow rate.

5. Define the common-mode rejection ratio (CMRR) and explain the significance of a relatively large value of (CMRR).

6. What is a sample and hold circuit? Why is it needed?

7. Discuss typical oscilloscope specifications.

8. Sketch the optical fibre construction.

9. What is the use of Lissojous figures in CRO?

10. What is the principle of elastic sensors?

PART B — (5 × 16 = 80 marks)

11. (i) An instrument is calibrated in an environment at a temperature of 20 degree centigrade and the following output readings Y are obtained for various input values X :

Input (X) :	5	10	15	20	25	30
Output (Y) :	13.1	26.2	39.3	52.4	65.5	78.6

Determine the measurement sensitivity. (6)

(ii) When the instrument in (i) is subsequently used in an environment at a temperature of 50 degree centigrade, the input/output characteristics changes to the following :

Input (X) :	5	10	15	20	25	30
Output (Y) :	14.7	29.4	44.1	58.8	73.5	88.2

Determine the new measurement sensitivity. Hence determine the sensitivity drift due to the change in ambient temperature of 30 degree centigrade. (10)

12. (a) (i) What are the six basic subsystems that are included in most data-acquisition systems? (6)

(ii) Explain the purpose of address bus and data bus. (5)

(iii) Explain LED characteristics and associated circuits. (5)

Or

(b) (i) Explain all static characteristics of instruments. (10)

(ii) With a neat circuit diagram explain passive analog low and high pass filters. (6)

13. (a) (i) Explain the measurement principle of Falling-body and rotational viscometers. (10)

(ii) Explain the measurement principle of capacitance and electrical conductivity type moisture measurement techniques. (6)

Or

(b) (i) Explain the measurement principle of turbine flow meter. (8)

(ii) Explain the measurement principle of electromagnetic flow meter. (8)

14. (a) (i) Write an engineering brief describing the relative merits of the RTD as temperature sensor. Also indicate the disadvantages of this sensor. (8)

(ii) With a neat diagram explain the construction and working principle of LVDT. (8)

Or

(b) (i) Write a concise description of a foil-type resistance strain gauge. Include the alloys employed. (5)

(ii) Describe the difference between resolution error and quantizing error. Which is most important? (5)

(iii) What is a strobe signal, and how it is used in a D/A converter? Why is it necessary? (6)

15. (a) (i) Explain the measurement principle of Dead-weight gauge and resonant-wire pressure measuring device. (8)

(ii) Explain the measurement principle of ultrasonic level gauge and vibrating level sensor. (8)

Or

(b) (i) Explain the measurement principle of a.c. tachogenerator and variable reluctance velocity transducer. (8)

(ii) Explain the construction and measurement principle of Venturi tube and orifice plate. (8)