AU – 2515

Third Semester B. E. (Electronics and Telecommunication) Examination

INSTRUMENTATION OF SENSORS

Paper – 3 ET 04

(USC – 11827)

P. Pages : 4

Time : Three Hours] [Max. Marks : 80

Note : (1) Separate answer book must be used for each section in the subject Geology, Engineering material of Civil branch and separate answer book must be used for Section A and B in pharmacy and Cosmetic Tech.
(2) Assume suitable data wherever necessary.
(3) Illustrate your answer wherever necessary with the help of neat sketches.
(4) Use pen of Blue / Black ink / refill only for writing the answer book.

SECTION A

1. (a) What are the different types of errors that occure during measurement ? Explain each. 7

   (b) What is probability error ? Find the probability error for the data given below :—

   41.7 , 42 , 41.8 , 42 , 42.1 , 41.9 , 42.5 , 42 , 41.9 and 41.8. 7

OR

2. (a) Explain the classification of transducers along with suitable example of each. 7

   (b) The expected value of voltage across a resistor is 100 V. However the volt meter reads a value 99V.
   Calculate :—

   (a) absolute error

   (b) % error

   (c) relative error

   (d) % accuracy. 7

3. (a) Explain following Electrical methods for measurement of liquid level with advantages and limitations :—

(i) Resistive Method

(ii) Capacitive Method. 8

(b) Explain Ultrasonic method and nuclear method for measurement of liquid level. 5

OR

4. (a) Explain the inductive method used for measurement of liquid level. Also state its applications and limitations. 7

(b) Explain capacitive voltage divider method for highly conductive liquid level measurement. 6

5. (a) What is thermocouple ? Explain the working principle and different laws of Thermocouple. 7

(b) A platinum resistance thermo-meter has resistance of 1000 Ω at 25^0C. Find its resistance at 50^0C. The resistance temp. coefficient of platinum is 0.00392 Ω/Ω^0C. If the thermometer has a resistance of 200 Ω. Calculate the value of temperature. 6

OR

6. (a) Explain temperature measurement using optical pyrometer. 7

(b) A thermister has a resistance temp. co-efficient of −5% over a temp. range of 25^0C to 50^0C. If the resistance of thermister is 1000 Ω at 25^0C. What is the resistance at 35^0C ? 6

SECTION B

7. (a) Draw and explain the working of Thermocouple vacuum Gauge for measurement of low pressure. 7

(b) Draw and explain the measurement of pressure with Bellows and LVDT. 7

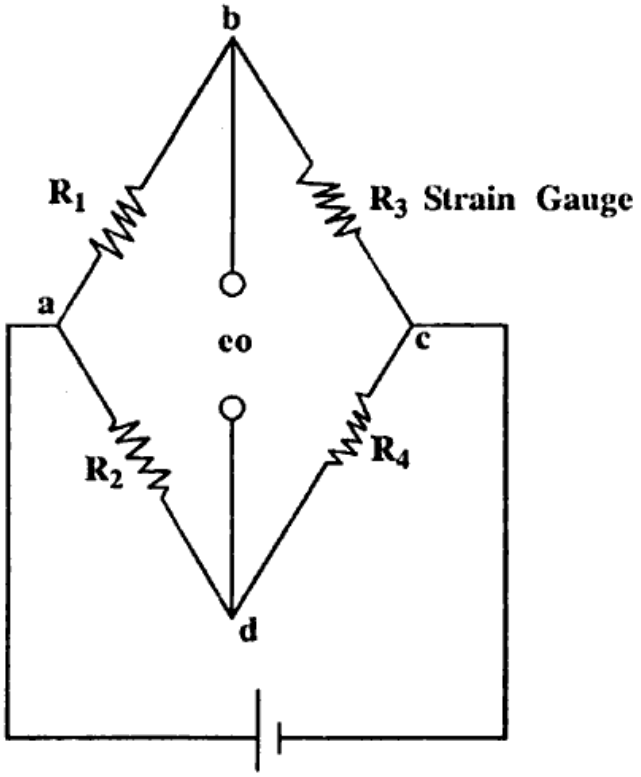
OR

8. (a) Draw and explain magnetic flow meter. State advantage and disadvantages of magnetic flow meter. 7

   (b) Explain measurement of humidity with hygrometers. 7

9. (a) What is strain gauge ? Explain different types of strain gauge with advantages and disadvantages. 7

   (b) A strain gauge bridge shown in fig. It has two fixed resistors R_1 and R_2 of 120 Ω each. The gauge is represented by R_3. The variable resistance R_4 is 120.00 Ω at zero strain and has value of 120.63 Ω with strain. The gauge factor is 2.04. Determine the strain in the beam at the point where the strain gauge is attached.



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OR

10. (a) Explain Angular Velocity measurement by tooth roter or variable Reluctance tachometer. 7

    (b) What is smart sensor ? Explain with the help of block diagram also specify advantages and disadvantages of smart sensors. 6

11. (a) What is signal conditioning ? Discuss why it is necessary in DAS. 6

(b) Draw and Explain the block diagram of general Data acquisition system. 7

OR

12. (a) What is p^H ? Explain the constructor and working of p^H measurement techniques. 7

(b) Describe the following types of shaft encoders :—

(i) Resistive type

(ii) Optical type. 6