Reg. No. : | | | | | | | | | | |

Question Paper Code: 43603

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2018

Third Semester

Instrumentation and Control Engineering

14UIC303-SENSORS AND TRANSDUCERS

(Common to Electronics and Instrumentation Engineering)

(Regulation 2014)

Duration: Threehours Maximum: 100 Marks

Answer ALL Questions.

PART A - (10 x 1 = 10 Marks)

1. Systematic errors are

   (a) environmental errors (b) observational error
   (c) instrument errors (d) all of the above

2. Self generating type transducers are _____ transducers.

   (a) Active (b) Passive (c) Secondary (d) Inverse

3. Which one is an ability to detect changes in the measured quantity?

   (a) linearity (b) sensitivity (c) precision (d) accuracy

4. The desirable static characteristic of a measuring system are

   (a) Accuracy and reproducibility (b) Accuracy, sensitivity and reproducibility
   (c) Drift and dead zone (d) Static error

5. Material used for the temperature range of operation (160-400)°C

   (a) platinum (b) copper (c) tungsten (d)nickel

6. Capacitive transducers are normally employed for_____ measurements

   (a) Static (b) Dynamic (c) Transient (d) Both static and dynamic

7. A Hall element can be used to transducer magnetic flux into

(a) voltage (b) current (c) vibration (d) none of these

8. Fiber optic sensor can be used to sense _____

(a) Displacement (b) Power (c) Current (d) Resistance

9. Piezo-resistive sensor employed for measurement of

(a) Vibration (b) Pressure (c) Temperature (d) Flow

10. Humidity sensor employed for determination of

(a) Relative Humidity (b) Bourdon tube
(c) Temperature (d) Nuclear radiation

PART - B (5 x 2 = 10 Marks)

11. Define Probable Error.

12. List the dynamic characteristics.

13. State the principle of capacitive transducer.

14. Define: Inverse Piezo Electric Effect.

15. What is a smart sensor?

PART - C (5 x 16 = 80 Marks)

16. (a) In an experiment 10 observations of pressure are made which are given below:

Trial no	1	2	3	4	5
Scale (kPa) reading	10.02	10.20	10.26	10.20	10.22
Trial no	6	7	8	9	10
Scale (kPa) reading	10.13	9.97	10.12	10.09	9.9

Calculate (1) mean (2) average deviation
(3) standard deviation and (4) variance. (16)

Or

(b) (i) Discuss the classification of standards. (8)

(ii) Discuss:

(1) Systematic error (4)

(2) Random error (4)

17. (a) State in detail, various types of static characteristics of transducers with example. (16)

Or

(b) With an example of a first order transducer, determine its step and frequency response characteristics. (16)

18. (a) Explain in brief about semiconductor strain gauges. (16)

Or

(b) Describe the construction, working, characteristics and uses of LVDT. (16)

19. (a) Define piezo-electric effect. Explain how a piezo-electric crystal is used for the measurement of force with necessary derivations. (16)

Or

(b) With neat sketch, describe the working of linear and angular digital displacement encoders. (16)

20. (a) State the construction, principle of operation of vibration Instrument for vibration measurement. (16)

Or

(b) (i) Draw the architecture of MEMS sensor and explain its functioning. (8)

(ii) Write short notes on any one IC temperature sensor. (8)

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