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

Question Paper Code: 41633

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2016

Third Semester

Instrumentation and Control Engineering

14UIC303-SENSORS AND TRANSDUCERS

(Common to Electronics and Instrumentation Engineering)

(Regulation 2014)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions.

PART A - (10 x 1 = 10 Marks)

1. Unit symbol of kinematic viscosity is represented as

(a) m / s^2 (b) m^2 / s (c) Ns / m^2 (d) Nm / s^2

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. Which sensor is used for the detection of objects in a moving conveyor?

(a) vibration (b) velocity (c) piezoresistive (d) proximity

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. What is unit? What are its types?

12. List the dynamic characteristics.

13. List out the features of capacitive transducers.

14. What are squids? What is the basic principle behind squids in sensing very feeble magnetic fields?

15. Write the features of SMART sensors.

PART - C (5 x 16 = 80 Marks)

16. (a) (i) Discuss the classification of standards. (8)

(ii) How will you classify errors? Explain them in brief. (8)

Or

(b) (i) Three resistors of $40\Omega \pm 5\%$ and $75\Omega \pm 5\%$ and $50\Omega \pm 5\%$ are connected in series. Calculate the total resistance and the limiting value. (8)

(ii) Discuss the significance of standards and its types. (8)

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

Or

(b) Obtain the equation for time response of first order system when subjected to
(i) Unit step input (8)

(ii) Unit ramp input and draw the response curves. (8)

18. (a) (i) With the basic principle of operation, derive the necessary conditions for loading effect of potentiometer under loading. (8)

(ii) Explain in brief about semiconductor strain gauges. (8)

Or

(b) (i) With a neat sketch, describe about the construction and operation of LVDT. (8)

(ii) Explain about the principle of operation of an induction potentiometer with its neat sketch. (8)

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) (i) Brief out the operation of Hall-effect transducer. (8)

(ii) Give a brief account on digital transducers. (8)

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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