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

Question Paper Code: 43063

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2017

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

(Smith chart may be permitted)

PART A - (10 x 1 = 10 Marks)

1. Self generating type transducers are _____ transducers.

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

2. Unit symbol of kinematic viscosity is represented as

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

3. Resolution of a transducer depends on

(a) Length of wire (b) Diameter of wire
(c) Material of wire (d) Excitation voltage

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

(a) Linearity (b) Sensitivity (c) Precision (d) Accuracy

5. Capacitive transducers are normally employed for_____ measurements

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

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

(a) Platinum (b) Copper (c) Tungsten (d)Nickel

7. Fiber optic sensor can be used to sense _____

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

8. Self generating type transducers are _____ transducers

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

9. Humidity sensor employed for determination of

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

10. Which of the following can be measured with the help of piezo electric crystal?

(a) Sound (b) Velocity (c) Force (d) Pressure

PART - B (5 x 2 = 10 Marks)

11. What is unit? What are its types?

12. A thermometer has a time constant of 3.5 *s*. it is quickly taken from a temperature 0^0C to a water bath having a temperature 100^0C. What temperature will be indicated after 1.5 *s*?

13. State the principle of capacitive transducer.

14. List the various factors affecting the propagation of light through optical sensors.

15. What is a smart sensor?

PART - C (5 x 16 = 80 Marks)

16. (a) A set of independent ten measurements were made to determine the weight of load shot. The weights in grams were. 1.570, 1.597, 1.591, 1.562, 1.577, 1.580, 1.564, 1.586, 1.550 and 1.575. Calculate

(i) Arithmetic mean (ii) Average deviation (iii) Standard deviation
(iv) variance (v) probable error of one reading. (16)

Or

(b) Discuss in detail the different types of errors occurring in measuring instruments and explain how to minimize them. (16)

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

Or

(b) Derive the expression for unit step and ramp response of first order transducer. Plot their responses. Also discuss about the steady state error in both the cases. (16)

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

Or

(b) With neat sketches and expressions, describe the constructional details and operation of different types of hot wire anemometer. (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 sketches, extend your thoughts on the constructional details and operation of the following transducers.

(i) Fiber optic transducer (8)

(ii) SQUID sensor (8)

20. (a) Draw the architecture of MEMS sensor and explain its functioning. (16)

Or

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