VR20 Reg. No:

VELAGAPUDI RAMAKRISHNA

SIDDHARTHA ENGINEERING COLLEGE

(AUTONOMOUS)

II/IV B.Tech. DEGREE EXAMINATION, March, 2022

Third Semester

ELECTRONICS AND INSTRUMENTATION ENGINEERING

20EI3304 SENSORS AND TRANSDUCERS

Time: 3 hours ***Max. Marks: 70***

Part-A is compulsory

Answer One Question from each Unit of Part - B

Answer to any single question or its part shall be written at one place only

PART-A

10 x 1 = 10M

1. a. Define accuracy of measuring instrument.
   b. Classify the characteristics of transducers.
   c. List few transducers based on change in resistance principle.
   d. Summarize the examples of active and passive transducers.
   e. What is the working principle of LVDT?
   f. Mention the applications of inductive transducers.
   g. State the importance of micro sensors.
   h. Outline the working principle of biosensor.
   i. Specify the significance of signal conditioning circuit.
   j. Classify the curve fitting methods.

PART-B

4 x 15 = 60M

UNIT-I

2. a. Define hysteresis, error, dead zone, precision, accuracy, speed of response. What is the basis for static and dynamic characteristics? Which of these come under static and dynamic? **8M**

   b. A set of independent current measurements were taken by six observers and were recorded as 12.8 A, 12.2 A, 12.5 A, 13.1 A. 12.9 A, and 12·4 A. Calculate **7M**
   i)Arithmetic mean,
   ii)Deviations from the mean,
   iii)Standard deviation.

(or)

3. a. Build a measurement system with required functional elements and explain the necessity of each element in detail with example. **8M**

   b. Derive the transfer function of second order system with step input and plot response with neat sketch. **7M**

UNIT-II

4. a. Select a suitable temperature transducer with negative temperature coefficient of resistance and explain its working in detail with neat sketch. **8M**

   b. Describe signal conditioning circuits used for resistive transducer and explain any one circuit in detail. **7M**

(or)

5. a. With a neat sketch explain the working of resistance potentiometers in detail. **7M**

   b. Outline the working of hot-wire anemometer and photovoltaic cell. **8M**

UNIT-III

6. a. Derive the relationship between linear displacement and change in overlapping area of the plates of capacitor and prove that sensitivity of the sensor is constant. **8M**

   b. Select a suitable inductive transducer to convert linear displacement in to voltage and explain its working with neat sketch. **7M**

(or)

7. a. Explain the signal condition circuit of inductive transducers in detail. **7M**

   b. Outline the working of variable reluctance accelerometer and RVDT in detail. **8M**

UNIT-IV

8. a. Explain the construction and working of IR sensor in detail. **7M**

   b. Illustrate the construction of chemical sensor and explain its importance in day today life. **8M**

(or)

9. a. Explain the working of smart sensor with suitable application. **8M**

   b. Describe the construction and working of ultrasonic sensors in detail. **7M**

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