(or)

9. a. With a neat block diagram, explain in detail about smart sensor. **8M**

   b. Illustrate the configuration of biosensor. **7M**

* * *

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

VELAGAPUDI RAMAKRISHNA

SIDDHARTHA ENGINEERING COLLEGE

(AUTONOMOUS)

II/IV B.Tech. DEGREE EXAMINATION, MARCH, 2021

Third Semester

ELECTRONICS AND INSTRUMENTATION ENGINEERING

17EI3304 SENSORS AND TRANSDUCERS

Time: 3hours ***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 the terms sensitivity and resolution.

   b. Why do you need calibration?

   c. What is loading effect?

   d. List out the salient featues of active and passive.

   e. What are the different factors that affect the choice of a transducer?

   f. Give the principle of piezo electric phenomenon.

   g. Why do we need accelerometer?

   h. What are the applications of inductive transducer?

   i. List the applications of micro sensor.

   j. What is chemical sensor?

PART-B

4 x 15 = 60M

UNIT-I

2. a. Derive the response of a first order element to a unit step input. Calculate the magnitude of the response at a time equal to twice the time constant. **7M**

   b. The following 10 observations were recorded when measuring a voltage in volts. 41.7, 42.0, 41.8, 42.0, 42.1, 41.9, 42.5, 42.0, 41.9, 41.8. Evaluate **8M**
   i) Mean ii) Standard Deviation
   iii) Probable Error iv) Mode

(or)

3. a. A voltmeter reading 70V on its 100V range and an ammeter reading 80mA on its 150mA range are used to determine the power dissipated in a resistor. Both these instruments are guaranteed to be accurate within $\pm$ 1.5% at full scaled deflection. Determine the limiting error of the power. **7M**

   b. What is an error? Classify the errors in measurement and also describe the reasons and preventive measures for the same? **8M**

UNIT-II

4. a. Discuss the operation of potentiometer and its application as a displacement sensor. **8M**

   b. Describe the thermoelectric effects. **7M**

(or)

5. a. Define gauge factor of a strain gauge and derive the expression of gauge factor for metals and semiconductors? **8M**

   b. Explain the principle of any one of inductive transducer with necessary diagrams. **7M**

UNIT-III

6. a. Explain how displacement is measured using Flapper-Nozzle transducer? **8M**

   b. With neat schematic, explain the principle and working of photo electric tachometer. **7M**

(or)

7. a. Explain about electromagnetic tachometer. **7M**

   b. Explain how piezo electric accelerometers are helpful for measurement purpose? **8M**

UNIT-IV

8. Explain how the following sensors are useful for modern industrial applications
   a. IR Radiation sensor **8M**
   b. Ultrasonic sensor **7M**