Registration No.: | | | | | | | | | | |

Total Number of Pages: 02 **Course: B.Tech**
Sub Code: REI4G001

4th Semester Regular/Back Examination: 2023-24
SUBJECT: Sensors and Transducers
BRANCH(S): AEIE,EIE
Time: 3 Hour
Max Marks: 100
Q.Code: P246

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right hand margin indicate marks.

Part-I

Q1 **Answer the following questions:** **(2 x 10)**

a) What is the difference between sensor and transducer?
b) What are some common methods used to measure the transfer function?
c) Write down the significance of potentiometer.
d) Give some examples of displacement sensors.
e) Compare inverting with non-inverting amplifier.
f) What is the concept of feedback in the context of op-amps used with sensors?
g) What are the advantages of using bourdon tube pressure sensors?
h) What is the range of pressure of bellows?
i) Write some techniques of force measurement.
j) Write some techniques of pressure measurement.

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** **(6 × 8)**

a) Explain the statistical characteristics of a measurement system.
b) Explain the distinction between accuracy and precision as systematic characteristics in sensor-based measurement system.
c) How does the resistance of an RTD change with temperature? What is the relationship between resistance and temperature?
d) How the strain gauges are constructed and what materials are used for fabrication?
e) What are the properties of an ideal operational amplifier? Explain its working principle.
f) What is the purpose of phase sensitive demodulator? Describeit's working.
g) Discuss the advantages of using elastic sensing elements in IC temperature sensors.
h) Describe the basic principles of torque measurement.
i) What are electromagnetic sensing elements and how do they function?
j) What are the advantages and disadvantages of using velocity sensors compared to other velocity measurement methods?

k) Explain the difference between an instrumentation amplifier and a standard operational amplifier.

l) How active filters differ from passive filters, and what are their advantages and disadvantages?

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 **a)** State various dynamic characteristics of a transducer. **(8)**

b) Discuss sources of dynamic errors in measurement systems. Write down some common techniques used to minimize dynamic error in measurement systems. (**8**)

Q4 **a)** What is a thermistor? Discuss the two main types of thermistors and their respective characteristics. **(8)**

b) Describe the construction of an LVDT. Also write down the advantages of using an LVDT in displacement applications. (**8**)

Q5 **a)** Explain signal conditioning elements in detail. **(8)**

b) Explain A.C. carrier systems in details. **(8)**

Q6 **a)** Describe the construction of a typical thermocouple and the materials used in its fabrication. **(8)**

b) Explain the working principle of amplifiers used in measurement systems and its types. **(8)**