Roll No												

PRESIDENCY UNIVERSITY
BENGALURU

SCHOOL OF ENGINEERING

MAKE UP EXAMINATION – JAN 2023

Course Code: ECE316

Course Name: Measuring Instruments and sensors

Program & Sem: ECE

Date: 24-JAN-2023

Time: 1PM to 4PM

Max Marks:100

Weightage: 50%

Instructions:

(i) Read the all questions carefully and answer accordingly.

(ii) Nonprogrammable/Scientific calculators are permitted.

Part A [Memory Recall Questions]

Answer all the Questions. Each question carries 5 marks. (3Qx5M= 15M)

1. A transducer is an electronic device that converts energy from one form to another. In view of the definition of the transducer, describe various types of transducers. (C.O.No.3) [Knowledge level]

2. A bridge circuit is a topology of electrical circuitry in which two circuit branches (usually in parallel with each other) are "bridged" by a third branch connected between the first two branches at some intermediate point along them. The bridge was originally developed for laboratory measurement purposes and one of the intermediate bridging points is often adjustable when so used. Bridge circuits now find many applications, both linear and non-linear, including in instrumentation, filtering and power conversion. A. C. bridges are used for measurement of inductance and capacitance. Identify a bridge that can be used to measure unknown capacitance and label the circuit diagram. (C.O.No.2) [Knowledge level]

3. The static characteristics are defined for the instruments which measure the quantities which do not vary with time. The various static characteristics are accuracy, precision, resolution, error, sensitivity, threshold, reproducibility, zero drift, stability and linearity. Define Accuracy, Precision, Resolution and Hysteresis. (C.O.No.1) [Knowledge level]

Part B [Thought Provoking Questions]

Answer all the Questions. Each question carries 15 marks. (3Qx15M=45M)

4. Signal conditioning circuits are used to process the output signal from sensors of a measurement system to be suitable for the next stage of operation. Identify and explain the circuits which does the following functions a) Amplification b) Change in resistance to voltage conversion c) Protection. (C.O.No.4)[Comprehension level]

5. Static sensitivity is the ratio of change in output to corresponding change in input under linear conditions. The following resistance values of a platinum resistance thermometer were measured at a range of temperatures. Determine the measurement sensitivity and inverse static sensitivity of the instrument.

Temperature(0c)	200	228	256	284
Resistance	307	314	321	328

(C.O.No.1) [Comprehension level]

6. Data acquisition is the process of sampling signals that measure real world physical conditions and converting the resulting samples into digital numeric values that can be manipulated by a computer. Based on the block diagram representation, distinguish between the single channel DAS and multi-channel DAS. (C.O.No.4) [Comprehension level]

Part C [Problem Solving Questions]

Answer all the Questions. Each question carries 20 marks. (2Qx20M=40M)

7. For measuring the liquid pressure during an experiment, Bourdone tube is used which is a sensor that converts pressure into displacement. Identify a transducer that can be used to convert the displacement into electrical signal. With neat sketch, explain its construction, working, advantages and disadvantages. (C.O.No.4) [Application level]

8. Fig. 01 shows a capacitive transducer using 5 plates. Let the dimensions of each plates be $l \times w$ and the distance between the plates is given by 'd'. This arrangement is to be used for the measurement of displacement by observing the change in capacitance with the displacement 'x'. Interpret the change in capacitance based on the designed. Assume that the plates are separated by air.
(C.O.No.3) [Application level]