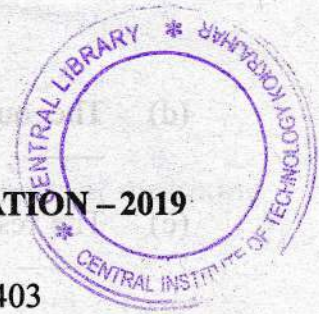


Total No. of printed pages = 6



END SEMESTER EXAMINATION – 2019

Semester : 4th

Subject Code : CAI-403

**INSTRUMENTATION AND
PROCESS CONTROL**

Full Marks – 70

Time – Three hours

The figures in the margin indicate full marks
for the questions.

Instructions :

1. All questions on PART – A are compulsory.
2. Answer any *five* questions from PART – B.

PART – A

Marks – 25

1. Fill in the blanks : 1×10=10
 - (a) The transducer element of a Bourdon Gauge is _____.
 - (b) A thermocouple works on the principle of _____ effect.
 - (c) Orifice plate is used to measure _____.

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- (d) The output variable of a strain gauge is _____.
 - (e) The resistance of a PTC type thermistor is _____ proportional to temperature.
 - (f) The most widely used metal for construction of RTD is _____.
 - (g) Pascal is a unit of _____.
 - (h) The minimum value of input below which no output can be detected in a measurement system is known as _____.
 - (i) _____ materials have the ability to develop electric charge in response to an applied mechanical stress.
 - (j) _____ is a device that converts light energy into electrical energy.
2. Write true or false : 1 × 10 = 10
- (a) A measuring instrument need not have a data presentation element.
 - (b) The output of a transducer should preferably be mechanical in nature.
 - (c) A precise instrument is not necessarily an accurate one.

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- (d) LDR is an active transducer.
 - (e) Drift is a static characteristic of measuring instruments.
 - (f) Bourdon Gauge is mostly used for measurement of pressure.
 - (g) Hair hygrometer is used for measurement of humidity.
 - (h) An open loop control system is faster than a closed loop system.
 - (i) Conveyor is an example of a final control element.
 - (j) NTC type thermistors are made of conductors.
3. Choose the correct answer : 1 × 5 = 5
- (a) Which of the following is an active transducer ?
 - (i) LVDT
 - (ii) RTD
 - (iii) Strain gauge
 - (iv) Thermocouple

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(b) Which of the following is a dynamic characteristic of a measurement system ?

- (i) Accuracy
- (ii) Speed of response
- (iii) Resolution
- (iv) Precision

(c) LVDT is a/an _____ transducer.

- (i) Resistive
- (ii) Capacitive
- (iii) Inductive
- (iv) None of these

(d) The output of Bi-metallic strip is _____.

- (i) Current
- (ii) Voltage
- (iii) Displacement
- (iv) Change in resistance

(e) _____ can be used as sensitive element in biosensors.

- (i) Tissue
- (ii) Enzymes
- (iii) Nucleic Acids
- (iv) All of these.

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PART - B

Marks - 45

4. (a) What is a transducer ? Name some desirable characteristics of a transducer. 4

(b) Differentiate between Contacting and Non-contacting type of instruments with example. 3

(c) Why is it necessary to calibrate a measuring instrument ? 2

5. (a) Discuss the different types of errors found in measuring instruments. 5

(b) Define the terms : Resolution, Hysteresis, Linearity and Dynamic error. 4

6. (a) Briefly explain the working of a capacitive transducer. 5

(b) What is Gauge Factor ? 2


(c) Name any two Opto-electrical transducers. 2

7. Explain the construction and working of LVDT with the help of a suitable diagram. 9

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8. (a) Name any four techniques for level measurement. 4
- (b) Briefly explain the working principle of RTD. 5
9. (a) Name the basic methods of drying and describe the principle of operation of each method. 6
- (b) Name any three different types of dryers. 3
10. Draw the block diagram of an automatic control system and briefly explain the function of each block. 9