

Total No. of printed pages = 6

END SEMESTER EXAMINATION-2020

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. Questions of 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.

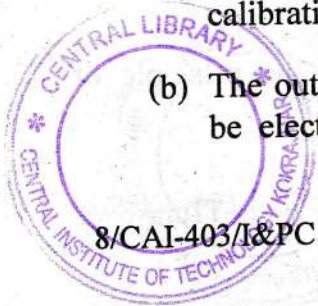
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- (c) _____ is used to measure flow rate.
- (d) The output variable of a bimetallic strip is _____.
- (e) The resistance of a NTC type thermistor is _____ proportional to temperature.
- (f) The most widely used metal for construction of RTD is _____.
- (g) Pascal is a unit of _____.
- (h) The minimum value of input blow which no output can be detected in a measurement system is known as _____.
- (i) Piezoelectric materials have the ability to develop _____ 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 calibration element.
- (b) The output of a transducer should preferably be electrical in nature.



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(2)

- (c) A precise instrument is also an accurate one.
- (d) RTD is an active transducer.
- (e) Speed of Response is a static characteristic of measuring instruments.
- (f) LDR is mostly used for measurement of pressure.
- (g) Hair hygrometer is used for measurement of humidity.
- (h) An open loop control system is more expensive than a closed loop system.
- (i) An Electric motor 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

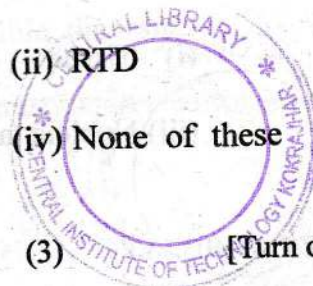
(iii) LDR

(iv) None of these

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

- (i) Accuracy (ii) Precision
(iii) Resolution (iv) All of these

(c) Strain gauge is a/an _____ transducer.

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

(d) The output of Thermocouple is _____.

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

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

- (i) Tissue (ii) Enzyme
(iii) Nucleic acids (iv) All of these.



(4)

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PART - B

Marks - 45

4. (a) What is a transducer? Name some desirable characteristics of a transducer. 3
- (b) Differentiate between :
- (i) Null type and Deflection type instruments and (ii) Self-generating and Power-operated type instruments. 6
5. (a) What do you mean by Standard and Calibration? Briefly explain the different types. 5
- (b) Define the terms : Resolution, Static sensitivity, Drift and Dynamic error. 4
6. (a) Briefly explain the working of a capacitive transducer. 5
- (b) Differentiate between NTC and PTC type of thermistors. 4
7. Explain the construction and working of LVDT with the help of a suitable diagram. 9
8. Explain the working of ultrasonic device for level measurement. 9

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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 functions of each block. 9

