## CENTRAL INSTITUTE OF TECHNOLOGY, KOKRAJHAR (Deemed to be University) KOKRAJHAR :: B.T.A.D. :: ASSAM :: 783370

## <u>END – SEMESTER EXAMINATION</u> <u>DIPLOMA</u>

Session: July-December, 2024Semester: 3rdTime: 3Hrs.Full Marks: 100Course Code: DIE303Course Title: Fundamentals of Instrumentation

## ANSWER ANY FIVE QUESTIONS:

1.	a. Draw the block diagram of an instrumentation system and explain the	functional
	elements of the instrumentation system.	10
	b. How the instruments can be classified? Explain.	10
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2.	a. Explain the loading effect in an instrument.	10

b. A voltage has a true value of 1.50V. An analog indicating instrument with a scale range of 0- 2.50 V shows a voltage of 1.46 V. What are the values of absolute error and correction. Express the error as a fraction of the true value and the full-scale deflection (f.s.d.).

c. A multimeter having a sensitivity of 2,000  $\Omega$ /V is used to measure the voltage across a circuit having an output resistance of 10 k $\Omega$ . The open circuit voltage of the circuit is 6V. Find the reading of the multimeter when it is set to its 10 V scale. Find the percentage error. 5

a. A garden contains 39 plants. The following plants were chosen at random, and their heights were recorded in cm: 38, 51, 46, 79, and 57. Calculate their heights' standard deviation.

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b. Prove that the first n natural number's standard deviation equals,

$$\sigma = \sqrt{rac{n^2 - 12}{12}}$$

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c. If the standard deviation of a data is 4.5 and if each value of the data is decreased by 5, then find the new standard deviation.

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d. If the standard deviation of a data is 3.6 and each value of the data is divided by 3, then find the new variance and new standard deviation.

- 4. a. Determine the limiting errors in following combinations of quantities with limiting errors
  - i. Sum of two quantitiesii. Quotient of two quantities 5x2=10
  - b. Determine the Laplace Transform of the following functions. 3+3+4=10
  - i. te<sup>at</sup>
  - ii. t<sup>3</sup>

- iii. Sinot
- 5. a. What is transfer function of a system? Derive the input-output relation for the following
  - i. First order instrument.
  - ii. Second order instrument 10
  - b. Define recorder. Explain X-Y recorder.
- 6. With the help of diagram, explain method for measuring the following:
  - i. Level
  - ii. Humidity
  - iii. Displacement



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5x4=20

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