

Total number of printed pages—4



2021

FUNDAMENTALS OF INSTRUMENTATION

Paper : IE 302

Full Marks : 100

Time : Three hours

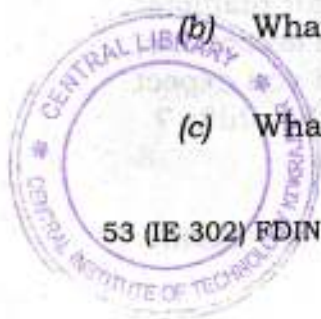
The figures in the margin indicate full marks for the questions.

Answer any five questions.

1. (a) What is settling time ? 2
- (b) How to prove a system is causal ? 4
- (c) What are the human errors ? 6
- (d) In a certain manufacturing process, the length of shafts produced has a mean length of 300 cm and a standard deviation of 2 cm. If the shaft diameter range from 296 to 304 cm is acceptable, how many rejections would you expect in a random list of 10 lakhs shafts ? 8

Contd.

2. (a) What is the significant of active power ? 2
(b) Define Precision and Drift. 4
(c) Write a note on standards. 6
(d) Draw the block diagram of weight measurement system. 8
3. (a) What is input impedance of non-inverting amplifier ? 2
(b) Draw inverting amplifier and equation. 4
(c) Explain op-amp based V to I converter. 6
(d) Write a note on Fundamental SI Units. 8
4. (a) Why is 4 to 20 mA used in current transmission ? 2
(b) What is the use of unity gain amplifier ? 4
(c) What are the calibration methods ? 6



- (d) Write Gaussian distribution equation.
Find out mean, mode, variance of
21, 22, 20, 25, 20, 21, 22, 23, 24, 20, 25,
21, 20, 23, 24, 25, 20, 21, 24, 23
8
5. (a) How voltmeter is calibrated? 2
(b) What are the features of Ideal op-amp? 4
(c) Draw the Differential amplifier. 6
(d) If $R_1 = \frac{R_2 \cdot R_3}{R_4}$, $R_2 = 100\Omega \pm 1\%$,
 $R_3 = 200\Omega \pm 2\%$, $R_4 = 150\Omega \pm 2\%$
calculate the limiting resistance of R_1 .
8
6. (a) Compare null-type and deflection-type. 2
(b) A 2A ammeter has an internal
resistance of 10Ω . For extending its
range to measure 5A, find the shunt
resistance. 4



(c) Define the following : 6

(i) Fidelity

(ii) Black lace

(iii) Non-linearity.

(d) Write short note on Method of least squares. 8

