53 (IE 302) FDIN

2019

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 ten** questions.*

1.   *(a)*   How to test a linear system ?   4

    (b)   Describe the traceability ladder of standard.   6

2.   *(a)*   What is the input impedance of inverting op-amp (ideal) ?   2

    (b)   Draw the block diagram of Weight Measurement System.   8

Contd.

3. (a) What is settling time? 2

(b) In a certain manufacturing process the length of shaft produced has a mean length of 1300 inch and a standard deviation of 1.0 inch. If the shaft diameter range from 1297 to 1303 inch is acceptable, how many rejection would you expect in a random list of 1000 shafts? 8

4. (a) Draw a non-inverting amplifier circuit and drive the output equation. 6

(b) Draw differential amplifier circuit only. 4

5. (a) What is rise time? 2

(b) Explain with circuit diagram, the op-amp based voltage to current (V to I) converter with grounded load. 8

6. (a) Write *two* systematic errors. 2

(b) Write Gaussian distribution equation. Find out mean absolute deviation, mean, median and mode of 20, 22, 21, 22, 24, 25, 21, 22, 20, 23. 8

7. (a) Why 4 to 20mA is used for current transmitter? 4

(b) Discuss the characteristics of an ideal operational amplifier. 6

8. (a) Define and explain Precision and Accuracy with diagram. 4

(b) Write a short note on Calibration. 6

9. (a) Define Hysteresis and Resolution. 4

(b) Explain "loading effect". How to reduce the loading effect? 6

10. (a) What is the difference between null and deflection-type bridges? 2

(b) Write a short note on Fundamental SI units. 8

11. (a) Draw instrumentation amplifier ckt. 4

(b) A 300mA ammeter has an internal resistance of 10Ω. For extending its range to measure 3A, find the shunt resistance required. 6

12. (a) How voltmeter is calibrated and how ammeter is calibrated? 2+2

(b) Write a short note on Curve fitting. 6

13. Define : 2×5

(i) Time lag (Dead time)

(ii) Tolerance

(iii) Bias

(iv) Threshold

(v) Reproducibility.

14. What are the Measurement Errors? Explain all kind of errors. 10