Total No. of printed pages = 8

CAI-503/PoI/5th Sem(B)/2018/M

PRINCIPLES OF INSTRUMENTATION

Full Marks – 70

Pass Marks – 28

Time – Three hours

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

SECTION – A

Answer any *twenty five* questions : 1×25=25

1. Full form of LED is _____.
2. Unit of Pressure in FPS system is _____.
3. Atmospheric pressure (atm) = _____ torr.
4. Full form of RTD is _____.
5. Full form of CRT is _____.
6. Full form of OP-AMP is _____.
7. Gain 10 = _____ dB.
8. 1°C = _____ °K.

[Turn over

9. Inductive impedance = _____.

10. A+j*B write in polar form.

11. Whetstone bridges are two types : _____ and _____.

12. Environmental effects are _____ and _____.

13. Which of the following have pass band of low frequency range ?

(a) High pass filter

(b) Band pass filter

(c) Low pass filter

(d) Band stop filter

14. Which of the following causes noise in passive filters ?

(a) Capacitor

(b) Resistor

(c) Inductor

(d) None of the mentioned above

15. Self generating type transducers are _____ transducers.

(a) Active (b) Passive

(c) Secondary (d) Inverse

16. The transducer that converts the input signal into the output signal, which is a discrete function of time, is known as _____ transducer.

(a) Active (b) Analog

(c) Digital (d) Pulse

17. Which of the following is a digital transducer ?

(a) Strain gauge (b) Encoder

(c) Thermistor (d) LVDT

18. Strain gauge, LVDT and thermocouple are examples of

(a) Active transducers

(b) Passive transducers

(c) Analog transducers

(d) Primary transducers

19. An inverse transducer is a device which converts

(a) an electrical quantity into a non electrical quantity.

(b) electrical energy into light energy.

(c) electrical energy into thermal energy.

(d) electrical quantity into mechanical quantity.

20. A strain gauge is a passive transducer and is employed for converting

(a) mechanical displacement into a change of resistance

(b) force into a displacement

(c) pressure into a change of resistance

(d) pressure into displacement

21. Resolution of a transducer depends on

(a) material of wire (b) length of wire

(c) diameter of wire (d) excitation voltage

22. In wire wound strain gauges, the change in resistance is due to _____.

23. Certain type of materials generates an electrostatic charge or voltage when mechanical force is applied across them. Such materials are called

(a) Piezo-electric (b) Photo-electric

(c) Thermo-electric (d) Photo-resistive

24. Piezo-electric transducers are

(a) Passive transducers

(b) Inverse transducers

(c) Digital transducers

(d) Pulse transducers

25. LVDT windings are wound on

(a) Steel sheets (b) Aluminium

(c) Ferrite (d) Copper

26. The size of air cored transducers in comparison to the iron core parts is

(a) smaller (b) larger

(c) same (d) unpredictable

27. The principle of operation of LVDT is based on the variation of

(a) Self inductance

(b) Mutual inductance

(c) Reluctance

(d) Permanence

28. Capacitive transducers are normally employed for _____ measurements.

(a) Static

(b) Dynamic

(c) Transient

(d) Both static and dynamic

29. The transducers which require an external power are called as _____.

(a) Active transducer

(b) Primary sensor

(c) Passive transducer

(d) Self generating transducer

30. The change in resistance of a metal wire owing to strain is due to _____ .

SECTION – B

Answer any *nine* questions : 5×9=45

1 What are the specifications of our domestic power supply ? Why ?

2 Draw the Instrumentation amplifier circuit with output equation and advantages.

3 Discuss the characteristics of an ideal operational amplifier.

4 What is LED ? How it works ?

5 What is the input impedance of an inverting operational amplifier ?

6 A 100μA ammeter has an internal resistance of 10Ω. For extending its range to measure 500μA, find the shunt resistance required.

7 Write a short note on 'temperature measurement'.

8 If $R_1 = \frac{R_2 R_3}{R_4}$, $R_2 = 100\Omega \pm 2\%$, $R_3 = 200\Omega$, $R_3 = 300\Omega$

Calculate the limiting resistance of R_1.

9 Write RL series electrical circuit equation.

10 Defined the following terms :

(i) Accuracy

(ii) Sensitivity

(iii) Linearity

11 Write a short note on errors ?

12 "A buffer can be used to reduce loading effect". Justify the statement.

13 Write the basic cathode ray tube construction with functional description.