

ELECTRICAL INSTRUMENTATION & PROCESS CONTROL

UNIT-1

1. Define Transducer with suitable example.
2. Explain the advantages of Electrical Transducers over other transducers.
3. Classify Transducer
 - i. on the basis of transduction
 - ii. as primary and secondary transducer
 - iii. as active and passive transducer
4. Explain transducers and Inverse Transducers with suitable example.
5. Describe the different criteria for selection of transducers for a particular application.
6. Describe the working and construction of resistance thermometers. Describe the material used for RTDs, along with their properties.
7. Explain the construction and working of the LVDT. Also explain how the magnitude and direction of the displacement of core of an LVDT be detected?
8. Explain the factors affecting the choice of the transducers.
9. Explain the construction of the wire wound strain gauges and derive the expression for the gauge factor.
10. Describe the construction of foil type strain gauges and explain their advantages over wire wound strain gauges.
11. What are thermistors? Explain their different forms of construction. Draw their resistivity versus temperature characteristics and show that they have a very high value of sensitivity as compared with that of metal resistance thermometers.
12. Explain the construction and working of the RVDT. Also explain how the magnitude and direction of the displacement of core of an RVDT be detected?
13. Draw the equivalent circuit of piezo-electric transducers. Derive the expression for magnitude of voltage across the load by making simplifying assumptions.
14. Derive the expression for frequency response characteristics of piezo-electric transducers.
15. Explain Nonlinear potentiometers function generators.
16. Explain the variation of error due to loading effect of a potentiometer.
17. What are advantages and disadvantages of Resistance potentiometers?
18. Explain the construction of semiconductor strain gauges.
19. Describe Bourdon tubes with neat sketch.
20. For a transducer describe transfer function and error.

UNIT-2

1. Explain the different principles of working of capacitive transducers.
2. How is a differential output taken from an inductive transducer?

3. Explain the advantage when the inductive transducers are used in push-pull configuration.
4. Describe the properties of material used for piezo-electric transducers.
5. Derive the expression for voltage and charge sensitivity for piezo-electric transducers.
6. Derive the expression for impulse response of piezo-electric transducers.
7. Describe the construction, principle of working and applications of Hall effect transducers.
8. Explain the constructional features of synchro-transmitters.
9. Explain the constructional features of synchro-transformers.
10. Explain how the synchro-transmitters and synchro-transformers can be used as an error detector.
11. Define a digital transducer and explain its application for measurement of linear and angular displacement.
12. Describe how fibre optic transducers are used for measurement of temperature.
13. Describe how fibre optic transducers are used for measurement of sound level.
14. Describe how fibre optic transducers are used for measurement of liquid level.
15. Explain constructional details and working of photo-voltaic cell.
16. Draw and describe the V-I characteristics of thermistors.
17. Describe the following:
 - i. Tachometer Encoder
 - ii. Incremental Encoder
 - iii. Absolute Encoder.
18. Draw and describe the resistance temperature characteristics of thermistors.
19. Describe the method for measurement of temperature with the use of
 - i. RTDs
 - ii. Thermistors
 - iii. IC sensors
20. Explain constructional details and working of photo-transistors.

UNIT-3

1. Define the term Telemetry and explain why it is necessary to use it in an instrumentation system.
2. Describe the different method of data transmission.
3. Explain the block diagram of a general telemetry system.
4. What is the different type of telemetry system?
5. Describe the land line telemetry system and its advantages.
6. Describe the method of amplitude modulation as applied to telemetry.
7. Find the condition for maximum power in AM wave.

8. Explain the land line telemetry system using a synchro -transmitter receiver pair used in torque transmission mode.
9. Define amplitude modulation and modulation index.
10. Explain why it is essential to use R.F telemetry.
11. Describe the frequency modulation system.
12. Explain the purpose of Multiplexer and demultiplexer.
13. Describe the Pulse Code Modulation Telemetry System.
14. Describe the comparison between FM, PAM and PCM telemetering system.
15. Describe in details a radio line system used for telemetry.
16. Define Time Division Multiplexing and Frequency Division Multiplexing as applied to telemetry.
17. What is a modem and how does it operate?
18. Explain the term Diversity Combining as used in radio link.
19. Use a PLL to demodulate an FSK carrier. Sketch a block diagram for explanation.
20. Describe the different types of Channels used for Telemetry. Explain their advantages and disadvantages.