*Total number of printed pages:***5** **D/4th/DIE402**

2021

TRANSDUCERS & SIGNAL CONDITIONING

Full Marks: 60

Time: Two hours

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

A. Multiple Choice Questions 1 x 20=20

1. Which of the following is an active transducer?
   a. RTD
   b. Thermocouple
   c. Thermistor
   d. All of these
2. In measurement/instrumentation system, Amplifier is a
   a. Calibration element.
   b. Data Presentation Element.
   c. Primary Sensing Element.
   d. Signal Conditioning Element.
3. Which of the following is use for pressure measurement?
   a. Hot Wire Anemometers.
   b. Ultrasonic Transducers.
   c. Synchro.
   d. Bourdon Tube.
4. Carbon Microphone is a
   a. Resistive Transducer.
   b. Inductive Transducer.
   c. Capacitive Transducer.
   d. Inverse Transducer.

5. Resistance decreases with increase in temperature in
    a. RTD
    b. Thermistor
    c. Thermocouple
    d. IC Temperature sensor.
6. Synchro is a
    a. Resistive Transducer.
    b. Capacitive Transducer.
    c. Inductive Transducer.
    d. Piezoelectric Transducer.
7. Solar cell is a
    a. Photoconductive detector.
    b. Photovoltaic detector.
    c. Photodiode detector.
    d. Photo-emissive detector.
8. Piezoelectric transducers are
    a. Passive transducers
    b. Inverse Transducers
    c. Active Transducers
    d. Both b and c
9. In an instrument, the ratio of the magnitude of the output signal or response to the magnitude of the input signal or the quantity being measured is called
    a. Linearity
    b. Sensitivity
    c. Transfer Function
    d. Speed of response
10. Which of the following is a digital transducer?
    a. Strain gauge
    b. Encoder
    c. Thermistor
    d. LVDT

11. Quartz crystals are
    a. Hall Effect transducer
    b. Photoconductive detector
    c. Piezoelectric transducer
    d. Strain Gauge
12. Cadmium Sulphide is a
    a. Photoconductive detector.
    b. Photovoltaic detector.
    c. Photodiode
    d. Phototransistor
13. In capacitive transducer, capacitance is directly proportional to
    a. Overlapping area of the plates.
    b. Permittivity of the medium
    c. Distance between the plates
    d. Both a and b.
14. In magnetic circuit, which of the following is analogous to current in electric circuit?
    a. MMF
    b. Flux
    c. Reluctance
    d. Number of turns.
15. LVDT is used for
    a. Displacement Measurement.
    b. Pressure Measurement.
    c. Flow Measurement.
    d. Both a and b.
16. Ultrasonic Transducers are used for
    a. Flow Measurement.
    b. Level Measurement.
    c. Position Measurement.

d. All the above.

17. Magnetic field is measured by
    a. Ultrasonic transducer
    b. Techogenerator
    c. Piezoelectric transducer
    d. Hall Effect transducer
18. Piezoelectric accelerometers are used for
    a. Voltage measurements
    b. Current measurements
    c. Flow measurements
    d. Vibration measurements
19. Bonded strain gauges are
    a. Wire strain gauges
    b. Thin film strain gauges
    c. Semiconductor strain gauges.
    d. Metal foil strain gauges
20 Platinum is used in
    a. RTD
    b. Thermocouple
    c. Thermistors
    d. Bimetallic strips.

B. Very Short Question 2*6=12

1. What is the function of primary sensing element in an instrumentation/measurement system?
2. Draw the signal conditioning circuit for RTD and explain its working in brief.
3. Describe the construction of LVDT.
4. Distinguish between active and passive transducer.
5. What is photoconductive and photovoltaic detectors?
6. Write few desirable features of a transducer.

C Short Question 4*7=28

1. Describe the working of shaft encoder with a suitable diagram.
2. Describe the basic principle of working of inductive transducers with suitable mathematical expressions and diagrams.
3. Determine the expression for voltage sensitivity in a piezoelectric transducer?
4. Explain the working of Hall Effect transducer with a suitable diagram.
5. How ultrasonic transducers are used in flow measurements? Explain
6. Determine the expression for output voltage when capacitive transducers are used to measure displacement in differential arrangement.
7. Differentiate between RTD and thermistors.

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