

**BALASORE COLLEGE OF ENGINEERING AND TECHNOLOGY**  
**SUBJECT- SENSOR AND TRANSDUCER (4<sup>th</sup> ET)**  
**By-S.S.Parhi**

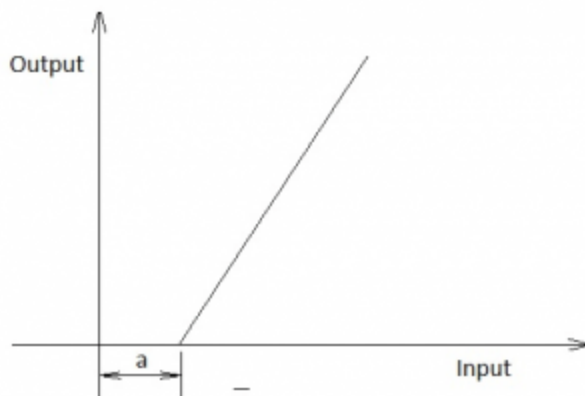
- 1) A pressure measurement instrument is calibrated between 10 bar and 250 bar. The scale span of the instrument is :
  - a) 260 bar
  - b) 250 bar
  - c) 240
  - d) All of the above
- 2) The output of an instrument under particular environmental conditions is given by the relationship  $O = KI + a$ , where  $I$  = input and  $a$  and  $K$  are constants  $K \neq 1$ . The theoretical input-output relationship is represented by a straight passing through zero. This is a case of
  - a) zero drift only
  - b) sensitivity drift only
  - c) all of the above
  - d) none of the above
- 3) A reading is recorded as 23.90 C°. The reading has :
  - a) Two significant figures
  - b) Three significant figures
  - c) Four significant figures
  - d) Five significant figures
- 4) The scale of a 0-500V voltmeter is divided into ten large divisions representing 50 V each and each large division is further subdivided into 10 small divisions, each representing 5 V. It is used for measurement of output voltage of a potentiometer which can be varied from 0 to 500V. It is observed that when the sliding contact is moved from its zero position, there is no perceptible movement of pointer of the voltmeter till the sliding contact reaches a position where the output voltage should be 5 V. Therefore, it can be concluded that :
  - a) The threshold of the volt meter is 5V
  - b) The resolution of the volt meter is 5V
  - c) The sensitivity of the volt meter is 5V
  - d) The accuracy of the volt meter is 5V
- 5) In the centre zero analog ammeter having a range of  $- 10$  A to  $+ 10$ A, there is a detectable change of the pointer from its zero position on either side of the scale only if the current reaches a value of 1A. The ammeter has a :
  - a) Resolution of 1 A
  - b) The dead zone of 2 A.
  - c) The dead zone of 1 A.
  - d) All of the above.
- 6) A pressure gauge is calibrated from 0-50 kN/m<sup>2</sup>. It has a uniform scale with 100 scale divisions. One-fifth of a scale division can be read with certainty. The gauge has a :
  - a) a resolution of 0.5 kN/m<sup>2</sup>
  - b) dead zone of 0.2 kN/m<sup>2</sup>
  - c) threshold of 0.1 kN/m<sup>2</sup>
  - d) resolution of 0.1 kN/m<sup>2</sup>

- 7) a sensor
- Detects and responds to physical input
  - Output can be electric or non-electric
  - Has a sensing element
  - all of these
- 8) A Sensor has
- Sensing element
  - Signal conditioning element
  - All of the above
  - None of the above
- 9) Dynamic response consists of :
- two parts, one steady state and the other transient state response
  - only steady state response
  - only transient state response
  - steady state and transient frequency response
- 10) In thermal systems if  $M$  is mass of liquid stored,  $Q$  is the liquid inflow rate and  $s$  is the specific heat, the thermal resistance is given by :
- $M_s$
  - $Q_s$
  - $1/M_s$
  - $1/Q_s$
- 11) A first order system has a time constant of 20 s. It is subjected to a step input. The settling time of the output is assumed to be the time it reaches 95% of its final steady state value. The settling time of the system is:
- 20s
  - 60s
  - 95s
  - 100s
- 12) A 2 gm mass is suspended from a simple spring. The deflection caused is 5 mm. The natural frequency of the system is:
- 7Hz
  - 10Hz
  - 2.5Hz
  - None of the above
- 13) A first order thermometer has a time constant of 50 s. It is subjected to a sinusoidal input cycling at 0.002 Hz. The time lag of the instrument is:
- 50s
  - 200s
  - 5.0s
  - 100s
- 14) Which of these is not a resistive transducer
- Potentiometer
  - LVDT
  - RTD
  - Strain Gauge
- 15) LVDT is a

- a) capacitive transducer
  - b) resistive transducer
  - c) inductive transducer
  - d) none of them
- 16) Thermocouples are — — — transducers
- a) active
  - b) passive
  - c) none of the above
  - d) both A and C
- 17) A Piezo electric transducer can be made of
- a) Quartz
  - b) Rochelle Salt
  - c) Tourmaline
  - d) All of these
- 18) The nature of output of primary transducer is
- a) Non electric
  - b) Electric
  - c) Cannot be determined
  - d) None of these
- 19) The nature of output of secondary transducer is
- a) Non electric
  - b) Electric
  - c) Cannot be determined
  - d) None of these
- 20) Self-generating transducers are called
- a) Passive Transducers
  - b) Active Transducers
  - c) Primary Transducers
  - d) Secondary Transducers
- 21) Externally-powered transducers are called
- a) Passive Transducers
  - b) Active Transducers
  - c) Primary Transducers
  - d) Secondary Transducers
- 22) Which of these is a Passive Transducer
- a) Piezoelectric Transducer
  - b) Thermocouple
  - c) Photovoltaic cell
  - d) Potentiometer
- 23) Average value of reading is \_\_\_\_\_
- a) Mean
  - b) Median
  - c) Mode
  - d) Deviation
- 24) Why inert gas is used in photo electric transducers?
- a) To increase efficiency

- b) To increase sensitivity
  - c) To increase robustness
  - d) None of the mentioned
- 25) Which of the following represents drawback of the inductive transducer for displacement measurement?
- a) Act of electromagnetic force of attraction
  - b) Lower sensitivity
  - c) Requirement of large displacement
  - d) None of the mentioned
- 26) Push-pull coil system is used for \_\_\_\_\_
- a) Providing constant permeability
  - b) Minimize electromagnetic force of attraction
  - c) Provide immunity from external magnetic effect
  - d) All of the mentioned
- 27) Which of the following device can be used for measuring relative angular displacement between two systems?
- a) Tachometer
  - b) Synchro
  - c) Speedo meter
  - d) None of the mentioned
- 28) Potentiometer works on which of the following principle?
- a) variable resistance
  - b) variable inductance
  - c) variable capacitance
  - d) variable electromagnet
- 29) On increasing the distance between the plates of a variable capacitor, the displacement-capacitance characteristics changes \_\_\_\_\_
- a) Proportionally
  - b) Linearly
  - c) Exceptionally
  - d) Hyperbolically
- 30) LVDT stands for \_\_\_\_\_
- a) Linear Virtual Double Transformer
  - b) Linear Virtual Differential Transducer
  - c) Linear Variable Differential Transducer
  - d) Linear Variable Differential Transformer
- 31) LVDT works on the principle of \_\_\_\_\_
- a) variable resistance
  - b) variable inductance
  - c) variable capacitance
  - d) variable pressure
- 32) How many coils are required to make LVDT?
- a) 4
  - b) 6
  - c) 3
  - d) 2
- 33) Which of the following is a displacement transducer?
- a) Thermistor

- b) LVDT
  - c) Strain gauge
  - d) Thermocouple
- 34) The displacement of a particle is given as function of time as  $x = t^2 + 2t$ . How much displacement is covered in the first 5 seconds?
- a) 5 units
  - b) 35 units
  - c) 40 units
  - d) 0 units
- 35) Standardization of potentiometer is used for \_\_\_\_\_
- a) Accuracy
  - b) Accuracy in measurement
  - c) Use of low voltage sources
  - d) None of the mentioned
- 36) Which of the following device is used for calibration of a potentiometer?
- a) Electrochemical cell
  - b) Galvanometer
  - c) Variable dc source
  - d) All of the mentioned
- 37) Closeness of measured value to true value is \_\_\_\_\_
- a) Accuracy
  - b) Precision
  - c) Correction
  - d) Uncertainty
- 38) \_\_\_\_\_ of a measuring system refers to its ability to follow instant by instant the measurand with time.
- a) Bandwidth
  - b) Fidelity
  - c) Measurement lag
  - d) Settling time
- 39) Given input out characteristic of a typical system, name the region marked as 'a'.



- a) Dead zone
- b) Range
- c) Drift region
- d) Threshold

- 40) For a Measurement, indicated value is 225V while true value is 226V. What will be the static error of an instrument?
- 1V
  - 1V
  - 0.5V
  - 0.5V
- 41) What is the term used to express the ability of a measuring system to maintain its standard performance?
- Zero stability
  - Stability
  - Sensitivity
  - Linearity
- 42) In a measuring system quantity under measurement is termed as \_\_\_\_\_
- Measurand
  - Controllers
  - Sensors
  - Indicators
- 43) In a measurement, what is the term used to specify the closeness of two or more measurements?
- Precision
  - Accuracy
  - Fidelity
  - Threshold
- 44) During a measurement, for a measured value "B", absolute error is obtained as "A", what will be the relative error of measurement?
- $A/B$
  - $B/A$
  - $(A+1)/B$
  - $(B+A)/A$
- 45) \_\_\_\_\_ is used to prevent oscillation in moving system.
- Oscillatory system
  - Controlling
  - Damping system
  - Deflecting
- 46) Which of the following device can be used for force measurement?
- Beams
  - Bellows
  - Capsule
  - Bourdon tube
- 47) Load cells are used for measuring \_\_\_\_\_
- Large weights only
  - Small weights only
  - Weights moving in high speed
  - Slowly moving weights
- 48) Which of the following arrangements are used in load cells?
- Tensile strain gauges
  - Compressive strain gauges
  - Both tensile and compressive strain gauges

- d) None of the mentioned
- 49) Which of the following conversion is correct for load cell?
- Force to strain
  - Force to displacement
  - Force to voltage
  - Both force to strain and force to displacement
- 50) Which of the following statement is true for diaphragms?
- Used for measuring small forces
  - Used for measuring large forces
  - Used for measuring dynamic forces
  - None of the mentioned
- 51) Which of the following represents Reynolds number for laminar flow?
- Less than 2000
  - Greater than 4000
  - Infinite
  - None of the mentioned
- 52) \_\_\_\_\_ measures velocity at a point of fluid in a stream.
- Venturi meter
  - pH meter
  - Pitot-Static tubes
  - None of the mentioned
- 53) Which of the following converts flow to rotational motion?
- Rotatic vane system
  - Rotameter flow system
  - Both rotameter flow system and rotatic vane system
  - None of the mentioned
- 54) Which of the following conversions take place in float element?
- Level to force
  - Level to voltage
  - Level to displacement
  - None of the mentioned
- 55) In closed container type level measuring system, pressure at top of container is due to \_\_\_\_\_
- Vacuum pressure
  - Vapor pressure
  - Liquid pressure
  - Atmospheric pressure
- 56) Ideal op-amp have \_\_\_\_\_ input impedance.
- Zero
  - Low
  - High
  - Infinite
- 57) Which of the following represents piezoelectric materials?
- ADP
  - Quartz
  - Bernilite
  - All of the mentioned

58) Property of exhibiting electric polarization when exposed to intense electric field is known as \_\_\_\_\_

- a) Electromagnetic effect
- b) Ferromagnetic material
- c) Ferroelectric materials
- d) Piezoelectric materials

59) In piezoelectric strain transducer voltage developed is \_\_\_\_\_ to strain applied.

- a) Directly proportional
- b) Inversely proportional
- c) Equal
- d) Independent

60) Hall Effect is a/an \_\_\_\_\_

- a) Electronic
- b) Magnetic
- c) Galvanic
- d) Ionizing

61) At equilibrium Lorentz forces will be \_\_\_\_\_ of Hall Effect force.

- a) Double
- b) Half
- c) Equal
- d) No proportionality

62) Hall Effect is clearly visible in \_\_\_\_\_

- a) Pure conductors
- b) Semiconductors
- c) Super conductors
- d) Metals

63) Force exerted by magnetic field in Hall Effect transducers is \_\_\_\_\_

- a) Lorentz force
- b) Hall Effect force
- c) Magnetic force
- d) Electric force

64) Which of the following represents correct expression for Lorentz force?

- a) BeV
- b) BV
- c) eV
- d) B

65) Which of the following represents the output of Hall Effect transducer?

- a) Hall potential
- b) Emf
- c) Applied voltage
- d) Lorentz Voltage

66) Hall Effect transducer can be used to measure \_\_\_\_\_

- a) Magnetic field
- b) Angular displacement
- c) Linear displacement
- d) All of the mentioned

67) Which of the following can be measured using tachometers?

- a) Angular speed



- b) Linear speed
  - c) Acceleration
  - d) Vibration
- 68) Electrodynamic vibration transducers are based on \_\_\_\_\_
- a) Magnetostriction
  - b) Electromagnetic induction
  - c) Self inductance
  - d) None of the mentioned
- 69) Which of the following quantities are sensitive to electromechanical flow meters?
- a) Viscosity
  - b) Density
  - c) Temperature
  - d) None of the mentioned
- 70) Which of the following is correct for the tachometer system?
- a) First order system
  - b) Second order system
  - c) Third order system
  - d) Unpredictable
- 71) VDU stands for \_\_\_\_\_
- a) Virtual display unit
  - b) Verbal display unit
  - c) Variable display unit
  - d) Visual display unit
- 72) Which of the following cannot be used for constructing alpha-numeric devices?
- a) LED
  - b) Neon lamp
  - c) Seven segment display
  - d) None of the mentioned
- 73) What is the equivalent quantity of capacitance in the transfer function of the viscous force?
- a) Viscous force
  - b) Viscosity
  - c) Damping coefficient
  - d) Inertia
- 74) 20N force is acting on a 5Kg body. What will be its rate of change of velocity?
- a)  $4\text{m/s}^2$
  - b)  $5\text{m/s}^2$
  - c)  $10\text{m/s}^2$
  - d)  $2\text{m/s}^2$
- 75) Which of the following can act as a comparator?
- a) Op-amp with negative feedback
  - b) Op-amp with positive feedback
  - c) Op-amp without feedback
  - d) None of the mentioned

## **Answers**

**1.C, 2.c, 3. C, 4.a, 5.b, 6.d, 7 d, 8.a 9.a, 10.d, 11.b 12.a  
13.a, 14.b, 15c, 16.a 17d, 18.a, 19.b 20.b, 21.a, 22,d, 23.a, 24.b,  
25.a, 26.d, 27.b, 28.a, 29.d, 30.d, 31.b, 32.c, 33.b, 34.b, 35.c, 36.a,  
37.a, 38.b, 39.a, 40.b, 41.b, 42.a, 43.a, 44.a, 45.c, 46.a, 47.d, 48.c,  
49.d, 50.a, 51.a, 52.c, 53.a, 54.c, 55.b, 56.c, 57.d, 58.c, 59.a, 60.c,  
61.b, 62.b, 63.a, 64.a, 65.a, 66.d, 67.a, 68.b, 69.d, 70.b, 71.d, 72.d,  
73.c, 74.a, 75.c**