

Instrumentation Multiple Choice Questions Answers

PDF

1. A recorder

- (a) is an indicating instrument which displays a time varying signal.
- (b) is a device whose function is to record the value of quantity as it is being measured.
- (c) records electrical and non-electrical quantities as a function of time or relates two signals to each other.
- (d) both (b) and (c).

Answer: (d) both (b) and (c).

2. Strip-chart recorders have the advantage(s) of

- (a) long period run.
- (b) more actually usable width.
- (c) possibility of change in chart speed simply by lever actions.
- (d) uniform resolution.
- (e) all of the above.

Answer: (e) all of the above.

3. The zero-suppression in recorders implies

- (a) recording signals with reference to a point other than the zero.
- (b) removing the static component so that rest of the signal is displayed with more expansion.
- (c) providing inertialess components to improve transient response.
- (d) designing the recorder for zero error.

Answer: (b) removing the static component so that rest of the signal is displayed with more expansion.

4. Galvanometer type recorders use

- (a) vibration galvanometer.
- (b) ballistic galvanometer.
- (c) D'Arsonval galvanometer.
- (d) tangent galvanometer.

Answer: (c) D'Arsonval galvanometer.

5. Galvanometer used in recorders is

- (a) an ordinary D'Arsonval galvanometer.
- (b) somewhat different from the ordinary D'Arsonval galvanometer.
- (c) a D'Arsonval galvanometer with large moving coil, strong magnetic field and critical damping.

(d) a D'Arsonval galvanometer with large moving coil, weak Magnetic field and critical damping.

(e) both (b) and (c).

Answer: (e) both (b) and (c).

6. Null type recorders are.....recorders.

(a) potentiometric

(b) bridge

(b) LVDT

(d) any of the above.

Answer: (d) any of the above.

7. The potentiometric recorders have the advantage(s) of

(a) very high input impedance.

(b) high sensitivity.

(c) high response to rapidly changing quantities.

(d) both (a) and (b).

Answer: (d) both (a) and (b).

8. The main drawback of balancing recorders is that

- (a) their ability to respond to rapidly changing quantities is quite limited.
- (b) low input impedance.
- (c) low input sensitivity.
- (d) none of these.

Answer: (a) their ability to respond to rapidly changing quantities is quite limited.

9. The advantages of x-y recorders are that

- (a) they are economical to operate.
- (b) they are easy and convenient to use.
- (c) they are cheaper than strip-chart recorders.
- (d) they can be conveniently used for continuous recording.
- (e) both (a) and (b).

Answer: (e) both (a) and (b).

10. The recorders used for plotting B-H curves for magnetic materials, current-voltage curves for transistors and speed-time curves for electric motors are.....recorders.

- (a) LVDT type
- (b) circular chart

(c) x-y

(d) potentiometer type

Answer: (c) x-y

11. The recording head in a magnetic tape responds to

(a) electrical signal and creates a magnetic signal.

(b) thermal signal and creates a magnetic signal.

(c) magnetic signal and creates an electrical signal.

(d) thermal signal and creates an electrical signal.

Answer: (a) electrical signal and creates a magnetic signal.

12. Consider the following statements regarding magnetic tape recorders.

1. They have a wide frequency range.

2. They have low distortion.

3. The storage of data is volatile.

Of these statements

(a) 1, 2 and 3 are correct.

(b) 1 and 2 are correct.

(c) 2 and 3 are correct.

(d) 1 and 3 are correct.

Answer: (b) 1 and 2 are correct.

13. In a magnetic tape blanks are provided at the

- (a) start of the tape.
- (b) middle of the tape.
- (c) end of the tape.
- (d) start and end of the tape.

Answer: (d) start and end of the tape.

14. The main drawback of direct recording is

- (a) complicated circuitry.
- (b) poor signal-to-noise ratio.
- (c) poor reliability.
- (d) limited high frequency response.

Answer: (b) poor signal-to-noise ratio.

15. The direct recording is mainly used

- (a) for recording the speech and music.
- (b) for recording voltages from the pressure, force and acceleration transducers.
- (c) for multiplexing in instrumentation.

(d) for simultaneous recording of a large number of slowly changing variables.

Answer: (a) for recording the speech and music.

16. The advantages of FM magnetic tape recording are

(a) it can record from dc to several kHz.

(b) it is free from dropout effects.

(c) it is independent of amplitude variations and reproduces the waveform of the input signal accurately.

(d) all of the above.

Answer: (d) all of the above.

17. The digital tape recording has the advantage(s) of

(a) giving highly accurate results.

(b) insensitivity to speed of tape.

(c) need of a simple data conditioner.

(d) feeding information directly to digital computers for processing and control.

(e) all of the above.

Answer: (e) all of the above.

18. Continuous recording of a signal is not possible in a

- (a) magnetic tape recorder.
- (b) strip chart recorder.
- (c) X-Y recorder.
- (d) Galvanometric recorder.

Answer: (a) magnetic tape recorder.

19. The sensitivity of an ECG is typically

- (a) 1 cm/V.
- (b) 0.1 cm/V.
- (c) 10 mm/mV.

Answer: (c) 10 mm/mV.

20. The main shortcomings of diaphragms are that

- (a) they are difficult to repair.
- (b) they are prone to shock vibrations.
- (c) poor stability and reliability.
- (d) high hysteresis and creep.
- (e) both (a) and (b).

Answer: (e) both (a) and (b).

21. Consider the following statements:

1. The main shortcomings of diaphragms are that they are prone to shock vibrations.
2. Diaphragms have the advantages of high accuracy and good dynamic response.
3. Selection of material for diaphragms mainly depends upon temperature range and chemical nature of fluid coming in contact with diaphragm during pressure measurement.

Which of the above statements is/are correct?

- (a) 1, 2 and 3.
- (b) 2 and 3 only.
- (c) 1 only.
- (d) 1 and 2 only.

Answer: (a) 1, 2 and 3.

22. If the number of bellows elements is made double and the thickness of the bellows element is made half, the displacement of the element for the same applied pressure would be the

- (a) 16 times.
- (b) 4 times.
- (c) same.
- (d) one-fourth.

Answer: (a) 16 times.

23. Bourdon tubes are made of

- (a) copper.
- (b) aluminum.
- (c) metal alloys.
- (d) phosphorus.

Answer: (c) metal alloys.

24. Rotameter is used for measuring

- (a) flow.
- (b) viscosity.
- (c) specific gravity.
- (d) none of these.

Answer: (a) flow.

25. The meter measuring total flow in a liquid makes use of

- (a) planti meter.
- (b) variable area meter.
- (c) square root extractor.
- (d) none of the above.

Answer: (a) planti meter.

26. Consider the following units for the measurement of pressure directly:

1. Rolta meter. 2. Bourdon tube. 3. Planti meter. 4. Vanes.

Of these, the pressure can be measured by

(a) 1 and 2 only.

(b) 3 and 4 only.

(c) 2 only.

(d) 1, 2, 3 and 4.

Answer: (c) 2 only.

27. The instrumentation amplifiers are used principally to amplify signals from which of the following?

(a) Transducers.

(b) Active flitters.

(c) Choppers.

(d) D/A converters.

Answer: (a) Transducers.

28. Self-generating type transducers are.....transducers.

- (a) active
- (b) passive
- (c) secondary
- (d) inverse

Answer: (a) active

29. Which one of the following is not a self-generating type transducer?

- (a) Thermocouple and thermopile.
- (b) Piezoelectric pick-up.
- (c) Photovoltaic cell.
- (d) Magnetostriction gauge.

Answer: (d) Magnetostriction gauge.

30. The transducer that converts the input signal into the output signal, which is a continuous function of time, is known as.....transducers.

- (a) active
- (b) passive
- (c) analog
- (d) digital

Answer: (c) analog

31. A transducer that converts measurand into the form of pulse is called the.....transducers.

- (a) active
- (b) analog
- (c) digital
- (d) pulse

Answer: (c) digital

32. Which one of the following is a passive transducer ?

- (a) Piezoelectric.
- (b) Thermocouple.
- (c) Photovoltaic cell.
- (d) LVDT.

Answer: (d) LVDT.

33. Which one of the following transducers is an active transducer ?

- (a) Piezoelectric pressure transducer.
- (b) Metallic strain gauge.
- (c) Semiconductor strain gauge.

(d) Platinum resistance thermometer.

Answer: (a) Piezoelectric pressure transducer.

34. The lower limit of useful working range of a transducer is determined by

(a) minimum useful input level.

(b) transducer error and noise.

(c) cross-sensitivity.

(d) dynamic response.

Answer: (b) transducer error and noise.

35. Which of the following transducers is classified as an active transducer ?

(a) Metallic strain gauge.

(b) Capacitive microphone.

(c) LVDT.

(d) Piezoelectric transducer.

Answer: (d) Piezoelectric transducer.

36. Pair of active transducers is

(a) Thermistor, Solar cell.

(b) Thermocouple, Thermistor.

(c) Thermocouple, Solar cell.

(d) Solar cell, LVDT.

Answer: (c) Thermocouple, Solar cell.

37. Consider the following transducers :

1. LVDT. 2. Piezoelectric. 3. Thermocouple.

4. Photovoltaic cell. 5. Strain gauge.

Which of these are active transducers ?

(a) 1, 2 and 5.

(b) 1, 3 and 4.

(c) 2, 3 and 5.

(d) 2, 3 and 4.

Answer: (d) 2, 3 and 4.

38. In a resistance potentiometer, the nonlinearity

(a) decreases with the increase in ratio of potentiometer to load resistance.

(b) increases with the increase in ratio of potentiometer to load resistance.

(c) is independent of the ratio of potentiometer to load resistance.

(d) none of the above.

Answer: (b) increases with the increase in ratio of potentiometer to load resistance.

39. Resolution of a potentiometric transducer depends on

- (a) diameter of wire
- (b) length of wire.
- (c) material of wire.
- (d) excitation voltage.

Answer: (a) diameter of wire

40. High value pot resistance leads to

- (a) low sensitivity.
- (b) high sensitivity.
- (c) low nonlinearity.
- (d) less error.

Answer: (b) high sensitivity.

41. The resolution of a potentiometer should be

- (a) infinite.
- (b) very high.
- (c) medium.

(d) zero.

Answer: (c) medium.

42. Which one of the following statements for a potentiometric transducer is correct?

(a) It is a zero order displacement transducer.

(b) It is a first order displacement transducer.

(c) It is a zero order temperature transducer.

(d) It is a second order displacement transducer.

Answer: (a) It is a zero order displacement transducer.

43. A strain gauge is passive transducer and is employed for converting

(a) mechanical displacement into a change of resistance.

(b) pressure into a change of resistance.

(c) force into displacement.

(d) none of the above.

Answer: (a) mechanical displacement into a change of resistance.

44. The sensitivity factor of strain gauge is normally of the order of

- (a) 1 to 1.5
- (b) 1.5 to 2.0
- (c) 0.5 to 1
- (d) 5 to 10

Answer: (b) 1.5 to 2.0

45. In wire wound strain gauges, the change in resistance under strained condition is mainly on account of

- (a) change in diameter of wire.
- (b) change in length of wire.
- (c) change in both length and diameter of wire.
- (d) change in resistivity.

Answer: (c) change in both length and diameter of wire.

46. Bonded strain gauges are

- (a) exclusively used for construction of transducers.
- (b) exclusively used for stress analysis.
- (c) used for both stress analysis and for construction of transducers.
- (d) none of the above.

Answer: (c) used for both stress analysis and for construction of transducers.

47. Over wire strain gauges foil strain gauges have the advantages of

- (a) higher heat dissipation capacity and better bonding.
- (b) superior mechanical stability under prolonged strained and high temperature conditions, low hysteresis and creeping effects.
- (c) excellent reproducibility and longer life.
- (d) all of the above.

Answer: (d) all of the above.

48. Which of the following is not an advantage of semiconductor gauges as compared to conventional strain gauges.

- (a) Excellent hysteresis characteristics.
- (b) Least sensitive to temperature changes.
- (c) High fatigue life.
- (d) Smaller size.

Answer: (b) Least sensitive to temperature changes.

49. In semiconductor strain gauges, what happens when a tensile strain is applied?

- (a) Resistance increases in N-type of materials.
- (b) Resistance increases in P-type of materials.
- (c) Resistance increases in both P and N-type of materials.
- (d) Resistance decreases in both P and N-type of materials.

Answer: (b) Resistance increases in P-type of materials.

50. The drawbacks of strain gauges are

- (a) low fatigue life.
- (b) that they are expensive, brittle, highly sensitive to temperature variations.
- (c) poor linearity.
- (d) that they are prone to hysteresis and creep effects.
- (e) both (b) and (c).

Answer: (e) both (b) and (c).

51. Semiconductor of strain gauges are made of

- (a) silicon.
- (b) gold.
- (c) silver.
- (d) nickel.

Answer: (a) silicon.

52. The wire material of strain gauges should have

(a) high resistivity and high thermo-emfs.

(b) low resistivity and high thermo-emfs.

(c) low resistivity and low thermo-emfs.

(d) high resistivity and low thermo-emfs.

Answer: (d) high resistivity and low thermo-emfs.

53. The strain gauges should have low

(a) gauge factor.

(b) resistance temperature coefficient.

(c) resistance.

(d) all of the above.

Answer: (b) resistance temperature coefficient.

54. The carrier material employed with strain gauges at room temperature is

(a) impregnated paper.

(b) bakelite.

(c) epoxy.

(d) aluminum foil.

Answer: (a) impregnated paper.

55. A rosette gauge is used to determine

(a) principal stress direction only.

(b) principal strain direction only.

(c) principal stress or strain direction and magnitude.

(d) principal strain direction and magnitude.

Answer: (c) principal stress or strain direction and magnitude.

56. Rosette gauges are employed for measuring

(a) strain in a direction.

(b) variable strain.

(c) strain in more than one direction.

(d) small strains.

Answer: (c) strain in more than one direction.

57. Platinum is the commonly used metal for resistance-temperature detectors (RTDs) because

(a) it is commercially available in pure form at reasonable rates.

(b) it is relatively stable under various environment conditions.

(c) it has wide operating temperature range.

(d) all of the above.

Answer: (d) all of the above.

58. RTDs have

(a) positive temperature coefficient.

(b) negative temperature coefficient.

(c) either type of temperature coefficient.

(d) high tolerance.

Answer: (a) positive temperature coefficient.

59. The V-I characteristics of a thermistor exhibits a negative resistance region. This statement is

(a) true.

(b) false.

(c) true for NTC thermistor (negative temperature coefficient).

(d) true for PTC thermistor (positive temperature coefficient).

Answer: (c) true for NTC thermistor (negative temperature coefficient).

60. Consider the following statements in connection with measurement of temperature :

1. A thermistor is highly sensitive as compared with platinum resistance thermometer.
2. The resistance of a thermistor is solely a function of its absolute temperature whether the source of heat is external, internal or both.
3. A thermistor has linear resistance temperature characteristics.
4. Most thermistors exhibit negative resistance temperature coefficient. Which of these statements are correct ?

- (a) 1, 2 and 3.
- (b) 1, 2 and 4.
- (c) 2, 3 and 4.
- (d) 1, 3 and 4.

Answer: (b) 1, 2 and 4.

61. Which one of the following is the most sensitive device ?

- (a) Thermocouple
- (b) RTD
- (c) Thermistor
- (d) Pyrometer

Answer: (c) Thermistor

62. Which of the following should be incorporated in the RTD to make a temperature sensing bridge most sensitive to temperature?

- (a) Platinum.
- (b) Nickel.
- (c) Thermistor.
- (d) Copper.

Answer: (c) Thermistor.

63. Consider the following statements : The causes of error in the measurement of temperature using a thermistor are

1. Self heating.
2. Poor sensitivity.
3. Non-linear characteristics.

Of these statements.

- (a) 1, 2 and 3 are correct.
- (b) 1 and 2 are correct.
- (c) 2 and 3 are correct.
- (d) 1 and 3 are correct.

Answer: (d) 1 and 3 are correct.

64. A fixed resistor of suitable value is usually connected across a thermistor to

- (a) decrease its resistance.
- (b) increase its sensitivity.
- (c) compensate its self-heating effect.
- (d) improve linearity.

Answer: (d) improve linearity.

65. Thermocouples

- (a) are most commonly employed for indication of rapidly changing temperature and for use in localized and in otherwise accessible positions.
- (b) need reference junction compensation.
- (c) have a low output voltage level.
- (d) all of the above.

Answer: (d) all of the above.

66. The drawbacks of thermocouples are that

- (a) they are less accurate than RTDs and thermistors.
- (b) they need compensating leads.
- (c) reference junction compensation is required in thermo-couples.
- (d) all of the above.

Answer: (d) all of the above.

67. For a thermocouple pair (A, B) the extension wires (C, D)

- (a) should be identical pair elements.
- (b) should be identical temperature emf relationship.
- (c) can be of any two dissimilar materials.
- (d) should have very small temperature emf sensitivity.

Answer: (a) should be identical pair elements.

68. Which one of the following thermocouples has the highest temperature measuring range ?

- (a) Copper-Constantan.
- (b) Iron-Constantan.
- (c) Alumel-Chromel.
- (d) Platinum Rhodium-Platinum.

Answer: (d) Platinum Rhodium-Platinum.

69. A thermocouple arrangement is to be used to measure temperature in the range of 700 - 800°C. Point out the pair that would be most suitable for this application.

- (a) Copper-constantan.
- (b) Iron-constantan.

(c) Chromel-alumel.

(d) Platinum-platinum rhodium.

Answer: (b) Iron-constantan.

70. For surface temperature measurement one can use

(a) strain gauge.

(b) diaphragm.

(c) RTD.

(d) thermocouple.

Answer: (d) thermocouple.

71. What is a differential transformer?

(a) Constant pressure transducer.

(b) Variable pressure transducer.

(c) Constant displacement transducer.

(d) Variable inductance transducer.

Answer: (d) Variable inductance transducer.

72. Inductive transducers are employed in differential configurations because differential outputs are less affected by

- (a) external magnetic fields.
- (b) temperature variations.
- (c) variations of bridge supply voltage and frequency.
- (d) all of the above.

Answer: (d) all of the above.

73. LVDT can be used for

- (a) vibration measurement.
- (b) angular velocity measurement.
- (c) force measurement in a beam.
- (d) load measurement on a column.

Answer: (c) force measurement in a beam.

74. The principle of operation of LVDT is based on variation of

- (a) self-inductance.
- (b) mutual inductance.
- (c) reluctance.
- (d) permeance.

Answer: (b) mutual inductance.

75. LVDT has following advantage(s)

- (a) infinite resolution, high sensitivity and very high output.
- (b) low hysteresis, good repeatability and capability of tolerating shock and vibrations.
- (c) good dynamic response.
- (d) both (a) and (b).

Answer: (d) both (a) and (b).

76. Consider the following statements about LVDT as a transducer.

1. The relationship between input displacement and output voltage is almost linear.
2. The range of displacement that can be measured is wide.
3. It does not form a loading on the mechanical system.

Of these statements

- (a) 1, 2 and 3 are correct.
- (b) 2 and 3 are correct.
- (c) 1 and 2 are correct.
- (d) 1 and 3 are correct.

Answer: (a) 1, 2 and 3 are correct.

77. A linear variable differential transformer (LVDT) has

1. One primary winding.
2. two exactly similarly secondary windings.
3. A toroidal magnetic core.

Of these statements

- (a) 2 and 3 are correct.
- (c) 1 and 3 are correct.
- (b) 1 and 2 are correct.
- (d) 1, 2 and 3 are correct.

Answer: (b) 1 and 2 are correct.

78. In an LVDT, there are two secondary coils which are connected for a single output. Which one of the following is correct ?

- (a) The coils are in series and in phase opposition.
- (b) The coils are in parallel and in phase opposition.
- (c) The coils are in series and in the same phase condition.
- (d) The coils are in parallel and in the same phase condition.

Answer: (a) The coils are in series and in phase opposition.

79. In a LVDT, the two secondary voltages

- (a) are independent of the core position.
- (b) vary unequally depending on the core position.
- (c) vary equally depending on the core position.
- (d) are always in phase quadrature.

Answer: (b) vary unequally depending on the core position.

80. Sensitivity of LVDT is mainly due to

- (a) magnetic shielding of the core.
- (b) permeability of the core.
- (c) exact cancellation of secondary voltages.
- (d) insulation used in the winding.

Answer: (c) exact cancellation of secondary voltages.

81. In an LVDT, the output quantity

- (a) is algebraically summed to zero.
- (b) is difference of the two currents flowing in the two secondaries.
- (c) depends upon its rating.
- (d) none of the above.

Answer: (b) is difference of the two currents flowing in the two secondaries.

82. For applications requiring large torques and high accuracies we use

- (a) torque transmission type servosystems.
- (b) control or error detecting type synchros.
- (c) either (a) or (b).
- (d) none of the above.

Answer: (b) control or error detecting type synchros.

83. Consider the following statements regarding constructional features of synchros :

1. Synchro repeater has a three phase stator and a three phase rotor.
2. Disc shaped rotor of the synchro control transformer offers a low resistance to the magnetic path.
3. Synchro transmitter has a frictionless bearing.

Of these statements

- (a) 1, 2 and 3 are correct.
- (b) 1 alone is correct.
- (c) 2 alone is correct.
- (d) 2 and 3 are correct.

Answer: (c) 2 alone is correct.

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