

## Instrumentation Multiple Choice Questions Answers

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#### 1. A synchrotransmitter consists of a

- (a) salient pole rotor winding excited by an ac supply and a 3-phase balanced rotor winding.
- (b) three phase balanced stator winding excited by a three phase balanced ac signal and rotor connected to a dc voltage source.
- (c) salient pole, rotor winding excited by a dc signal.
- (d) cylindrical rotor winding and a stepped stator excited by pulses.

**Answer: (a) salient pole rotor winding excited by an ac supply and a 3-phase balanced rotor winding.**

#### 2. A synchro is used to

- (a) accelerate a rotating shaft.
- (b) convert an angular position of a shaft into an electrical signal.
- (c) convert linear motion into angular position.
- (d) amplify low frequency signals.

**Answer: (b) convert an angular position of a shaft into an electrical signal.**

### 3. Synchros and resolvers have the following advantages

- (a) infinite resolution.
- (b) much operating speeds.
- (c) high reliability and accuracy.
- (d) all of the above.

**Answer: (d) all of the above.**

### 4. Which of the following statements is NOT true ?

- (a) Potentiometric linear displacement can give high output signal.
- (b) LVD transformer has low output impedance.
- (c) Synchros and resolvers have low accuracy.
- (d) Eddy current proximity transducers are non-contact type transducers.

**Answer: (c) Synchros and resolvers have low accuracy.**

### 5. Capacitive transducers have the advantages of

- (a) very high input impedance, excellent frequency response, high sensitivity, and not being affected by stray magnetic fields.
- (b) very high output impedance.
- (c) both (a) and (b).
- (d) none of the above.

**Answer: (a) very high input impedance, excellent frequency response, high sensitivity, and not being affected by stray magnetic fields.**

**6. The dynamic characteristics of capacitive transducers are similar to those of**

- (a) low pass filter
- (b) high pass filter.
- (c) notch filter.
- (d) band stop filter.

**Answer: (b) high pass filter.**

**7. Quartz and Rochelle salt belong to**

- (a) natural group of piezoelectric materials.
- (b) synthetic group of piezoelectric materials.
- (c) natural or synthetic group of piezoelectric materials provided they are properly polarized.
- (d) none of the above.

**Answer: (a) natural group of piezoelectric materials.**

**8. Which one of the following materials is not used as a piezoelectric transducer?**

- (a) Rochelle salt.

(b) Lithium sulphate.

(c) Barium titanate

(d) Tungsten oxide.

**Answer: (d) Tungsten oxide.**

### **9. Which of the following are piezoelectric substances ?**

1. Barium titanate. 2. Lead titanate. 3. Lead zirconate. 4. Cadmium sulphate.

(a) 1, 2 and 4.

(b) 1, 3 and 4.

(c) 1, 2 and 3.

(d) 2, 3 and 4.

**Answer: (c) 1, 2 and 3.**

### **10. Piezoelectric crystals produce an emf**

(a) when external mechanical force is applied to it.

(b) when external magnetic field is applied.

(c) when radiant energy stimulates the crystal.

(d) when the junction of two such crystals is heated.

**Answer: (a) when external mechanical force is applied to it.**

**11. Piezoelectric materials owe their property to the**

- (a) presence of a centre of symmetry.
- (b) lack of a centre of symmetry.
- (c) presence of axis of symmetry.
- (d) lack of axis of symmetry.

**Answer: (b) lack of a centre of symmetry.**

**12. Consider the following statements : Piezoelectric materials are useful for converting**

1. mechanical energy into electrical energy.
2. electrical energy into mechanical energy.
3. mechanical energy into chemical energy.
4. chemical energy into mechanical energy.

Of these statements

- (a) 1 and 2 are correct.
- (b) 1, 2, 3 and 4 are correct.
- (c) 1 alone is correct.
- (d) 2, 3 and 4 are correct.

**Answer: (a) 1 and 2 are correct.**

**13. Consider the following statements: Piezoelectric materials serve as**

1. A source of ultrasonic waves.

2. When electric field is applied, the mechanical dimensions of the substances are not at all altered.
3. Converts electrical energy to mechanical and vice versa.
4. Converts thermal energy to electrical energy.

Which of the above statements is/are correct?

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

**Answer: (c) 1 and 3 only.**

#### **14. Consider the following statements: Piezoelectric materials**

1. Crystal can be shown as electrical equivalent circuit similar to an inductor and a capacitor (Tank circuit).
2. Quartz, Rochelle salt, tourmaline.
3. Used in voltage stabilizers.
4. This exhibits the reverse effect of electrostriction.

Which of the above statements are correct?

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

(d) 1, 2, 3 and 4.

**Answer: (d) 1, 2, 3 and 4.**

**15. The piezoelectric crystal voltage sensitivity is defined as**

(a) Field developed per unit force.

(b) Field developed per unit stress.

(c) Voltage developed per unit stress.

(d) Voltage developed per unit force.

**Answer: (b) Field developed per unit stress.**

**16. Piezoelectric crystal is generally employed for the measurement of which one of the following ?**

(a) Flow.

(b) Velocity.

(c) Acceleration.

(d) Temperature.

**Answer: (c) Acceleration.**

**17. Piezoelectric crystal can be used to measure**

(a) static pressure only.

(b) dynamic pressure only.

(c) both static and dynamic pressures.

(d) none of the above.

**Answer: (c) both static and dynamic pressures.**

**18. Piezoelectric crystals are used for the measurement of**

(a) temperature.

(b) velocity.

(c) sound.

(d) none of the above.

**Answer: (a) temperature.**

**19. Piezoelectric transducers have the following advantage(s).**

(a) These are small in size, light in weight and very rugged in construction.

(b) wide operating temperature range.

(c) very good frequency response and quite large output.

(d) all of the above.

**Answer: (b) wide operating temperature range.**

**20. Hall effect transducers have the drawbacks of**

(a) high sensitivity to temperature variations.

(b) variation of Hall coefficient from plate to plate.

(c) poor resolution.

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

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

## **21. Hall effect transducers are used for measuring**

(a) magnetic field.

(b) current.

(c) electric field.

(d) pressure.

**Answer: (a) magnetic field.**

## **22. Hall effect device can be used to**

(a) multiply two signals.

(b) divide one signal by another on an instantaneous basis.

(c) add two signals.

(d) subtract one signal from another.

**Answer: (a) multiply two signals.**

**23. The measurement of Hall coefficient of a semiconductor with one type of charge carrier gives the information about**

- (a) sign of charge carrier.
- (b) density of charge carrier.
- (c) both sign and density of charge carrier.
- (d) mass of the charge carrier.

**Answer: (c) both sign and density of charge carrier.**

**24. Which one of the following transducers can be used for magnetic flux density measurement ?**

- (a) LVDT.
- (b) Synchro.
- (c) Hall effect transducer.
- (d) Thermocouple.

**Answer: (c) Hall effect transducer.**

**25. Magnetoelastic transducers operate on the principle of**

- (a) change in permeability with change in stress.
- (b) change in dimensions with change in applied stress.
- (c) change in coercive force with change in stress.
- (d) none of the above.

**Answer: (a) change in permeability with change in stress.**

**26. Photoelectric transducers are used for the measurement of any phenomenon associated with variation in**

- (a) light intensity.
- (b) magnetic flux.
- (c) current.
- (d) voltage.

**Answer: (a) light intensity.**

**27. Which of the following does not require auxiliary circuitry if used as transducer ?**

- (a) Capacitance.
- (b) Photocell.
- (c) Resistance.
- (d) Inductance.

**Answer: (b) Photocell.**

**28. A tachometer encoder has**

- (a) single output.
- (b) two outputs.
- (c) three outputs.
- (d) four outputs.

**Answer: (a) single output.**

**29. A tachometer encoder can be used for measurement of**

- (a) displacement in one direction only.
- (b) displacement in both directions.
- (c) speed in situations where the rotation never reverse.
- (d) both (a) and (c).

**Answer: (d) both (a) and (c).**

**30. Incremental encoders use**

- (a) one channel only.
- (b) two channels.
- (c) two channels and sometimes three.
- (d) four channels.

**Answer: (c) two channels and sometimes three.**

**31. The drawbacks of incremental encoders are that**

- (a) any false pulse resulting from electric noise will cause error, which will persist even on disappearance of noise.
- (b) the failure of power supply causes total loss of position data which cannot be retrieved even after restoration of power supply.

(c) these encoders are usually limited to a measurement of single revolution.

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

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

### **32. Absolute encoders are employed for**

(a) normally one revolution.

(b) continuous speed.

(c) continuous speed in both directions.

(d) none of the above.

**Answer: (a) normally one revolution.**

### **33. A bolometer is an element that**

(a) senses thermal output.

(b) senses optical input and gives thermal output.

(c) senses optical input and gives electrical output.

(d) senses electrical input and gives optical output.

**Answer: (b) senses optical input and gives thermal output.**

### **34. Bolometers are used for measuring**

(a) electrical signals.

- (b) optical inputs.
- (c) thermal radiations.
- (d) none of these.

**Answer: (c) thermal radiations.**

### **35. Ring-balance meter cannot be used for measuring**

- (a) pressure.
- (b) differential pressure.
- (c) mass flow rate.
- (d) total flow.

**Answer: (c) mass flow rate.**

### **36. A force balance transducer**

- (a) amplifies the output from the sensing element.
- (b) feeds back the output to an element which makes a force-summing member to return to its zero position.
- (c) both (a) and (b).
- (d) neither (a) nor (b).

**Answer: (c) both (a) and (b).**

### **37. Which displacement transducer is used for accurate and linear measurement ?**

- (a) LVDT.

- (b) Strain gauge.
- (c) Potentiometer.
- (d) Capacitive displacement transducer.

**Answer: (a) LVDT.**

**38. Which of the following primary detector type transducers are employed for displacement measurement?**

1. Thermistor. 2. Diaphragm. 3. Thermocouple. 4. Pivot Torque.

Select the correct answer using the code given below :

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

**Answer: (b) 2 and 4**

**39. The ballast circuit employs a capacitor to act as high pass filter for measurement of**

- (a) static strains.
- (b) dynamic strains.
- (c) both static and dynamic strains.
- (d) none of the above.

**Answer: (b) dynamic strains.**

**40. Why are dummy strain gauges employed ?**

- (a) For calibration of strain gauges.
- (b) For increasing the sensitivity of the bridge.
- (c) For compensation of temperature variations.
- (d) For neutralizing the influence of bridge voltage supply variations.

**Answer: (c) For compensation of temperature variations.**

**41. Which one of the following is the main reason for insertion of two strain gauges in the adjacent arms of a bridge circuit ?**

- (a) Achievement of higher sensitivity.
- (b) Elimination of radio-frequency interference.
- (c) Elimination of effect of environmental temperature.
- (d) To facilitate quick balancing of the bridge.

**Answer: (a) Achievement of higher sensitivity.**

**42. Why is strain gauge bridge sometimes excited with ac ?**

- (a) It has a stable performance with ac.
- (b) Its sensitivity is more with ac.
- (c) Power frequency pick-up can be avoided with ac.

(d) AC output can be easily amplified.

**Answer: (c) Power frequency pick-up can be avoided with ac.**

**43. A load cell is an electromechanical device and is widely used for measurement of**

(a) static forces.

(b) dynamic forces.

(c) both static and dynamic forces.

(d) temperature.

**Answer: (c) both static and dynamic forces.**

**44. The factors to be considered in the selection of a load cell for a particular application are**

(a) type of loading-tensile or compressive.

(b) required accuracy, loading conditions, environment, space available, scale capacity.

(c) desired output characteristics and number of cells required.

(d) all of the above.

**Answer: (d) all of the above.**

**45. Which of the following is not an element of electropneumatic pressure transmitter?**

(a) LVDT.

- (b) Bellows.
- (c) Flapper-nozzle mechanism.
- (d) Op-amp.

**Answer: (c) Flapper-nozzle mechanism.**

**46. Which of the following transducers can be used for measurement of pressures as high as 100,000 atmosphere.**

- (a) Mcleod gauge.
- (b) Pirani gauge.
- (c) Bridgman gauge.
- (d) Knudsen gauge.

**Answer: (a) Mcleod gauge.**

**47. The operation of Pirani gauge depends upon the**

- (a) variation of the thermal conductivity of a gas with the change in pressure.
- (b) variation of the electrical conductivity of a gas with the change in pressure.
- (c) variation in humidity of the medium with the change in pressure.
- (d) none of the above.

**Answer: (a) variation of the thermal conductivity of a gas with the change in pressure.**

**48. Thermal conductivity gauges have the following shortcomings**

- (a) these gauges need individual calibration and frequent checking.
- (b) these gauges burn out when exposed to atmospheric pressure during operation.
- (c) these gauges get easily damaged by organic vapors.
- (d) all of the above.

**Answer: (d) all of the above.**

**49. The working principle of a pirani gauge pressure transducer is based on which one of the following ?**

- (a) Humidity of the medium.
- (b) Thermal conductivity of the medium.
- (c) Combustibility of the medium.
- (d) Electrical resistivity of the medium.

**Answer: (b) Thermal conductivity of the medium.**

**50. The ionization vacuum gauge, in construction, is similar to a**

- (a) vacuum diode.
- (b) vacuum triode.
- (c) thyratron.
- (d) none of these.

**Answer: (b) vacuum triode.**

**51. The advantages of ionization vacuum gauges are**

(a) linearity.

(b) interchangeability.

(c) that these can be used for measurement of vacuum pressure below  $10^{-10}$  torr.

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

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

**52. Pick the odd one out**

(a) Pirani gauge.

(b) Thermocouple gauge.

(c) Meleod gauge.

(d) Resistance-wire strain gauge.

**Answer: (d) Resistance-wire strain gauge.**

**53. Which one of the following statements is not correct ?**

(a) Vacuum can act as a dielectric material.

(b) Piezoelectric materials can act as transducers.

(c) Quartz crystal is a ferroelectric material.

(d) The dielectric constant of dielectrics depends on the frequency of the applied field.

**Answer: (c) Quartz crystal is a ferroelectric material.**

**54. Which one of the following pressure transducers is suitable for measurement of high pressure ?**

(a) Alphatron.

(b) Mcleod gauge.

(c) Pirani gauge.

(d) Bourdon gauge.

**Answer: (b) Mcleod gauge.**

**55. In strain gauge torque transducers, the strain gauges are mounted at which one of the following ?**

(a)  $0^\circ$  to the shaft axis.

(b)  $45^\circ$  to the shaft axis.

(c)  $90^\circ$  to the shaft axis.

(d) at any angle with the shaft axis.

**Answer: (b)  $45^\circ$  to the shaft axis.**

**56. Which of the following can be used/modified for measurement of angular speed ?**

1. LVDT. 2. Magnetic pick-up. 3. Tachogenerator. 4. Strain gauge.

Select the correct answer using the code given below :

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

**Answer: (b) Only 2 and 3.**

**57. The generated emf of a dc tachogenerator is**

- (a) directly proportional to angular speed.
- (b) inversely proportional to angular speed.
- (c) proportional to square root of angular speed.
- (d) proportional to square of angular speed.

**Answer: (a) directly proportional to angular speed.**

**58. AC tachometers are often built with thin metallic drag-cup rotor to**

- (a) reduce inertia.
- (b) obtain low Q.
- (c) make them suitable for high frequency (400 Hz) operation.

**Answer: (c) make them suitable for high frequency (400 Hz) operation.**

**59. The commercial thermopiles are formed by**

- (a) Series of Si-Al thermocouples in an IC by doping Al layers on p-type Si on n-type Si epitaxial layers.
- (b) Series of Cu-W thermocouple strips.
- (c) Piezoelectric material strips piled together.
- (d) Series of bismuth-telluride couples.

**Answer: (a) Series of Si-Al thermocouples in an IC by doping Al layers on p-type Si on n-type Si epitaxial layers.**

**60. In optical pyrometers temperature is measured by**

- (a) thermocouple effect.
- (b) photocell principle.
- (c) comparison of brightness of the source with that of a standard source.
- (d) none of the above.

**Answer: (c) comparison of brightness of the source with that of a standard source.**

**61. Which one of the following is the best method of measurement of temperature of hot bodies radiating energy in visible spectrum ?**

- (a) Thermocouple.

- (b) Thermopile.
- (c) Optical pyrometer.
- (d) Bolometer.

**Answer: (c) Optical pyrometer.**

**62. Which one of the following is used to measure temperature inside a boiler furnace ?**

- (a) Resistance thermometer.
- (b) Bimetallic thermometer.
- (c) Optical pyrometer.
- (d) Thermistor.

**Answer: (b) Bimetallic thermometer.**

**63. Which is the most suitable thermocouple transducer for the measurement of temperature in the range of 1,300°C to 1,500°C ?**

- (a) Chromel-alumel.
- (b) Platinum-rhodium.
- (c) Iron-constantan.
- (d) Chromel-constantan.

**Answer: (b) Platinum-rhodium.**

**64. Hot-wire anemometers are used for measuring**

- (a) gas velocities.
- (b) pressure of fluids.
- (c) liquid discharges.
- (d) very low pressures.

**Answer: (a) gas velocities.**

**65. The device used for measuring flow of air around an airplane is**

- (a) rotameter.
- (b) venturi meter.
- (c) anemometer.
- (d) none of these.

**Answer: (c) anemometer.**

**66. Consider the following statements:**

1. Electromagnetic flowmeter is independent of liquid density.
2. Electromagnetic flowmeter cannot be employed for measuring flow of non-conducting fluids.

Which of the above statements is/are correct?

- (a) 1 only.
- (b) Both 1 and 2.

(c) 2 only.

(d) Neither 1 nor 2.

**Answer: (b) Both 1 and 2.**

**67. Which one of the following transducers cannot measure flow in non-conducting medium ?**

(a) Orifice meter.

(b) Electromagnetic flow-meter.

(c) Turbine meter.

(d) Rotameter.

**Answer: (b) Electromagnetic flow-meter.**

**68. A flow-meter that is independent of liquid density is**

(a) rotameter.

(b) Electromagnetic flow-meter.

(c) venturimeter.

(d) orifice meter.

**Answer: (b) Electromagnetic flow-meter.**

**69. Which of the following transducers is used for transmitting as well as receiving the acoustic energy in an ultrasonic flow-meter ?**

(a) LVDT.

(b) RTD.

(c) Piezoelectric crystals.

(d) Strain gauge.

**Answer: (c) Piezoelectric crystals.**

**70. Consider the following statements :**

1. Ultrasonic technique cannot be used for measurement of flow of a liquid having air bubbles in it.

2. Attenuation of ultrasonic signal is less in air compared to that in a liquid.

Of these statements

(a) 2 is false and 1 is true.

(b) 1 and 2 are true.

(c) 2 is true and 1 is false.

(d) 1 and 2 are false.

**Answer: (c) 2 is true and 1 is false.**

**71. The main drawbacks of ultrasonic flow-meter are**

(a) low accuracy and slow response.

(b) complexity and relatively high cost.

(c) affected by pressure and temperature variations.

(d) none of the above.

**Answer: (b) complexity and relatively high cost.**

**72. In radioactive method the receiver measures fluid level by recording the**

(a) direction of the rays.

(b) number of radioactive particles received.

(c) time taken by the rays in reaching the receiver.

(d) none of the above.

**Answer: (c) time taken by the rays in reaching the receiver.**

**73. The method; that can be employed for measuring only fluid level, is**

(a) radioactive method.

(b) bellows.

(c) strain gauge.

(d) bourdon tube.

(c) bell type meter.

**Answer: (a) radioactive method.**

**74. Hydrometer is employed for determination of**

(a) relative humidity.

(b) specific gravity of liquids.

(c) fluid level.

(d) none of the above.

**Answer: (b) specific gravity of liquids.**

**75. Inductive method can be used for measuring thickness of**

(a) magnetic but non-conducting materials.

(b) conducting but non-magnetic materials.

(c) conducting and magnetic materials.

(d) non-conducting and non-magnetic materials.

(e) both magnetic and non-magnetic materials, as well as non-conducting and conducting materials.

**Answer: (e) both magnetic and non-magnetic materials, as well as non-conducting and conducting materials.**

**76. The non-contact method of measuring thickness or density of cold or hot materials while in motion or when stationary is**

(a) inductive.

(b) capacitive.

(c) nuclear radiation.

(d) ultrasonic.

**Answer: (a) inductive.**

**77. The most suitable transducer for monitoring continuously variations in very fine thickness (say of paper in paper industry) is**

(a) inductive.

(b) capacitive.

(c) ultrasonic.

(d) nuclear radiation.

**Answer: (d) nuclear radiation.**

**78. In hygrometers the principle of measurement is**

(a) change in resistance of salts with humidity.

(b) change in microwave power using klystron.

(c) change in thermal conductivity using thermistor.

(d) none of the above.

**Answer: (a) change in resistance of salts with humidity.**

**79. The electrical transducers used for continuous recording and control of humidity are**

(a) resistive hygrometers.

(b) electrolytic hygrometers.

(c) aluminum oxide hygrometers.

(d) all of the above.

**Answer: (d) all of the above.**

**80. Measurements of flow, thermal conductivity and liquid level using thermistors make use of**

(a) resistance decrease with temperature.

(b) resistance increase with temperature.

(c) self-heating phenomenon.

(d) change of resistivity.

**Answer: (a) resistance decrease with temperature.**

**81. The function of the reference electrode in a pH meter is to provide**

(a) a constant current.

(b) a constant voltage.

(c) temperature compensation.

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

**Answer: (b) a constant voltage.**

**82. The disadvantage(s) of capacitor microphones is/are**

(a) higher cost.

(b) high voltage supply requirement.

(c) limited frequency range.

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

**Answer: (c) limited frequency range.**

**83. The devices extensively used in sound measurement systems are**

(a) capacitor microphones.

(b) carbon microphones.

(c) dynamic microphones.

(d) vibration pickups.

**Answer: (d) vibration pickups.**

**84. Geiger counter has the advantages of**

(a) being relatively inexpensive, reliable and rugged in construction.

(b) producing easily countable large pulses.

(c) having response independent of variations in humidity, temperature and atmospheric pressure.

(d) all of the above.

**Answer: (d) all of the above.**

**85. The activity of a radioactive sample goes down to 12.5 % in a time of  $x$  days. The half life of this sample is nearly**

(a)  $12x$

(b)  $8x$

(c)  $x/3$

(d)  $3x$

**Answer: (c)  $x/3$**

**86. Scintillation counters have the advantage(s) of**

(a) very fast counting rate.

(b) capability of detecting of radiations of lower levels.

(c) capability of detecting of x-rays.

(d) all of the above.

**Answer: (d) all of the above.**

**87. Environmental pollution is not caused by**

(a) atmospheric air and water pollution.

(b) high humidity content in atmospheric air.

(c) noise pollution.

(d) radioactive fallout.

**Answer: (b) high humidity content in atmospheric air.**

**88. Data acquisition systems are usually of**

- (a) analog type.
- (b) digital type.
- (c) integrating type.
- (d) hybrid type.

**Answer: (b) digital type.**

**89. Which one of the following definitions correctly represents a data acquisition system (DAS) ?**

- (a) DAS is a group of electronic devices that are connected to perform the measurement and quantization of electrical signals for digital processing.
- (b) DAS is a group of devices that are connected to store different signals.
- (c) DAS is a system to control a process.
- (d) DAS is a signal conditioner.

**Answer: (a) DAS is a group of electronic devices that are connected to perform the measurement and quantization of electrical signals for digital processing.**

**90. Consider the following statements**

1. Low-pass filter. 2. Signal transmission medium. 3. Amplifier.

4. Digital-to-analog converter. 5. Analog-to-digital converter.

Which one of the following sequences is the correct sequence for effective signal reconstruction in a data acquisition and processing scheme ?

(a) 1-3-5-2-4.

(c) 1-5-3-2-4.

(b) 3-1-5-2-4.

(d) 3-5-1-4-2.

**Answer: (b) 3-1-5-2-4.**

**91. Which of the following are data representation elements in a generalized measurement system ?**

1. Analog indicator. 2. Amplifier. 3. A/D converter. 4. Digital display.

Select the correct answer using the codes given below:

(a) 1 and 2.

(b) 1 and 4.

(c) 2 and 4.

(d) 3 and 4.

**Answer: (b) 1 and 4.**

**92. In an analog Data Acquisition System (DAS), what is the correct sequence of the blocks (therein) starting from the input ?**

- (a) Transducer - recorder - filter - signal conditioner.
- (b) Transducer - signal conditioner - recorder.
- (c) Signal conditioner - transducer - recorder.
- (d) Signal conditioner - filter - transducer - recorder.

**Answer: (b) Transducer - signal conditioner - recorder.**

**93. Digital data acquisition systems are used**

1. only when the output of the transducers is in digital form.
2. when physical process being monitored is slowly varying (narrow bandwidth).
3. when low accuracy can be tolerated.
4. when high accuracy and low per channel cost is required.

Which of these statements are correct?

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

**Answer: (d) 2 and 4.**

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