1. What is a sensor?

a) A device that converts physical or environmental stimuli into electrical signals
b) A tool used for measuring distance in robotics
c) A component that regulates temperature in electronic circuits
d) A type of switch used in automation systems

Answer: a) A device that converts physical or environmental stimuli into electrical signals

Explanation: Sensors are devices that detect and respond to physical stimuli from the environment and convert them into electrical signals, which can be measured and analyzed.

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2. Which of the following is a basic component of a sensor node?

a) Transistor
b) Capacitor
c) Microcontroller
d) Inductor

Answer: c) Microcontroller

Explanation: A microcontroller is a fundamental component of a sensor node as it processes data from sensors, communicates with other devices, and controls the overall operation of the node.

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3. What are some challenges associated with sensor nodes?

a) Power consumption
b) Data transmission
c) Environmental factors
d) All of the above

Answer: d) All of the above

Explanation: Sensor nodes face challenges such as power consumption, data transmission over wireless networks, and susceptibility to environmental conditions like temperature and humidity.

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4. Which of the following is a feature of sensors?

a) Accuracy
b) Sensitivity
c) Range
d) All of the above

Answer: d) All of the above

Explanation: Sensors can have various features including accuracy, sensitivity, and range, among others, depending on their intended application and design.

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5. What does sensor resolution refer to?

a) The ability of a sensor to detect small changes in the measured quantity
b) The physical size of the sensor
c) The frequency response of the sensor
d) The number of wires connected to the sensor

Answer: a) The ability of a sensor to detect small changes in the measured quantity

Explanation: Sensor resolution indicates the smallest change in the measured quantity that a sensor can detect reliably.

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6. Which class of sensors includes devices that provide continuous output signals?

a) Analog sensors
b) Digital sensors
c) Scalar sensors
d) Vector sensors

Answer: a) Analog sensors

Explanation: Analog sensors produce continuous output signals proportional to the measured quantity without discrete steps.

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7. What is a common type of digital sensor?

a) Thermocouple
b) Photodiode
c) Hall effect sensor
d) Pressure sensor

Answer: c) Hall effect sensor

Explanation: Hall effect sensors are examples of digital sensors that provide discrete output signals, typically in the form of binary data.

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8. What does bias refer to in sensor terminology?

a) Systematic error that affects sensor readings
b) Random fluctuations in sensor output
c) Sensitivity of the sensor

d) Operating temperature range of the sensor

Answer: a) Systematic error that affects sensor readings

Explanation: Bias in sensors represents a consistent deviation of sensor readings from the true value, usually due to factors such as calibration errors or environmental influences.

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9. What is drift in the context of sensors?

a) Gradual change in sensor output over time
b) Sudden spike in sensor readings
c) Variation in sensor sensitivity
d) Error caused by electromagnetic interference

Answer: a) Gradual change in sensor output over time

Explanation: Sensor drift refers to the gradual change in sensor output or behavior over time, often due to factors like aging, temperature variations, or material degradation.

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10. Which error arises due to the lag between the input and output of a sensor?

a) Bias error

b) Drift error
c) Hysteresis error
d) Quantization error

Answer: c) Hysteresis error

Explanation: Hysteresis error occurs when there is a delay or lag in the sensor’s response to changes in the input, resulting in discrepancies between ascending and descending input-output curves.

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11. What is quantization error related to in sensors?

a) Accuracy of digital sensors
b) Precision of analog sensors
c) Conversion of continuous signals to discrete values
d) Transmission of sensor data

Answer: c) Conversion of continuous signals to discrete values

Explanation: Quantization error occurs when continuous signals are converted into discrete digital values, leading to inaccuracies due to rounding or truncation.

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12. What is an actuator?

a) A device that converts electrical signals into physical action
b) A sensor used for detecting motion
c) A component that stores electrical energy
d) A type of switch used in mechanical systems

Answer: a) A device that converts electrical signals into physical action

Explanation: Actuators are devices that receive electrical signals and convert them into physical movement, force, or action in the environment.

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13. Which actuator type uses fluid pressure to generate motion?

a) Hydraulic actuator
b) Pneumatic actuator
c) Electrical actuator
d) Thermal/magnetic actuator

Answer: a) Hydraulic actuator

Explanation: Hydraulic actuators utilize pressurized fluids, typically oil or water, to generate

mechanical motion or force in various applications.

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14. What type of actuator converts electrical signals into linear motion?

a) Hydraulic actuator
b) Pneumatic actuator
c) Electrical actuator
d) Thermal/magnetic actuator

Answer: c) Electrical actuator

Explanation: Electrical actuators use electrical signals to produce linear or rotational motion, making them suitable for precise control in many industrial and robotic systems.

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15. Which actuator type relies on the expansion of gases to generate force?

a) Hydraulic actuator
b) Pneumatic actuator
c) Electrical actuator
d) Thermal/magnetic actuator

Answer: b) Pneumatic actuator

Explanation: Pneumatic actuators utilize compressed air or other gases to create mechanical motion or force, commonly used in pneumatic systems for automation and control.

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16. What is a soft actuator?

a) An actuator with flexible components
b) An actuator designed for gentle motion
c) An actuator with low power consumption
d) An actuator with advanced software control

Answer: a) An actuator with flexible components

Explanation: Soft actuators are characterized by their flexible or deformable structures, allowing them to adapt to complex shapes or perform delicate manipulations, often used in soft robotics and wearable devices.

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17. Which type of sensor provides continuous output signals without discrete steps?

a) Digital sensor
b) Scalar sensor
c) Vector sensor
d) Analog sensor

Answer: d) Analog sensor

Explanation: Analog sensors produce continuous output signals that vary smoothly with changes in the measured quantity, without discrete steps or levels.

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18. What type of sensor measures physical quantities such as temperature or pressure?

a) Scalar sensor
b) Vector sensor
c) Digital sensor
d) Analog sensor

Answer: a) Scalar sensor

Explanation: Scalar sensors measure scalar quantities, which have only magnitude and no direction, such as temperature, pressure, or humidity.

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19. Which error in sensors is characterized by a consistent deviation from the true value?

a) Drift error
b) Hysteresis error
c) Bias error

d) Quantization error

Answer: c) Bias error

Explanation: Bias error represents a systematic deviation of sensor readings from the true value, typically constant over a range of measurements.

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20. What does sensor resolution indicate?

a) The maximum range of measurement
b) The smallest detectable change in the measured quantity
c) The speed of sensor response
d) The physical size of the sensor

Answer: b) The smallest detectable change in the measured quantity

Explanation: Sensor resolution refers to the smallest change in the measured quantity that a sensor can detect and accurately represent in its output signal.

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