1. Which organelle is responsible for generating most of the energy needed for cellular processes?
a) Nucleus
b) Golgi apparatus
c) Mitochondria
d) Endoplasmic reticulum

Answer: c) Mitochondria
Explanation: Mitochondria are often referred to as the powerhouse of the cell because they produce adenosine triphosphate (ATP), the primary molecule used for energy transfer within cells.

2. What is the main function of the resting potential in a neuron?
a) To transmit signals between neurons
b) To maintain the stability of the cell membrane
c) To initiate an action potential
d) To release neurotransmitters

Answer: b) To maintain the stability of the cell membrane
Explanation: The resting potential is the electrical charge across the plasma membrane of a neuron when it is not transmitting signals. It helps maintain the stability of the cell membrane by balancing ion concentrations inside and outside the cell.

3. Which part of the nervous system is responsible for voluntary movements and sensory perception?
a) Central nervous system
b) Peripheral nervous system

c) Autonomic nervous system
d) Somatic nervous system

Answer: d) Somatic nervous system
Explanation: The somatic nervous system is responsible for voluntary movements and sensory perception. It controls skeletal muscles and receives sensory information from sensory receptors.

4. What is the primary structural unit of the nervous system responsible for transmitting signals?
a) Glial cells
b) Neurons
c) Dendrites
d) Axons

Answer: b) Neurons
Explanation: Neurons, also known as nerve cells, are the primary structural units of the nervous system. They are specialized for transmitting information through electrical and chemical signals.

5. Which neurotransmitter is commonly associated with feelings of pleasure and reward?
a) Serotonin
b) Dopamine
c) Acetylcholine
d) GABA

Answer: b) Dopamine

Explanation: Dopamine is a neurotransmitter associated with pleasure, reward, and motivation. It plays a role in various brain functions, including movement, emotion, and cognition.

6. Which system is responsible for transporting oxygen and nutrients to tissues while removing waste products?
a) Respiratory system
b) Cardiovascular system
c) Digestive system
d) Endocrine system

Answer: b) Cardiovascular system
Explanation: The cardiovascular system, composed of the heart, blood vessels, and blood, is responsible for transporting oxygen and nutrients to tissues while removing waste products such as carbon dioxide and metabolic byproducts.

7. What is the basic function of a transducer in a biomedical system?
a) To amplify electrical signals
b) To convert one form of energy into another
c) To regulate temperature
d) To store biological data

Answer: b) To convert one form of energy into another
Explanation: A transducer in a biomedical system is a device that converts one form of energy (such as pressure, temperature, or light) into another form (such as electrical signals) that can be measured and analyzed.

8. Which type of transducer generates electrical signals in response to mechanical pressure?
a) Piezoelectric transducer
b) Ultrasonic transducer
c) Thermistor
d) Photodetector

Answer: a) Piezoelectric transducer
Explanation: Piezoelectric transducers generate electrical signals in response to mechanical pressure or stress. They are commonly used in applications such as ultrasound imaging and pressure sensors.

9. How do fiber optic temperature sensors measure temperature?
a) By detecting changes in electrical resistance
b) By measuring changes in light intensity
c) By analyzing changes in magnetic fields
d) By assessing changes in radio frequency

Answer: b) By measuring changes in light intensity
Explanation: Fiber optic temperature sensors measure temperature by detecting changes in the intensity of light passing through an optical fiber. Temperature changes cause changes in the properties of the optical fiber, which in turn alter the intensity of light transmitted through it.

10. What is the primary selection criterion for choosing a transducer for a specific biomedical application?
a) Cost-effectiveness
b) Durability

c) Sensitivity
d) Aesthetics

Answer: c) Sensitivity
Explanation: Sensitivity, or the ability of a transducer to detect small changes in the measured quantity, is a primary selection criterion for choosing a transducer for a specific biomedical application. Higher sensitivity allows for more accurate measurements, especially in biomedical contexts where small variations may be significant.

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