Renewable Energy Principles

Environmental Science · Answer Key · 10 Questions

1. Which physical phenomenon allows solar photovoltaic cells to directly convert light energy into electricity?

A) Photovoltaic effect
B) Thermoelectric effect
C) Piezoelectric effect
D) Photoelectric emission into a vacuum

2. According to Betz's law, what is the theoretical maximum percentage of kinetic energy that a wind turbine can extract from wind?

A) 45.2%
B) 59.3%
C) 72.8%
D) 88.5%

3. Which type of geothermal power plant creates steam by pumping high-pressure hot water into a low-pressure tank?

A) Dry steam
B) Flash steam
C) Binary cycle
D) Enhanced geothermal

4. In hydroelectric power generation, what is the term for the vertical drop distance between the upstream reservoir level and the turbine?

A) Hydraulic head
B) Draft length
C) Surge height
D) Penstock gradient

5. Which microorganism is most commonly used in the industrial fermentation of biomass sugars to produce bioethanol?

A) Escherichia coli
B) Saccharomyces cerevisiae
C) Rhizobium leguminosarum
D) Nitrosomonas europaea

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6. What heat-transfer fluid is used in high-temperature Concentrated Solar Power (CSP) tower systems to store energy efficiently?

A) Distilled water
B) Molten salt
C) Compressed nitrogen gas
D) Mineral oil

7. Ocean Thermal Energy Conversion (OTEC) generates electricity by taking advantage of temperature differences between which two marine layers?

A) Warm surface water and cold deep ocean water
B) Intertidal surface water and ocean floor sediment
C) Polar surface water and equatorial surface water
D) Coastal estuary water and open ocean water

8. When green hydrogen is processed in a Proton Exchange Membrane (PEM) fuel cell, what is the primary byproduct emitted?

A) Carbon dioxide
B) Methane
C) Water
D) Nitrogen dioxide

9. What parameter measures the ratio of actual energy produced by a power plant over a period to its maximum theoretical output at full capacity?

A) Capacity factor
B) Thermal efficiency
C) Grid tolerance
D) Power density

10. Which primary celestial mechanism supplies the mechanical energy harnessed by tidal power plants?

A) Atmospheric pressure changes from solar heating
B) Gravitational interactions between Earth, the Moon, and the Sun
C) Coriolis forces driven by Earth's rotation
D) Geothermal heating of the ocean floor

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