PASSAGE 4 – Questions 31-40

Ocean Thermal Energy Conversion (OTEC) is a method of producing electricity developed from the temperature difference that subsists between deep and shallow waters. It converts solar radiation to electric power. The system uses the ocean's natural thermal gradient to direct a power-producing cycle. To produce a significant amount of power, the temperature between warm water on the surface and deep cold water should differ by about 20 degrees Celsius. On average, 23 million square miles of tropical seas **absorb** an amount of solar radiation equal in heat content to about 250 million barrels of oil. If less than one tenth of this could be **converted** into electric power, it would provide more than 20 times the total amount of electricity utilized in America on any given day.

Oceans are a huge renewable resource with the possibility of producing millions of watts of electric power. Some experts think the cold, deep seawater that is used in the OTEC process is rich in nutrients and, therefore, can be used to culture marine and plant life on shore or on land.

There are certain conditions which have to be met to enable OTEC to work. First, commercial OTEC facilities must be located in an environment that is stable enough for efficient system operation. This means that they must be built on land or submerged on the continental shelf. In addition, the natural ocean thermal gradient necessary for OTEC operation is generally found between latitudes 20° N and 20° S. **The temperature of the surface water** must differ from that of deep water and allowances should be made for a wide-open space. Tropical islands meet the requirements for a wide space, so they are areas for OTEC development. Land-based facilities offer advantages. For example, plants do not require extensive maintenance, and they can be installed in sheltered areas, safe from storms and general bad weather. Land-based sites allow OTEC plants to function with related industries.

Thermal energy from the ocean was first proposed as far back as 1881. However, it wasn't until 1930 that a system was built, producing 22kw of electricity. Another was constructed sometime later, but It was destroyed by waves. In 1980, the U.S department of energy built a site for OTEC heat exchangers on board a navy ship. Tests revealed that OTEC systems are able to function on slow

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moving ships and are of little consequence to the surrounding marine environment.

In 1981, Japan established a closed-cycle plant in the Pacific Ocean, producing 40,000 watts of electricity. In May 1993, another 50,000 watts of electricity was produced. However, it was an impractical energy source as the materials used were expensive. Currently, scientists are continuing to develop more cost effective and open-cycle OTEC systems. **An integrated OTEC system can help create harmonious, self-sustaining island communities, independent of imported fossil fuels and their associated costs.**

Tidal energy is another form of ocean energy caused by the gravitational pull of the moon and sun, and the rotation of the Earth. When tides come into shore, they can be trapped in reservoirs behind dams. Then when the tide lowers, the water behind the dam can be released, functioning similarly to a hydroelectric power plant. Tidal dams can change the tidal level. In the local basin, affecting the navigation. The prime disadvantage is the effect a tidal station has on plants and animals. However, tidal fences, which are also used to channel the energy of tides, have less environmental impact than traditional sources of power such as fossil fuels or nuclear power, and are cheaper to install.

Turbines are devices with blades attached to a central rod that spin when a force hits the blades. **[A]** This spinning motion is extremely **practical**. The first turbine used was the undershot waterwheel, probably the oldest type of waterwheel dating back over 2,000 years. **[B]** Waterwheels and windmills were the first turbines; their wooden blades captured the power of wind or rivers to lift water for irrigation or to rotate huge stones to grind grain. **[C]** It wasn't until the 1880s, when the generator was first invented, that people began using turbines to produce electricity. **[D]**

31. According to paragraph 1, OTEC uses what to produce power?

A. The wave energy stored in the Earth's oceans

B. The salt in the ocean

C. The seawater temperature differences

D. The tropical oceans' warm surface water

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32. The word "<u>absorb</u>" in the passage is closest in meaning to_____.

A. take in

C. reject

B. work together with

D. make efficient

33. The word "<u>converted</u>" in the passage is closest in meaning to_____.

A. consumed

B. released

C. used

D. transformed

34. In paragraph 3, the author mentions "<u>The temperature of the surface water</u>" as an example of_____.

A. the requirements for the perfect OTEC settlement

B. the specific requirements needed for OTEC to work

C. the careful calculations and considerations needed in OTEC

D. why water based programs are always superior to land-based ones

35. According to paragraph 5, what does the author say was the main problem with the closed cycle plant in the Pacific Ocean?

A. It was damaged by the salt water.

B. It was environmentally damaging to the area.

C. It could not generate electricity without pollution.

D. The overall cost was far too high to be economically feasible.

36. Which of the following best expresses the essential information in the highlighted sentence? Incorrect answer choices change the meaning in important ways or leave out essential information.

A. The beauty of the OTEC system is that it allows islands to be self-sufficient.

B. The OTEC system could prove to lead the world in an age of co-dependency.

C. A completely autonomous, cost effective society could be created by the system.

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D. The system could mean that societies are no longer dependent on fossil fuels.

37. According to paragraph 6, which of the following is true of tidal energy?

A. It is derived from the hydrological climate cycle.

B. It is based on the small fluctuation of tide in a given area.

C. It has no environmental and ecological effects on local inhabitants.

D. It needs a barrage to convert tidal energy into electricity.

38. The word "<u>practical</u>" in the passage is closest in meaning to_____.

A. unnecessary

B. swift

C. useful

D. sensitive

39. The following are all characteristics of the OTEC system EXCEPT_____.

A. It seeks to harness the temperature difference.

B. It is not technically feasible for the production of base load electricity.

C. It can be practiced on slow moving ships.

D. It can create self-sufficient systems.

40. Look at the four squares [_] that indicate where the following sentence can be added to the passage.

It was turned by water flowing under the wheel and striking the boards.

Where would the sentence best fit?

A. [A]

B. [B]

C. [C]

D. [D]

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