EXAMEN : BACCALAUREAT GENERAL	
EPREUVE : Evaluation spécifique de langue section européenne	
PHYSIQUE-CHIMIE en langue ANGLAISE	**Sujet N°7**

Ocean wave energy

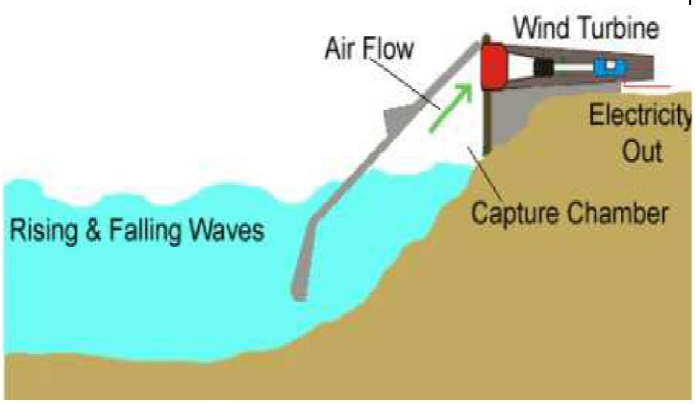
Wave energy is one of the ways to generate electricity today. Waves form through the current of winds that blow on the ocean, and these winds are created by differences in air pressure created by solar energy (…).

There are many ways in which wave energy can be used to generate electricity. The oscillating water column (OWC) is one of the commonly used methods today (doc.1) but other offshore projects (doc.2) are developed to avoid disturbances (noise, settlement patterns . . .).

The potential worldwide usable energy that could be extracted from waves has been estimated at two terawatts, equivalent to the current worldwide installed capacity for electricity generation. Only a tiny fraction of this is currently being used.

Doc. 1 : oscillating water column

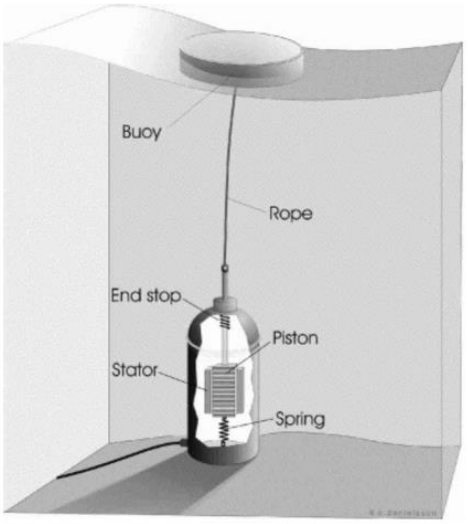
An OWC is built next to a shore, with a wave capture chamber that is used to trap the air and the water of the surface below the walls of the chamber. The waves arriving cause the water in the chamber to rise and fall, which means that air is forced in and out of the hole in the top of the chamber. We place a turbine in this hole, which is turned by the air rushing in and out. This turbine rotates in the same direction regardless of the direction of the air flow generating power whether waves have just entered or left the chamber.



Doc. 2 : Offshore project

The concept is based on a system of unique piston driven generators. A so-called linear generator stands protected on the seabed and is driven via a rope by a buoy on the surface. With the help of power electronics, the generated alternating power is converted into direct current, which is then taken to land by means of standard cables.

This system is expected to be cheap, sturdy, environment-friendly, and able to resist extreme conditions at sea.



Questions :

1) What is the origin of the waves ?
2) Explain the way OWC convert wave's energy into electric power.
3) What are the advantages and drawbacks of OWC compared with offshore projects ?
4) What is the common point between a wind generator, a nuclear plant, and a wave generator ?
5) What do you think of this method to generate electricity (pros and cons) and why is it necessary to develop renewable energies ?