



Physics

First exercise:(7pts)

The << Karaoun >> lake feeds the hydro-electric power plant of << Markaba >> with water whose rate of flow is 22×10^3 Kg per second. Water falls a height $h=197$ m.

The electric energy furnished is 34×10^6 J in each second.

The level of the turbine in << Markaba >> is taken as a gravitational potential energy reference.

Take $g=10\text{m/s}^2$.

- 1. Specify the form of energy stored in the system (Lake-Earth).*
 - 2. Water is a renewable source of energy. Why?*
 - 3. Determine the amount of energy provided by the falling water (received by the turbine)in each second .*
 - 4. Specify the conversion into useful energy that take place in the power plant of <<Markaba>>.*
 - 5. Calculate the ratio of the energy furnished by the turbine to the energy it received, during the same time.*
 - 6. In << Jieh >> thermal power plant, a part of the energy resulting from combustion of fuel is converted into electric energy. The ratio of the energy furnished to the energy received, during the same time 40%.*
- *Give three advantages of << Markaba >> power plant and <<Jieh >> power plant.*

Exercise two : (7pts)

In order to help an isolated village, a stationary helicopter release boxes of food supplies from a height $h_A = 50$ m. Each box provide with parachute

The set (S) [box, parachute] has a mass $M = 50 \text{ Kg}$.

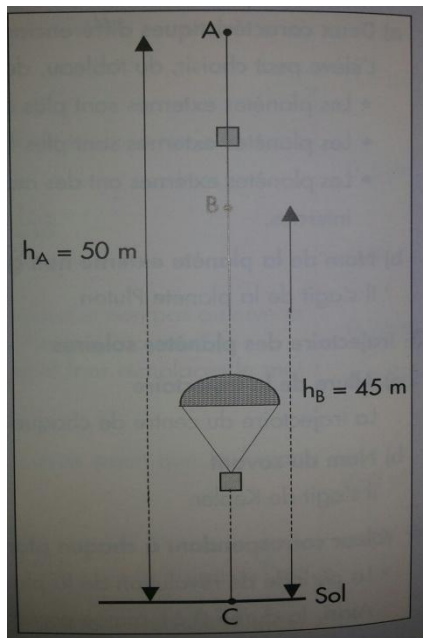
(S) released at A without initial velocity ($V_A = 0$), moves down along the vertical trajectory ABC and reaches B, of height $h_B = 45 \text{ m}$, with a speed $V_B = 10 \text{ m/s}$ (see the figure)

The horizontal ground is taken as a gravitational potential energy reference ($PE_g = 0$). Take $g = 10 \text{ m/s}^2$.

1-The parachute remaining closed while falling from A to B ,

All the forces of friction are thus neglected .

a)The mechanical energy of the system [(S),Earth]



is conserved along the path A to B. Why ?

b- Specify the transformation of energy that took place while falling from A to B.

2-Upon reaching B, the parachute opens and the (S)

continue its fall at a constant speed of 10 m/s until it reaches C ($V_C = 10 \text{ m/s}$)

a-Find the decrease in the mechanical energy of the system [(S),Earth] when it passes from B to C.

b-How does this loss of energy appear?

3- One of the parachutes did not open while falling from A to C .

Determine , in this case, the speed with which this box reaches C.

4-What can you conclude about the role of the parachute in the fall of the box.

Third exercise:(6pts)

A Carbon atom (${}^A_Z\text{C}$) that contains 6 electrons and 8 neutrons

a) Determine the charge number Z?

b) Determine the mass number A ?

c)Which of the two nuclide ${}^{14}_7\text{N}$ and ${}^{12}_6\text{C}$ is isotops to ${}^A_Z\text{C}$, Justify ?

d) The carbon atom considered as a radioactive β^-

Write the equation of disintegration of this nucleid and specify the obtained atom.

e) A sample contains 8×10^{22} nucleus of carbon (${}^A_Z\text{C}$) knowing that the half life of carbon ${}^A_Z\text{C}$ is 5570 years .Calculate the number of Carbon present in a sample after 11140 years.

Good luck