وزارة التربية والتعليم العالي المديرية العامة للتربية دائرة الامتحانات	امتحانات الشهادة الثانوية العامة فرعا الاجتماع والاقتصاد والآداب والإنسانيات	دورة سنة 2010 العادية
	مسابقة في مادة الفيزياء المدة: ساعة واحدة	الاسم: الرقم:

This exam is formed of three exercises in two pages.
The use of non-programmable calculators is recommended

First Exercise (7 points) Launching the telescope "Hubble"

The telescope Hubble has a mass m = 12×10^3kg. It moves at a constant speed, v = 7.5×10^3m/s, along a circular orbit, around the Earth, at an altitude h = 600 km.
In order to launch the telescope Hubble from the ground and to put it in motion in its orbit, we use a rocket whose engines are fed by liquid oxygen and kerosene.
Take: the ground level as a gravitational potential energy reference;
g = 8 m/s^2 the gravitational acceleration at the altitude h = 600 km.

1. The set (telescope, rocket) is initially at rest on the ground.
Give the value of:
a) The kinetic energy of the telescope ;
b) The gravitational potential energy of the system (telescope, Earth);
c) The mechanical energy of the system (telescope, Earth).
2. The telescope is in its orbit at the altitude h.
a) Calculate:
i. ts kinetic energy;
ii. the gravitational potential energy of the system (telescope, Earth).
b) Deduce that the mechanical energy of the system (telescope, Earth) is 39.51×10^{10}J.
3. The mechanical energy of the system (telescope, Earth) has increased when the telescope is raised from the ground to the altitude h = 600 km.
a) By how much did it increase?
b) This increase is due to an energy conversion. Give the form of this converted energy.
4. In order to launch the telescope and to put it in its orbit, the rocket consumes a certain amount of kerosene of mass M. Knowing that the energy transferred to the system (telescope, Earth) is 10% of the total energy produced by the combustion of kerosene, calculate the value of M.
Given: the combustion of 1 kg of kerosene liberates an energy of 4.2×10^7 J.

Second Exercise (6 ½ points) Nuclear Energy

Read carefully the following selection then answer the questions that follow:
"*Towards the end of the 19th century, Man achieved remarkable progress in the small-scale world towards the smallest particles such as electrons and nuclei….*
Later, Man discovered accidentally "radioactivity" of some unstable nuclei thus opening the door wide for the "nuclear era"…
He studied natural radioactivity and was able to perform some provoked nuclear reactions leading to a tremendous amount of released energy. Thus he was able to produce large amounts of electric energy in nuclear power plants instead of fossil fuel plants.
On the other hand, nuclear energy became very useful and helpful in medicine for diagnosis and therapy.
However this was not without dangerous and catastrophic consequences [*Hiroshima bombing in 1945, nuclear wastes and nuclear leaks*] *some of which affecting the environment for a very long time.*

Questions

1) What are the main constituents of a nucleus?
2) In the selection, we read about two types of nuclear reactions.
a) Give the names of these two types;
b) How can they be distinguished?
3) Nuclear energy is used in medicine in two fields: diagnosis and therapy.
Give an example of this use in each field.
4) Nuclear wastes pose a major problem.
a) The nuclear wastes are dangerous. Why?
b) How can their danger be reduced?
c) During the last century, a major nuclear catastrophe took place in Chernobyl.
Give two of its consequences.
d) Every day, nuclear wastes are formed in Lebanon. From where do they come?

Third Exercise (6 ½ points) Galileo

Read carefully the following selection then answer the questions that follow.

«*Galileo (1564-1642), physicist and astronomer, was one of the founders of the modern physics. His theories and that of Kepler served as foundation for the work of Newton on Universal Gravitation. In 1595, Galileo participated in the debate about the theory of Copernicus and the theory of Ptolemy. In 1609, he constructed the astronomical telescope, with which he discovered the mountains and the craters of the Moon. He deduced also that the Milky Way is formed of stars and he discovered the four greatest moons of Jupiter. In December 1610, he observed the phases of Venus*. »

Questions

1) Tell, according to Galileo, of what is the Milky Way formed.
2) According to the selection, a debate took place**,** in 1595, about two theories.
State the basic difference between these two theories.
3) What is the main contribution of Galileo to astronomy?
4) According to the selection, the theories of Galileo and of Kepler served as foundation to a law stated by Newton:
a) What do we call this law?
b) Give the statement of this law.
5) **a)** Two planets of the solar system are mentioned in the selection. What are these planets?
b) The planets of the solar system are classified into two groups.
i) Give the names of these two groups and specify to what group does each of the mentioned planets belong.
ii) Give the names of two other planets in each group.
c) The two groups are separated by a belt. Of what is this belt formed?

وزارة التربية والتعليم العالي المديرية العامة للتربية دائرة الامتحانات	امتحانات الشهادة الثانوية العامة فرعا الاجتماع والاقتصاد والآداب والإنسانيات	دورة سنة 2010 العادية
مشروع معيار التصحيح	مسابقة في مادة الفيزياء المدة: ساعة واحدة	الاسم: الرقم:

First Exercise (7 points)

Part	Answer	Mark
1.a	$KE_1 = 0$	
1.b	$PEg_1 = 0$	
1.c	$ME_1 = 0$	
2.a.i	$KE_2 = ½\ mv^2 = ½ \times 12\times10^3\times(7.5\times10^3)^2 = 33.75\times10^{10}$ J	
2.a.ii	$PEg_2 = mgh = 12\times10^3\times8\times600\times10^3 = 5.76\times10^{10}$ J	
2.b	$ME_2 = KE_2 + PEg_2 = (33.75 + 5.76)10^{10} = 39.51\times10^{10}$ J	
3.a	$\Delta ME = ME_2 - ME_1 = 39.51\times10^{10}$ J	
3.b	The chemical energy.	
4	The energy liberated by the combustible: $39.51 \times 10^{10} \times \frac{100}{10} = 39.51 \times 10^{11}$J 1kg of kerosene liberates 4.2×10^7 J M kg of kerosene liberate 39.87×10^{11} J then: $M = \frac{39.87\times10^{11}}{4.2\times10^7} = 9.4 \times 10^4$kg	

Second Exercise (6.5 points)

Part	Answer	Mark
1	Protons and neutrons Spontaneous and Provoked	
2.a	Provoked: does not take place without the intervention of an external factor whereas spontaneous does not require.	
2.b	Diagnosis: Scintigraphy or tomography Therapy: radiotherapy.	
3	Radioactive substances	
4.a	Packing them in some containers underground	
4.b	Death of peoples, pollution of surrounding area by dangerous radiations,	
4.c	From the hospitals ; Radiology nuclear centers	

Third Exercise (6.5 points)

Part	Answer	Mark
1	The Milky Way is made up of stars	
2	According to the geocentric theory the Earth is motionless at the center of the universe while according to the heliocentric theory the Sun is motionless at the center of the universe	
3	Construction of the astronomical telescope	
4.a	The law of universal gravitation	
4.b	Any two bodies attract each other with a force that varies with the inverse of the square of the distance between them and with the product of their masses.	
5.a	Jupiter and Venus	
5.b.i	Inner, Outer. Venus belongs to the group of the inner planets ; Jupiter belongs to the group of the outer planets.	
5.b.ii	Inner: The Earth, Mars , Mercury, Outer: Saturn, Uranus, Neptune, Pluto.	
5.c	The asteroids.	