University of Mansoura Faculty of Science Physics Department Subject: Physics		First Term Sophomore Students Date: Dec. 26, 2012 Time allowed: 2 hours
Course (s): Phys 213	Nuclear Physics	Full Mark: 80

Answer the Following Questions

1-a) Give an idea about the structure of the charge on the proton and the neutron which explain in the anomalous value of the proton and neutron magnetic moments. (7 marks)

b) Give the difference between the neutrino and anti-neutrino. (7 marks)

c) Give an account about one of the detectors. (7 marks)

2- Consider the successive decay Ruthenium $_{44}Ru^{105}$ which decays by β^- with half–life time 4.5 hours to Rhodium $_{54}Rh^{510}$, which decays by β^- with half-life time 35 hours to stable palladium $_{46}Pd^{105}$.
Calculate the time in which the number of the Rhodium nuclei reaches to a maximum value. Derive the necessary formula that may use. (19 marks)

3- a) From β^+ decay of $_7N^{13}$ find the value of r_o in the expression $R = r_o A^{1/3}$. The maximum energy of a β^+ is found to be 1.19 MeV.
[m_e =0.000549 u , m_n = 1.008665 u , m_p = 1.007277 u,
M (N^{13}) =13.005738 u, M (C^{13}) =13.003550 u, 1U =931.5 MeV/C^2,
Ke^2=1.44 MeV Fm] (13 marks)

b) Give an account on one of the accelerators. (7 marks)

4- Write in details about the semi empirical mass-formula. (20 marks)

Examiners: 1) Prof. Dr. Mahmoud Abouzeid 2) Prof. Dr. Hayam Mashaly
3) Dr. Mohamed Salah 4) Dr. Abeir Awadh

Mansoura University Faculty of Science Physics Department Course Title: Elasticity Date: 24/12/2012		Jan. 2013 Exam Type: Final Second Level : (Physics) Time: 2 Hours Full Mark: 80 Mark

Answer the following questions:

1- a- What the difference between elastic and viscoelastic material? [10 Mark]

b- What is the meant by fatigue and mention the type of it. [6 Mark]

c- Write on the following: - Stress- Elasticity- Strain [9 Mark]

2- a- What is the meant by creep and Mention the types of it. [10 Mark]

b- Write on the following: - [15 Mark]

Dynamic modulus- Deformation- Toughness- Resilience

3- a- Explain the factors affecting on the fatigue life. [10 Mark]

b- Write on the following:-

Elastic moduli- Fracture – Stages of creep [15 Mark]

c- Discuss Stress- Strain curve [5 Mark]

With best wishes

Examiners

أ.د. محمود أحمد أبوزيد أ.د. أبوبكر البديوى

المستوى الثانى - فيزياء - جوية وفلك (ف ٢١٢)

Mansoura University **Faculty of Science** **Physics Department** **Subject: Physics**		**First Term** **Credit hours Students: Physics** **Date : January 2013** **Time allowed : 2 hours**
Course: Physics 212, Meteorology & Astronomy		**Full Mark : 80 Mark**

Answer the 1st question then any other two questions

[1] a- Derive the differential equation for the motion of a body in a field of a central force , when $r \neq r(\theta)$ [10] Marks

b- A body moves under the effect of central force in an orbit of radius is given by $r = 3a \cos\theta$, determine:

i- The potential energy V(r), [10] Marks

ii- The force F(r). [5] Marks

c- Calculate the distance between the sun and Earth planet at 23rd of December if the astronomical unit $a = 150 \times 10^6$ km. [5] Marks

[2] a- State Kepler's 2nd law. [3] Marks

b- Define the Eccentricity. [7] Marks

c- Prove that the planet increases its velocity when it come closer to the sun and slower its velocity when it is far away from the sun [10] Marks

d- The troposphere is unstable layer. Discuss this phrase. [5] Marks

[3] a- For El-Mansoura of latitude 31°N, on 22 of March, Calculate: [12] Marks

i-The declination angle. **ii-**The zenith angle, at 10:00 LAT.

iii-The time of sunrise and sunset **iv-**The day length.

b-The atmosphere consists of different layers. Discuss this phrase with illustrating the dependence of temperature on altitude. [6] Marks

c- Study the effect of the latitude angle ϕ and the declination angle δ on the sunrise hours at the following conditions:

i- At the equator, ii- At the poles, iii- At the equinoxes. [7] Marks

[4] a- For Venus, Earth, and Saturn, the semi major axis are (0.723, 1.0, 9.54) AU and the eccentricity are (0.007, 0.017, 0.056) respectively. Determine

i-The semi major axis in Km, ii-The periodic time in days, iii-The Aphelion iv-The Perihelion and v-The nearest distance from Earth.

Tabulate your results [15] Marks

b- Mercury has no atmosphere. Discuss this phrase [10] Marks

Good Luck

Examiners: 1- Prof. Dr. Magdy Tadros Yacoub* **2-** Prof. Dr. Mahmoud Abou Zeid

3- Dr. Hamed Ibrahem **4-** Dr. Aziza Atta

Mansoura University
Faculty of Science
Physics Department
Course code: Phy 210
Course title: Thermodynamics

First semester 2012-2013
Date: 2-1-2013

2nd Level physics students

Full Mark: 80
Allowed time: 2 hours

Answer all the following questions:

Marks

1- a- Using Maxwell's equation deduce the first and second TdS equations, then find (C_p-C_V) in terms of coefficient of volume expansion β and isothermal compressibility K. 25

b- Deduce the enthalpy equation $\left(\frac{\partial h}{\partial P}\right)_T = V(1-\beta T)$ and find $\left(\frac{\partial h}{\partial P}\right)_T$ for an ideal gas.

2- a- State and prove Clausius inequality. 25

b- Using the fact that Gibbs function remain constant during a reversible process taking place constant temperature and pressure, deduce the Clausis – Clapeyron equation.

c- Find the increase in boiling point of water when the pressure increase is 1.5 atmosphere, and one gram of water vapour have volume 1761 cm^3 and latent heat of vaporization 540 Cal/gm.

3- a- One gram of an ideal gas $C_v=(5/2)$ R Joule/ mole K at temperature 127 °C and pressure 1 atmosphere, if its temperature increased at constant volume until its pressure becomes 2 atmosphere and then the gas expand adiabatically until its temperature return to 127 °C and finally the gas compressed isothermally to its initial volume. Draw the cycle on (P-V) and on (T-S) diagram and find:- 30

I. The change in internal energy during the change at constant volume.
II. The work done during adiabatic change.
III. The change in enthalpy during the isothermal change.
IV. The change in entropy during the isothermal change.
V. The efficiency of the cycle (R=8.3 Joule / mole K).

Best wishes:

Dr. Anwar Megahed

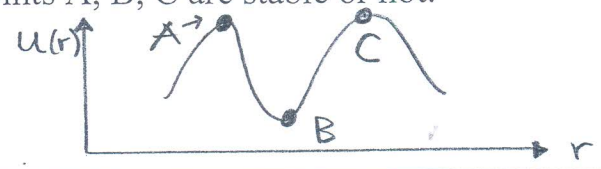
المستوى الثانى - فيزياء - ميكانيكا كلاسيكية ف ٢ ١٢

Mansoura University
Faculty of Science
Physics Department

Level (2) physics students
Full Mark: 80
Allowed time: 2 hours
Course title: phys 214
classical mechanics.

First semester
Date:9-1-2013

Answer the following questions:

			Marks
1-	a-	Prove that the total external torque on a system of particles is equal to the time rate of change of angular moment of the system and show that the internal forces are central forces.	15
	b-	Show that $\sum_i m_i r_i = \sum_i m_i \dot{r}_i = 0$ where r_i and $\dot{r}_i$ are the position vector and velocity of particle i relative to the center of mass.	10
2-	a-	Plot the force function related to the potential diagram and classify, with give reason, whether the points A, B, C are stable or not. 	20
	b-	Draw the potential function related to the force $F = -G m_1 m_2 / r^2$, $F = -kx$	10
3-	a-	Find the moment of inertia of two particles m_1 and m_2 connected by a rigid rod of length a about perpendicular axis to the plane from the center of mass. in terms of a.	15
	b-	Prove the parallel axis theorem of moment of inertia.	10

Best wishes:

أ.د/ عطاالله الحنبلى

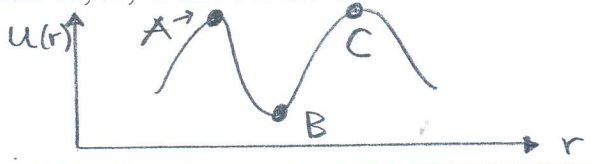
المستوى الثانى - فيزياء - ميكانيكا كلاسيكية ف ٢ ٢١

Mansoura University
Faculty of Science
Physics Department

Level (2) physics students
Full Mark: 80
Allowed time: 2 hours
Course title: phys 214
classical mechanics.

First semester
Date:9-1-2013

Answer the following questions:

			Marks
1-	a-	Prove that the total external torque on a system of particles is equal to the time rate of change of angular moment of the system and show that the internal forces are central forces.	15
	b-	Show that $\sum_i m_i r_i = \sum_i m_i \dot{r}_i = 0$ where r_i and $\dot{r}_i$ are the position vector and velocity of particle i relative to the center of mass.	10
2-	a-	Plot the force function related to the potential diagram and classify, with give reason, whether the points A, B, C are stable or not. 	20
	b-	Draw the potential function related to the force $F = -G m_1 m_2 / r^2$, $F = -kx$	10
3-	a-	Find the moment of inertia of two particles m_1 and m_2 connected by a rigid rod of length a about perpendicular axis to the plane from the center of mass. in terms of a.	15
	b-	Prove the parallel axis theorem of moment of inertia.	10

Best wishes:

أ.د/ عطاالله الحنبلى

الفرقة : المستوى الثاني المادة : جبر خطى وهندسة كود المادة : (ر203) البرنامج: فيزياء	كلية العلوم – قسم الرياضيات	دور: يناير 2013 الزمن : ساعتان التاريخ : 2013/1/20

أجب عن الأسئلة الآتية: *الدرجة الكلية :* 80

1-أ) باستخدام طريقة جاوس – جوردان حل مجموعة المعادلات :

$$2x_1 + x_2 + x_3 = 8\ ,\ 3x_1 - 2x_2 - x_3 = 1\ ,\ 4x_1 - 7x_2 + 3x_3 = 10$$

ب) اوجد معادلة المستقيم المار بالنقطة (1- , 2 , 1 -) وعمودي على المستوى $2x + y - 2z + 3 = 0$ ثم اوجد طول العمود من النقطة (1, - 1 , 1) على هذا المستقيم .

(20 درجة)

2- أ) عرف كل من : الفراغ الجزئي – الاستقلال الخطى – الأساس و البعد للفراغ الاتجاهى

ب) حدد ما إذا كانت الفئة $S = \{V_1, V_2, V_3\}$ تكون أساسا للفضاء R^3 أم لا حيث $V_1 = (1,0,1)\ ,\ V_2 = (1,1,1)\ ,V_3 = (1,-1,2)$.

جـ) بفرض أن A مصفوفة مربعة وقابلة للانعكاس و تحقق $A^2 - 3A + I = 0$ فاثبت أن $A^{-1} = 3I - A$.

(20 درجة)

3- أ) اوجد المعكوس و القيم الذاتية وأساسات الفراغات الأساسية للمصفوفة

$$A = \begin{bmatrix} 2 & -2 & 3 \\ 1 & 1 & 1 \\ 1 & 3 & -1 \end{bmatrix}$$

ب) اوجد نقطة تقاطع المستقيم $\frac{x+2}{1} = \frac{y-4}{-2} = \frac{z+4}{2}$ مع المستوى $3x + 4y + 12z + 19 = 0$ واوجد أيضا الزاوية بين المستقيم و المستوى .

(20 درجة)

4- أ) اثبت أن المستقيمين $\frac{x-2}{2} = \frac{y-3}{-1} = \frac{z+4}{3}$, $\frac{x-3}{1} = \frac{y+1}{3} = \frac{z-1}{-2}$ يتقاطعان واوجد نقطة التقاطع والزاوية بينهما و معادلة المستوى الذي يحتويهما .

ب) اثبت انه إذا كان $c = a + b$ فان نظام المعادلات :

$x + y + 2z = a\ ,\ x + z = b\ ,\ 2x + y + 3z = c$ يكون متآلفا .

(20 درجة)

مع تمنياتنا بالتوفيق والنجاح إن شاء الله

Mansoura University
Faculty of Science
Physics Department
Course code: Bio-Phys 211
Course title: General biophysics

First term 2012-2013
Date: 16-1-2013

2nd Level students
Biophysics-Physics-Microbiology-
Chemistry-Biochemistry-Chemistry
Botany - Chemistry Zoology and
Environmental Science
Full Mark: 80
Allowed time: 2 hours

Answer all the following questions:

1- A- Write true (√) or False (χ) [each item = 1.5 Mark]

i. The frequency range detected by the human ear is between 20 Hz-20000 KHz.

ii. Hypermetropia caused by irregularity shaped cornea results in light focusing in front of retina.

iii. There are three types of color sensitive cones in retina.

iv. The human eye is organ design to receive visible light having wavelengths between 380 and 760 μm.

v. Ionizing radiations are known to cause DNA damage, cancer, mutation and birth defects.

vi. The electric potential of the heart can be measured by electro-encephalogram EEG.

vii. There are negative charges on the outside of the cell membrane of neurons than the inside produces a resting potential of -70 mV.

viii. The conduction speed of unmyleinated axons is given by $u = 1.8\sqrt{a}$ (m/sec) where a is the radius of axon (μm).

ix. The efferent neurons are those axons travel from sensing areas to the spinal cord

x. The ear canal behaves like a pipe open from one end and the other end is closed by tympanic membrane.

B- Calculate the lowest frequency in which sound resonates in ear, knowing that the velocity of sound is C=350 m/sec and the ear canal length is L=2.5 cm (n=1 when $L=\lambda/4$). **[5 Marks]**

C- What is the total flow resistance of a two parallel arteries in a calf have radius 0.5 mm and length 100 mm? If the volume flow rate of blood through these arteries is 1.2×10^{-6} m^3/sec, what is the pressure drop across the arties knowing that $\eta_{blood}=3.5\times10^{-3}$ poise.

[5 Marks]

2- A- Complete the following sentences: (each item = 2 Mark)

- The P-Wave in ECG indicates .....(1).....of the right and left .....(2).....

الإمتحان مكتوب على وجهى الورقة

- The alpha waves of EEG have frequency range .....(3).....Hz in .....(4).....state.
- In .....(5).....effect, electron is ejected from the atom and is accompanied by scattered ...(6).....

B- Find an expression given for the half life time and decay constant of a radionuclide?

[8 Marks]

C- If you have 1gm of ^{226}Ra that emits $3.7x10^{10}$ photon/sec. What is the decay constant and half life time knowing that Avogadro's number=$6.02x10^{23}$. **[5 Marks]**

3- A- Choose the correct answer : **[each item = 1 Mark]**

i. The retina of the eye contains two types of photoreceptors cones and ..... (Spheres- triangles- rods-rectangles).

ii. The flow of ions causes an electric current in the ion chamber with intensity proportional to the .....of ions (volume- number-density –shape).

iii. The beta particles are a fast moving .....(protons-neutrons-electrons-photons).

iv. ..... provide the eye's color sensitivity (Rods –Cones- Corneas –Irises).

v. The percent of hydrogen atoms in human body is (53%-63%-73%-83%).

vi. About ..... of cones are green sensitive. (23%-42%-52%-62%).

vii. 1 gray equal (1 rad- 10 rad-100 rad-1000 rad).

viii. 1 rem equal (0.1 Sv-0.01 Sv-0.001 Sv-0.0001 Sv).

B- Define the following: **[each item = 2 Marks]**

a. Depolarization
b. Graded potential
c. Radiation flux
d. Decibel
e. Magnetic resonance imaging

C- Calculate the capacitance per unit length and area of an unmyleinated axon, if the material in the axon membrane has dielectric constant K=7 and $\varepsilon_o=8.85x10^{-12}$ S/ohm-m and the radius a= $3.5x10^{-6}$ m and thickness of membrane is b=$5x10^{-9}$ m. **[7 Marks]**

D- If a person has an unaided near point of 0.5 m, what would the power of a lens make him able to see an object at 25 cm? **[5 Marks]**

Best wishes:

Examiners: Dr. H. Kamal Dr. N. Kenawi Dr. M. Mansour

الإمتحان مكتوب على وجهى الورقة

Mansoura University
Faculty of Science
Physics Department
Subject : Physics
Course(s): 210 : Vibrations & waves

First Term
Level2: physics & Biophysics
Date Jan. 2013
Time Allowed: 2 hours
Full Mark: 90 Mark

Answer The following questions

[1]	a- Solve the differential equation of forced oscillating waves.	[10]Mark
	b- Find the normal mode of oscillation of a wave propagates in a rod fixed at both ends.	[10]Mark
	c- A spring is hanged vertically and fixed at the upper end. A mass of 7 Kg is fixed at the other end. The mass is pulled down a distance of 5 cm and left, find i) the maximum amplitude ii) the periodic time iii) the total energy	[10]Mark
[2]	a- Define the transmittance coefficient and prove that it depends on the density per unit length of both parts of the string.	[15]Mark
	b- Find the apparent frequency at a detector for a source of wave moves with velocity U away from the detector.	[15]Mark
[3]	a- Find the condition to obtain a straight line with negative slope as a resultant of the superposition of to perpendicular waves.	[15] Mark
	b- Prove that the total energy of a SHM proportional with amplitude.	[15] Mark

Examiner

1- Prof. Mahrous Shaker