TANTA UNIVERSITY
FACULTY OF SCIENCE
DEPARTMENT OF PHYSICS

FINAL EXAM. FOR BIOPHYSICS (LEVEL TWO)

COURSE TITLE: Introduction For Thermodynamics	COURSE CODE: PH2181

PHYSICS DEPARTMENT

DATE: 27/12/2014	SEMESTER: FIRST	TOTAL ASSESSMENT MARKS: 100	TIME: 2 HOURS

Answer the following questions:

Question [1]
[25Mark]

(a)-Put (√) or (X) for the following and then correct the false: [8Marks]

1. The boundary is not necessarily fixed in either shape or volume. [　]

2. The work W is a property of the system, and work is a path function. [　]

3. The total volume of a system in a given state that are proportional to the mass of a system are called intensive. [　]

4. A system which is in thermal, mechanical, and chemical equilibrium is said to be in thermodynamic equilibrium. [　]

5. The value of the internal energy depends only on the path of the process. [　]

(b)-Define: (i)The mean heat capacity of a system, (ii)The work in isothermal process of an ideal gases, and(iii)The specific enthalpy. [6Marks]

(c)-Draw projection of a number of isotherms of van der Waals equation onto the P-v plane. [5Marks]

(d)-Mention: (i)Equations of state of van der Waals equation , (ii)Mathematical theorems . [6Marks]

....

Question [2]
[15Mark]

(a)-Choose the correct answer: [5Marks]

1-If no matter crosses the boundary, the system is said to be............

(a)Open,   (b)Closed,   (c)Isolated,   (d)Universe.

2-If the pressure is constant, the process is called ....

(a)Isovolumic ,   (b)Adiabatic ,   (c)Quasistatic ,   (d)isopiestic.

Tanta University- Faculty of Science-Department of Physics				
	Examination for Senior (Second level) Students of Biophysics			
	Course title	**General Biophysics**		**course code:BP2110**
Date:	1/ 2015	**term: 1st**	**Total assessment marks:**	**Time allowed: 2hours**

(Answer the following question)

First question   (25 marks)

a- what are the physical idea and principles of the following? (12 Marks)
1- Electrophoresis   2- Optical trapping   3- Liposomes 4- Protein tagging
b- What are the functions of the following?   (6 Marks)
1- Ultracentrifugation   2- Scanning electron microscopy 3-Hydroxyapatite
c- Write short notes on the secondary structure of proteins? **(7 Marks)**

Second question (25 marks)

a- Compare with examples in brief between the following: (12 marks)
1. Ionizing and non ionizing radiation
2. Bioceramics and biopolymers: definition, types and applications
3- A- mode and B-mode in medical imaging
b- Give reason for the following: (6 marks)
1- Using porous beads in size exclusion chromatography?
2- Barium titanate crystals have piezoelectricity
d. draw a schematic diagram for various hypothesized mechanism through which ELF fields are coupled with living cells?   **(7 marks)**

Third question (25 marks)

a- Define Hematoporphyrin as a photosensitizer and explain with drawings how can it applied for photodynamic therapy? **(10 marks)**
b- Describe mathematically how that electrical intensity inside biological oraganisms depends on applied frequency? **(10 marks)**
c- Write short notes on 1) invitro and 2) invivo models used for assessment of materials biocompatibility **(5 marks)**

Fourth question (25 marks)

a- answer the following problem   (10 marks)
The measured effective irradiance at a distance of 10 cm from the center of a UV lamp is 5mW/cm^2. Assuming the radiation to be isotropic, calculate
(1) The irradiance at a distance of 0.5 m.
(2) The limiting exposure time at this irradiance?
b- Answer the following questions
1- Explain in brief the types and differences between ex-vivo X-ray structural states of DNA?   **(8 marks)**
2- Define Levinthal's paradox and states only the factors affecting on the protein conformations (at least four factors)? **(7 marks)**

Good luck.......................Dr. Reda Morsy

	Tanta University- Faculty of Science-Department of Physics		
	Examination for Senior (Second level) Students of Biophysics		
Course title	Bioelectrical phenomena		course code:BP2112
Date: 1/ 1/ 2015	term: 1st	Total assessment marks:50	Time allowed: 2hours

First question (12.5 marks)

a. Choose the correct answer   (9 marks)

1- Lipid membrane in living cells is (conductor- insulator) and can be physically modeled as (resistor-battery- capacitor).

2- The potential at the inner side of the membrane relative to the potential at the outer side of the membrane is (transmembrane - membrane - intermembrane) potential.

3- If 10^5 Na+ ions cross the membrane each millisecond that a single Na+ channel is open. This current equals (1.6 pA, 16 pA, 160 pA, 1600 pA).

4- The unit of the membrane conductance is (Siemens - Siemens/m – Siemens^{-1})

5- The (resting – active - steady) membrane potential describes a steady-state condition with no net flow of electrical current across the membrane

6- The typical cell membrane at rest has a much higher permeability to (potassium – sodium - calcium – chloride)

7- The action potential velocity through a nerve is direct proportional to the square root of its (radius – diameter – length – thickness)

8- At electrode electrolyte interface, a double electric layer called (Helmholtz – Bilayer – Capacitance - Electrode) layer's is formed

b- Draw and discuss in details Einthoven's triangle for three lead ECG electrodes? **(3.5 marks)**

Second question   (12.5 marks)

a. Explain in details the voltage clamp experiment of Hodgkin-Huxley for study the action potential of squid giant axon and their expressions to model sodium conductance? **(8 marks)**

b. Give the mathematical formula and advantage/disadvantages of Nernst potential, Goldman potential, and diffusion potential. **(4.5 marks).**

Third question (12.5 marks)

a. draw a diagram showing action potential of nerve, sodium and potassium conductance. Explain biophysically the behavior of these curves? **(7.5marks)**

b. Describe the main categories of bioelectrodes (types and applications) then describe how to manufacture Ag/AgCl electrode and what is its important and mechanism? **(5 marks)**

Fourth question: give reason for the followings (12.5 marks)

1- Electrophysiological instruments must have high input resistance (with draw)

2- The rest membrane potential has negative values   (with draw)

3- Action potential of cardiac cell has a long plateau   (with draw)

4- The EEG signals do not resembles the action potentials of neurons (with draw)

5- Using inert materials to design wire bioelectrodes

Good luck.......................Dr. Reda Morsy

جامعه طنطا – كليه العلوم	امتحان الفصل الدراسي الأول	المادة: مقدمه في الإحصاء
قسم الرياضيات	المستوى: الثاني [ساعات معتمده]	الزمن: ساعتان
رقم المقرر: ST2105	الشعبة: كيمياء ميكروبيولوجي	التاريخ: ٢٠١٤/١/١٢

Answer the Following Questions:

1- Calculate the mean, the median and the mode for the following Senna leaves lengths which shown in the following table:

Lengths(mm)	118-126	127-135	136-144	145-153	154-162	163-171	172-180
Frequency	3	5	9	12	5	4	2

2- For the following data:

X	2	4	7	5	3	5	6	4	7	3
Y	3	5	9	7	4	6	7	6	8	5

(i) Find the regression line Y on X   (ii) Estimate the value of Y if $X = 7$

(ii) Calculate Pearson 's correlation coefficient (r).

3- If the probability distribution of the discrete random variable X is defined by:

x	1	3	4	5
$p(x)$	4k	k	0.2	3k

Find: (i) k   (ii) $E(2X + 1)$ (iii) σ^2

4- If X is a random variable following a normal distribution such that $X \sim N(50,25)$, Calculate the following probabilities:

$(i) P(40 < X < 60)$ $(ii) P(X > 60)$ $(iii) P(X < 45)$ $(iv) P(55 < X < 65)$

Given : $A(1) = 0.34134$, $A(2) = 0.47725$, $A(3) = 0.49865$

With All My Best Wishes

Dr. Wafaa Anwar

3- According to the van der Waals equation this ratio (P_cV_c/RT_c) should have the value .... for all substances at the critical point.

   (a)2/8,   (b)0,357,   (c)0.375,   (d)0.573.

4-In Joule and Thomson experiment ....

   (a)$\left(\dfrac{\partial T}{\partial v}\right)_u = 0.$ (b)$\left(\dfrac{\partial u}{\partial v}\right)_T = 0$,   (c)$\left(\dfrac{\partial P}{\partial v}\right)_T = 0,$ (d)$\left(\dfrac{\partial h}{\partial P}\right)_T = 0$

5-The work in any isochoric process of an ideal gases is.............

   (a)0.0,   (b)0,39,   (c)1.0,   (d) -0.573.

(b)-Prove that $\left(\dfrac{\partial u}{\partial v}\right)_T = \dfrac{c_P - c_v}{\beta v} - P$.   [10Marks]

....

Question [3]   [30Mark]
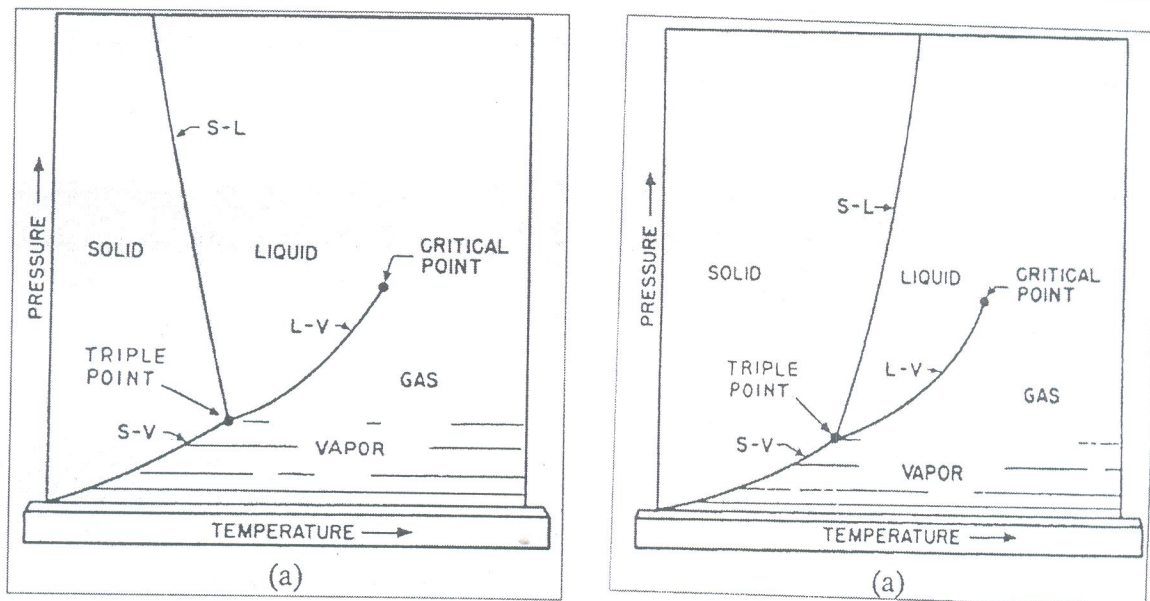
(a)Write short notes about the following :   [12Mark]

   (i)-The Work in solid material ,and(ii)-Chemical equilibrium .

(b)-Compare between the following Figures: [8Marks]

(a)   (a)

(c)-Explain the specific work in a reversible adiabatic expansion of an ideal gas.

                                                                   [10Marks]

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PH2181   *Dr.S.El-Attar*   27/12/2014

Question [4] [30Mark]

(a) Consider an ideal gas in a cylinder at temperature 300°K and 10 atm pressure. The pressure is changed from 100 to 10 atmosphere at constant temperature. Calculate the work in this process if n=1mole. [15Mark]

$$R = 8.3143 \text{ J mole}^{-1} \text{ K}^{-1}.$$

(b)-Deduce P_c, V_c, and T_c of a van der Waals gas. [15Mark]

Good luck

Examiner	Dr. Samy El-Attar.

Answer the following questions

Question No. 1 :   (40Marks)

a- Draw the structures corresponding to the following names :

  i-   Z- and E- 3-chloro-2-pentene.   ii- Methyl isopropyl carbinol.

  iii-   Vinyl acetylene   iv- 1,1,1-trichloro -2,2-bis(p-chlorophenyl) ethane.

b- C_3H_6 (A) reacts with Cl_2 to give either $C_3H_6Cl_2$ (B) or C_3H_6Cl (C) according
to the temperature. The reaction of (B) with alcoholic KOH gives C_3H_4 (D) which
on treatment with H_3O^+/Hg^{+2}, it forms C_3H_6O (E).Compound (C) reacts with aq. NaOH to
give C_3H_6O (F), which reacts with HOCl to yield a compound $C_3H_7O_2Cl$ (G).
Hydrolysis of (G) with aq. NaOH, gives $C_3H_8O_3$ (H). Identify compounds from A to H.

Question No. 2 :   (30Marks)

Carry out the following conversions :

i-	Ethylene	into	diethylether.
ii-	Acetaldehyde	into	2,5-dimethyl lactide.
iii-	Phthalimide	into	methylamine.
iv-	2-Butanol	into	1-butanol.
v-	Acetylene	into	5-methyl-2-hexene.

Question No.3 :   (30 Marks)

Write structural formulas for compounds A to D :

i-   Propene + HBr $\xrightarrow{H_2O_2}$ A $\xrightarrow{KOH}$ B $\xrightarrow{Na}$ C $\xrightarrow{CH_3I}$ D

ii-   Acetylene + H_2O/H^+ $\xrightarrow{Hg^{+2}}$ A $\xrightarrow{(O)}$ B $\xrightarrow{CaCO_3}$ C $\xrightarrow{Heat}$ D

iii-   Acetic acid + $SOCl_2$ $\longrightarrow$ A $\xrightarrow{NH_3}$ B $\xrightarrow{Br_2/KOH}$ C $\xrightarrow{HNO_2}$ D

iv-   Silver acetate $\xrightarrow{C_2H_5Cl}$ A $\xrightarrow{CH_3MgI}$ B $\xrightarrow{H_2O/H^+}$ C $\xrightarrow{NH_2OH}$ D

v-   2-Bbutene $\xrightarrow{O_3}$ A $\xrightarrow{H_2O/H^+/Zn}$ B $\xrightarrow{3I_2 / NaOH}$ C

Mahmoud El-Badawi.

Good Luck

Tanta University
Faculty of Science
Department of Chemistry

Principles of Analytical Chemistry (CH2105)
(First Semester Test - Level two)

كيمياء/ كيمياء حيوي- كيمياء/ نبات – كيمياء/ ميكروبيولوجي – نبات – ميكروبيولوجي

(First Semester Test - Level three)
كيمياء/ جيولوجيا

December 31, 2013   Total Assessment Marks: 100   Time Allowed: 2 h

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(I)- Write (√) for the true and (×) for false statements, (Give the reasons):

(65 Marks)

1) Acid media must be avoided in determination of Cl⁻ by titration with $AgNO_3$ (   )

2) ph.ph is dibasic acid while M.O is Monoacidic base   (   )

3) For determination of CNS⁻ by titration with Hg^{+2} ions white precipitate of mercury nitroprosside is formed at the end point.   (   )

4) Weak acid of $pK_a \leq 10^{-7}$ give sharp end point.   (   )

5) For saturated solution of AgCl ($K_{sp}(AgCl) = 1.2 \times 10^{-10}$), white precipitate can be observed.   (   )

6) The useful pH range of ph.ph is 8-10.   (   )

7) For titration with EDTA, metal-EDTA complex must be less stable than metal-indicator complex.   (   )

8) Detection of end point in "Mohr method" is the formation of a soluble color compound.   (   )

9) 2.5 gm of Na_2CO_3 dissolved in 500 ml of water. Normality of this solution is 0.05 gm.eq/L (Atomic weight : Na = 23, C = 12, and O = 16 gm/mol).   (   )

10) Upon addition of S^{-2} as precipitant agent to mixture of (Ag^+ and Hg^{+2}), Ag_2S is precipitated first then HgS (K_{sp} (Ag_2S) = 2×10^{-29} & K_{sp}(HgS) = 4×10^{-53})   (   )

11) Cu metals can not dissolve in HCl but it can dissolve in HNO_3 ($E^o_{Cu/Cu2+}$ = +0.34 V & $E^o_{NO3⁻/NO}$ = + 0.96 V vs. NHE and $E^o_{H2/H+}$ = 0.0)   (   )

12) H_3PO_4 can not be titrated stepwise with NaOH ($K_{a1} = 7.5 \times 10^{-3}$, $K_{a2} = 6.2 \times 10^{-8}$ and $K_{a3} = 1 \times 10^{-12}$)   (   )

13) Cu^{+2} can almost completely complexed with EDTA at pH 3.5   (   )

باقي الأسئلة في الصفحة الخلفية

Tanta University , Faculty of Science, Department of Chemistry
Final Examination of (Organic Chemistry 1) for 2nd year students of Chem.(Micro.,
Bio., Bot.) and special Microbiology.
Jan. 2014   Total Assessment :100   Course Code: CH2143   Time Allowed: 2hrs

Answer the following questions

1] Put ($\sqrt{}$) or (x) and correct the wrong answer (Explain your answer) . (30 marks)

1) T.N.B can be prepared by direct nitration of benzene. ( )

2) In benzene, all carbons are SP^3 hybridized and all C-C bonds are equal in length.   ( )

3) Aniline is more basicity than Benzyl amine. ( )

4) Oxidation of *p*-nitro- *tert*-butyl benzene by (KMnO$_4$) gives *p*-nitro-benzoic acid.   ( )

5) Sulphonation of phenol at 25 °C gives *o*-phenol sulphonic acid. ( )

6) Reaction of benzene with 2-methyl propene in acid medium gives 2-methyl-1-phenyl

   propane as a major product. ( )

7) OH is *meta*-directing group in benzene & halogen has (+I,-M) effect on benzene.   ( )

8) *p*- Amino phenol is more acidic than *p*-Cyano phenol. ( )

9) Nitration of 4-nitro- anisol gives 3,4-di-nitro- anisol. ( )
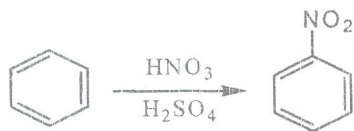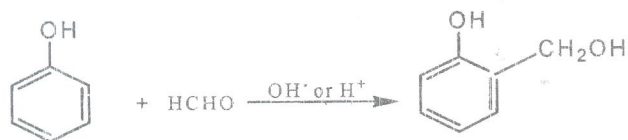
10) Cyclopentadienyl anion is not aromatic compound. ( )

2] Carry out of the following conversions: (25 marks)

1- Acetylene to Sulphanilamide.

2- Bromo benzene to *m*-Nitro benzoic acid.

3- Aniline to 100% o-bromophenol.

4- Toluene to Aspirine

5- Benzene to Mandelic acid.

3] Complete the following equations and name the final product. (22 marks)

a) Benzamide $+ Br_2 \xrightarrow{KOH}$ A $\xrightarrow[HCl]{NaNO2}$ B $\xrightarrow{CH_3OH}$ C

b) Phenol $\xrightarrow{(O)}$ ----------------

c) Aniline $\xrightarrow{2CH_3I}$ A $\xrightarrow[HCl]{NaNO2}$ B

d) Toluene $+ ClSO_3H \longrightarrow$ A $\xrightarrow{NH_3}$ B $\xrightarrow{(O)}$ C $\xrightarrow{Heat}$ D

e) Phenol + Benzoyl chloride $\longrightarrow$ A $\xrightarrow{AlCl_3}$ B + C

$\longrightarrow$

4] Write the mechanism of the following reaction: (15 marks)

5] Write on the following (by equation only) : (8 marks)

a) Reimer –Tiemann reaction

b) Claisen condensation

c) Canizzaro reaction

d) Ulman's reaction

Good Luck
Dr. Sahar El-Khalafy
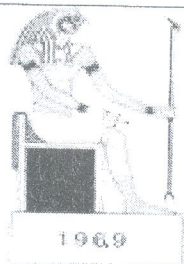
Examination for Biophysics and Physics Students

COURSE TITLE:	ACOUSTICS	COURSE CODE:	PH 2141
January 6th 2015	TERM: FIRST	TOTAL ASSESSMENT MARKS:100	TIME ALLOWED: 2 HOURS

QUESTION	ANSWER THE FOLLOWING QUESTIONS:	Marks
1.	a- Define and write short notes about the following phenomena: 1- Piezoelectric effect, 2- Doppler effect. b- Discuss in details the different types of transducers.	25
2.	a- Write short notes about attenuation process and explain the main sources of losses and absorption processes. b- Compare between the different types of the mechanical waves, and explain the parameters that affect on the speed of sound in the different media.	25
3.	a- Write short notes about the superposition and interference principles of waves. b- Explain in details the A-mode medical imaging.	25
4.	a- Explain by using the proper equations the conditions for the creation of nodes and antinodes in the standing waves. b- Discuss in details the bioeffects of the ultrasound waves on the human being.	25
EXAMINER	Dr. Hassan El Gohary	

Answer The Following Questions

First Question:

a) - The equation of motion $m\ddot{x} + sx = 0$ applies to a mass m at the center of a light string of length 2L fixed at both ends under a constant tension T. Show that he stiffness s is equal to $\dfrac{2T}{L}$ and that $w^2 = 2T/m L$.

b) - Prove that the displacement resonance for a forced oscillator occurs at frequency w given by $w^2 = \dfrac{s}{m} - \dfrac{r^2}{2m^2}$.

Second Question:

a) - Define the logarithmic decrement. If the normal frequency of an oscillator is 50 cycle/sec while the damping frequency is 40 cycle/sec, find the logarithmic decrement of this oscillator.

b) - The equation of motion of a forced oscillator is given by $m\ddot{x} + r\dot{x} + sx = F_o e^{iwt}$. Find the steady state displacement and the velocity of the given oscillator.

Third Question:

a) - Prove that the energy of a simple harmonic oscillator is constant.

b) For damping simple harmonic motion verify that the solution $x = (A + B)e^{-\frac{rt}{2m}}$ satisfies the equation $m\ddot{x} + r\dot{x} + sx = 0$ when $\dfrac{r^2}{4m^2} = \dfrac{s}{m}$

Fourth question:

If x and y are the displacements of a coupled oscillator which made of two identical pendulum each having a mass m suspended on a light rigid rod of length L and connected by a light spring of stiffness s. Discuss and drive expressions for these displacements as a function of time, t.

| Tanta University **Faculty of Science** Department of Physics | Final First Term Examination Academic year 2014/2015 Mathematical Physics Course (1) | Course Code: PH 2161 Biophysics Date: 31/12/2014 Time allowed: 2 hours | |

Solve the Following Questions:(100 marks)

First Question:(25 Marks)
(a) Find the differential equation which its general solution of the form:

$$y = cx^2 + c^2$$

where c is an arbitrary constant.

(b) According to Newton's law of cooling, which states that "The rate of heat loss of a body is proportional to the difference in temperatures between the body and its surroundings". If a sphere of cupper material at a temperature 100^oC insert in water of constant temperature of 30^oC. After 3 minutes the sphere temperature became 70^oC. After what time the sphere temperature would be 31^oC.

Second Question:(25 Marks)
(a) Make sure that the next differential equation is homogeneous, then find its general solution

$$x^2 \frac{dy}{dx} = y^2 - xy$$

(b) Write down the definition of the Gamma function, and find the value of integration;

$$\int_0^{\pi/2} \sin^6 \theta d\theta$$

Third Question:(25 Marks)
(a) Find the integrating factor of the following differential equation, then find its general solution:

$$2xydx + (y^2 - 3x^2)dy = 0$$

(b) Write down the two forms of definitions of Beta function, and find the value of $\Gamma(\frac{1}{2})$.

Fourth Question:(25 Marks)
(a) Find the solution of Bernoulli's equation:

$$\frac{dy}{dx} + 2y = e^x y^2$$

(b) By variable separation, solve the following differential equation

$$\tan(x)\frac{dy}{dx} = y$$

(c) Find the value of the following

$$\frac{\beta(5,\frac{7}{2}).\Gamma(-\frac{5}{2})}{\Gamma(\frac{9}{2})}$$

With my best wishes.   **Dr/ Mohamed Hamza**

تيرم يونيو

	TANTA UNIVERSITY- Faculty of Science -Department of Physics	
	EXAM FOR LEVEL TWO STUDENTS OF BIOPHYSICS	
COURSE TITLE	Electromagnetism	COURSE CODE: 2183
DATE: 4- 1 - 2015	TERM: FIRST TOTAL ASSESSMENT MARKS: 100	TIME ALLOWED: 2 HOURS

1. I) Formulate the work done (W) to move electric charge (Q) in uniform electric field (E) between two points A and B, then find the potential difference between these two points. [10marks]

II) Using gauss's law find the electric field (E) of a point charge (Q), and then find the potential difference between two points A and B around the point charge. [15marks]

2. I) Three vectors extending from the origin are given as r_1=7ax+3ay-2az, r_2=-2ax+7ay-3az, and r_3=2ax-2ay+3az. Find [15marks]

(a) A unite vector perpendicular to both r_1 and r_2;
(b) A unite vector perpendicular to the vectors r_1-r_2 and r_2-r_3;
(c) The area of the triangle defined by r_1 and r_2;
(d) The area of the triangle defined by the heads of r_1, r_2, and r_3.

II) -For a straight line along Z axis from -∞ to +∞ with line charge density ρ_ℓ, find The electric field intensity **E** at general point P(x,y,z) in free space. [10marks]

-If the line charge located on a line parallel to the Z axis at P (6, 8, 0). Find the electric field intensity **E** at a general point P(x,y,z). [5marks]

3. I) Given the potential field, $V=\frac{100}{Z^2+1}\rho\cos\varphi$ V, and point P at ρ=3m, $\varphi = 60°$, Z=2m. Find the numerical values at P for [10marks]

(a) The potential   (b) The electric field intensity **E**
(c) The direction of **E**   (d) The electric flux density **D**
(f) The volume charge density ρ_v.

II) Find the potential (V) and electric field intensity (**E**) at point p(0,0,z) on the Z axis for uniform line charge ρ_ℓ in the form of a ring, (ρ=a, in the z =0 plan) as in figure.
- Discuss the result at z≫ a and z ≈ 0.[15marks]
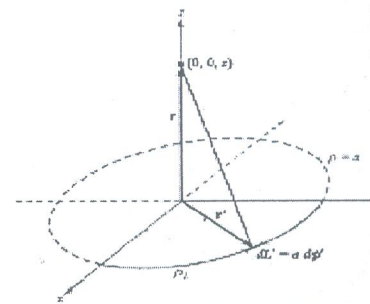
4. Four 10 nC positive charge are located in the z=0 plane at P_1(4,4,0), P_2(-4,4,0), P_3(-4,-4,0), and P_4(4,-4,0). At point P 8cm distance from each of the other charges. Calculate [20 marks]
(a) The electric field at point P.
(b) The potential at point P.
(c) Find the electric work done to bring the fifth 10 nC positive charge from infinity to point P.
(d) The magnitude of total force on the fifth charge.

EXAMINER	DR. REDA EL-SHATER

☺ BEST WISHES ☺

Tanta University- Faculty of Science-Department of Physics		
Examination for Senior (Second level) Students of Biophysics		
Course title	General Biophysics	course code:BP2110
Date: **/ 1/ 2013	term: 1st Total assessment marks:	Time allowed: 2hours

(Answer the following question)

First question   (25 marks)

a- what are the functions of the following?   (6 Marks)

1- Ultracentrifugation, 2-electrophoresis, 3- Scanning electron microscopy, 4-phospholipids in living cells, 5-polylactic acid in medicine, 6- polymethyl acrylate

b- write mathematical formula for the following and important? (12 Marks)

1. Beer Lambart's law   2. Bragg's law   3- effective spectral effective irradiance for UV-exposure   4- electromechanical coupling

c- Write short notes on primary and secondary structure of proteins? (7 Marks)

Second question (25 marks)

a- define photosensitizer in photodynamic therapy and explain its role by using energy diagram? **(8 marks)**

b- Describe in brief Schwann model to calculate electrical intensity inside biological oraganisms? **(9 marks)**

c- Write short notes on 1) invitro and 2) invivo models used for assessment biocompatibility **(8 marks)**

Third question (25 marks)

a- answer the following problem   (10 marks)

The measured effective irradiance at a distance of 10 cm from the center of a UV lamp is $5mW/cm^2$. Assuming the radiation to be isotropic, calculate

(1) The irradiance at a distance of 0.5 m.

(2) The limiting exposure time at this irradiance?

b- answer the following questions   (15 marks)

1- Explain how can carbon monoxide serve as a marker to study conformational changes of proteins such as haemaglobin?   **(7 marks)**

2- State factors affecting on protein conformations and Levinthal's paradox? **(8 marks)**

Fourth question (25 marks)

a- Compare with examples in brief between the following: (12 marks)

1. Ionizing and non ionizing radiation   **(3 marks)**

2. Different mechanisms of polymer degradation   **(3 marks)**

3- A- mode and B-mode in medical imaging   **(6 marks)**

b- Give reason for the following: **(6 marks)**

1- Using porous beads in size exclusion chromatography?

2- Quartz has piezoelectricity

d. describe frequency dependence of dielectric constant of biological tissues and their effects?   **(7 marks)**

Good luck.......................Dr. Reda Morsy

	Tanta University- Faculty of Science-Department of Physics	
	Examination for Senior (Second level) Students of Biophysics	
Course title	Acoustics	course code:PH2141
Date: 17/ 1/ 2013	term: 1st	Total assessment marks:	Time allowed: 2hours

(Answer the following question)

First question

a- Complete the following   (12 marks)

1. Audible Range in humans has the frequency range of …………

2. Sound wave motion transports ……..3. Speed of transverse wave on a string is given by……..

4. The intensity level (IL) is defined in decibels relative to a standard intensity of……

5. The electromechanical coupling coefficient of ultrasound transducer is given by……or…...

6. The phonon is………..   7. The threshold of audibility in human = ……. N/m^2

8. The maximum sound frequency in ultrasound is ……………

9. Piezoelectric strain coefficient is given by equation………..or……..

10. If the distance is changed with a doubling, the sound intensity will drop by …….

b- Write a mathematical formula (in word) for the following   (12 marks)

1. Root mean square of sound wave pressure   2. Gradient of sound wave pressure

3. Speed of longitudinal waves in solid rod

Second question

a. Write the units for the following physical quantities (5 marks)

1- Acoustics impedance (two units)   2- sound intensity   3- scattering cross section

4- attenuation coefficient of material for ultrasound

b. if sound wave falling normally upon a plane interface separating two media with wave impedances Z_1 and Z_2. Deduce a mathematical formula for reflection coefficient (R)? **(20 marks)**

Third question

a. define the following (5 marks)

1. Backscatter cross section   2. cavitation   3. Sound pressure level

4. The image resolution   5. Decibel

b. answer the following (20 marks)

1. State at least five names of piezoelectric materials and explain the source of its piezoelectricity?

2. A train emits a 250-Hz signal while traveling at the rate of 85m/sec. What are the apparent frequencies in approaching the observer and retreating from the observer at the railroad crossing?

3. What is Rayleigh scattering and the relations between the scatterer size and wavelength of incident waves?

4. Explain, what is meant by A-scan and its advantage?

Fourth question (25 marks)

a- What is the Fourier theory, discuss its role in signal and imaging analysis?

b- Write notes on using ultrasound for increased drug uptake and cell death?

c- What does mean by standing wave and its equation?

d- Why is it extremely difficult to use simple analytical expressions to describe ultrasound scattering in the human body?

e- Covering patient skin's with gel material during using ultrasound transducer?

Good luck…………………….Dr. Reda Morsy

Tanta University- Faculty of Science-Department of Physics
Examination for Senior (Second level) Students of Biophysics

Course title	Bioelectrical phenomena		course code:BP2112
Date: **/1/2014	term: 1st	Total assessment marks:	Time allowed: 2hours

(Answer the following question)

First question (25 marks)
a- Complete the following   (10 marks)
1- Unit of electrical conductivity is ………….. while unit of conductance is…………..
2- Kirchhoff's law of current states that ……….
3- The problems caused by bioelectrical electrodes are ……. and……
4- The capacitance of cell membrane is measured by unit of ………
5- Mathematical formula of Goldman's potential equation is………………
6- The action potential velocity through a nerve is direct proportional to ………
7- At electrode electrolyte interface, a double electric layer called ………. is formed
8- Current density = volume charge density × electron charge × ……………
b- draw a diagram showing action potential of nerve, sodium and potassium conductance. Explain biophysically the behavior of these curves?   **(10marks)**
c. Describe how to manufacture Ag/AgCl electrode and what is its important? **(5 marks)**

Second question   (25 marks)
a. Explain with drawing voltage clamp experiment used by Hodgkin to study sodium and potassium conductance? **(13 marks)**
b. Explain in detail Hodgkin-Huxley model of the action potential and their expressions to model sodium conductance? **(12 marks)**

Third question (25 marks)
a- Draw and discuss in details Einthoven's triangle for three lead ECG electrodes? **(5marks)**
b. Compare in brief between the following: (20 marks)
1. Three types of theories used to explain relief of pain?
2. Physical and electric properties of A-type and C-type nerve fibers
3. Glass microelectrode and silver - silver chloride electrode
4. Application of electroencephalogram and electromyogram
5. Single and two electrode voltage clamp

Fourth question (25 marks)
a. draw and describe electric equivalent circuit of biopotential electrode? **(5marks)**
b. Give reasons for the following: (10 marks)
1. Using Hodgkin and Huxley an unmyelinated squid giant axon in their studies to investigate the action potential?
2. Using biopotential amplifiers with high input impedance?
3- Resting potential has a negative value
4- using inert materials to design wire bioelectrodes
Write brief notes on the following: (10 marks)
1. Electrode offset   2. electroporation   3. Electrotherapy for wound healing   4. Autonomic nervous system

Good luck…………………….Dr. Reda Morsy
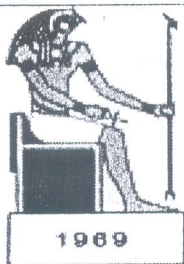
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Examination for Biophysics and Physics Students	

COURSE TITLE:	Acoustics	COURSE CODE:	PH 2141
January 9th, 2014	TERM: FIRST	TOTAL ASSESSMENT MARKS:100	TIME ALLOWED: 2 HOURS

QUESTION	ANSWER THE FOLLOWING QUESTIONS:	Marks
1.	a- Attenuation process of ultrasonic takes place in solids, Write about attenuation process and explain the main sources of losses and absorption processes. b- Discuss the different types of the mechanical waves, and explain the parameters that control the speed of sound in different media for each type.	25

2.	a- Explain in details the following phenomena:
	
	   1- Piezoelectric effect,
	
	   2- Doppler effect.
	
	b- Discuss in details the different types of transducers.
		25

3.	a- A submarine (sub A) travels through water at a speed of 8.00 m/s, emitting a sonar wave at a frequency of 1 400 Hz. The speed of sound in the water is 1 533 m/s. A second submarine (sub B) is located such that both submarines are traveling directly toward one another. The second submarine is moving at 9.00 m/s. 1- What frequency is detected by an observer riding on sub B as the subs approach each other? 2- The subs barely miss each other and pass. What frequency is detected by an observer riding on sub B as the subs recede from each other? b- Medical imaging using the ultrasound is very important application in medicine; explain in details one mode of medical imaging.	25
4.	a- A standing wave is generated if two waves superposed upon another of the same frequency traveling in different directions, Explain and derive the conditions for nodes and antinodes creation. b- Scattering process of ultrasonic is of great important, explain why and define the different scattering regions and scattering parameters.	25
EXAMINER	Dr. Hassan El Gohary	

Solve the Following Questions:

First Question:

(a) IF

$$A = 2xz \qquad\qquad \overline{F} = yz\hat{i} + xy\hat{j}$$

Find: (a) $Curl(A\overline{F})$ (b) $grad\ div\ \overline{F}$ (c) $\nabla^2\overline{F}$

(b) Two charges in space, $q_1 = 4\,mc$ at coordinates (2, 3,4) cm and $q_2 = -2\,\mu c$ at the origin.

     Find: (i) The force vector between the two charges.

            (ii) The net potential at the point (1,1,4) cm.

Second Question:

(a) Find the flux of the electric field

$$\overline{E} = -\hat{i} + 2\hat{j} - 2\hat{k} \qquad N/C$$

     through a rectangle of dimensions 4 cm and 2 cm in the YZ plane.

(b) Find the electric field at a point P at a distance Z from a disc, of radius R and of surface charge density σ, along its central axis.

Third Question:

(a) Two points of coordinates $P_1(5\,cm, 30^o, 3\,cm)$ and $P_2(10\,cm, 45^o, 60^o)$. Find the value of the position vectors corresponding to both points in Cartesian coordinates.

(b) A sphere of radius R made from insulated material and contains a positive charge of volume density ρ distributed uniformally. Using Gauss's theorem to find the electric field at any point : (a) inside the sphere, (b) outside the sphere, (c) directly on the surface of the sphere. Draw a diagram shows the changes in the electric field in three states.

Fourth Question:

(a) Deduce the relation between the Cartesian coordinates and both the cylindrical and spherical coordinates in space.

(b) A vector Ā of value equal 2 units and make an angle of 30⁰ with the positive direction of the X-axis, and another one Ḇ of value equal 6 units in the positive direction of the Y- direction. Find:

$$\left|\overline{A}\wedge\overline{B}\right| \qquad and \qquad \overline{A}.\overline{B}$$

(c) The distance between two point charges q and -3q, is 1m. Find the point (or points) at which the potential is zero.

With my best wishes.

TANTA UNIVERSITY
FACULTY OF SCIENCE
DEPARTMENT OF PHYSICS

BIOPHYSICS,   LEVEL 2, EXAMINER DR. AYMAN ELTAHAN

COURSE TITLE:	Classical Mechanics		COURSE CODE: MS 2125
DATE:23 JAN, 2014	TERM: FIRST	TOTAL ASSESSMENT MARKS: 100	TIME ALLOWED: 2 HOURS

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Final exam

Answer the fowling questions:

First question:

1- A man weights a fish with a spring scale attached to the ceiling of an elevator, while the elevator is at rest, he measures a weight of 80.0 N.
   (a) What weight does the scale read if the elevator accelerates upward at 4.00 m/s^2?
   (b) What does the scale read if the elevator accelerates downward at 4.00 m/s^2?
   (c) If the elevator cable breaks, what does the scale read?

3- Write short notes about:
   a) The collision in two dimensions.
   b) Gravitational Work and Potential Energy

Second question:

1- An object of mass 50 kg is at rest . A net force of 20 N is applied for 10 s. what is the final velocity? How far will the object have moved in the 20 s interval?

2- Find the torque, work and power as a regards of the Newton's second law?

3- Compare among Position, velocity, acceleration and motion laws in case of linear and   angular motion?

Third question:

1- A solid cylindrical disc of mass M =1.4 Kg and whose radius is R= 8.5 cm, rolls across a horizontal table at a speed v of 15 cm/s, find
(a) What is the instantaneous velocity of the top of this disk?
(b) The angular speed of the rolling disk.

2-   Find the relation between angular and linear acceleration?

3-   Correct the wrong if found;

   a) A thin uniform, circular ring is rolling down an inclined plane of inclination 30° without slipping. Its linear acceleration along the inclined plane will be " 2g".

b) In rotational motion, the work done by the external force equal the change in the object's position.

c) The frictional force has the same direction of object motion.

d) Whenever a net force acts on a body it produces acceleration in the direction of the force.

e) When a zero net torque τ acts on an object, the object gains angular acceleration.

Fourth question:

1- Prove the work kinetic energy theorem for rotational motion

2- What is the type of physical quantities?

3- Complete the sentences:

a) In -------- collision, momentum is conserved, kinetic energy is not, and the two objects stick together after the collision.

b) Right Now you are at rest on a chair. Ignoring the rotation and orbit of the earth, your acceleration is --------------.

c) The masses of two planets are in the ratio 1: 2. Their radii are in the ratio 1: 2. The acceleration due to gravity on the planets is in the ratio of -----------.

d) The value of μ_s (coefficient of static friction) depends upon the two materials in contact, and it is independent of --------.

e) The magnitude of the linear velocity v of a point on the rolling object depends on --------.

Best wishes

Solve the Following Questions:

First Question:

(a) Find the differential equation of the equation

$$y = a \ln bx$$

where a & b are arbitrary constants.

(b) According to Newton's law of cooling, which states that "The rate of heat loss of a body is proportional to the difference in temperatures between the body and its surroundings". If the temperatures of the surroundings is 30° and the temperature of the body decrease from 100° to 70° in 15 minutes. After what time the body temperature would be 40°.

Second Question:

(a) Make sure that the next differential equation is homogeneous, then find its general solution

$$(2x + 3y)dx + (y - x)dy = 0$$

(b) Find the inverse of the matrix

$$A = \begin{pmatrix} 1 & 3 & 3 \\ 1 & 4 & 3 \\ 1 & 3 & 4 \end{pmatrix}$$

Third Question:

(a) Solve the exact differential equation

$$[\cos x - x \cos y]dy = (\sin y + y \sin x)dx$$

(b) Find the values of x which satisfies the equation:

$$\begin{vmatrix} x^2 & x & 1 \\ 4 & 2 & 1 \\ 9 & -3 & 1 \end{vmatrix} = 0$$

Fourth Question:

(a) Find the solution of the differential equation

$$x\frac{dy}{dx} + y = xy^3$$

(b) By variable separation, solve the following differential equation

$$\cos x \cos y\, dx + \sin x \sin y\, dy = 0$$

(c) If the matrisies

$$A = \begin{bmatrix} -1 & 3 & 1 \\ -2 & 2 & 4 \end{bmatrix} \quad , \quad B = \begin{bmatrix} 2 & -1 \\ 3 & 4 \end{bmatrix} \quad , \quad C = \begin{bmatrix} 2 \\ -3 \end{bmatrix}$$

$$AA^T, BC, B^T C \text{ Find}$$

With my best wishes,