TANTA UNIVERSITY
FACULTY OF SCIENCE
DEPARTMENT OF PHYSICS

EXAMINATION FOR SOPHOMORES (2ND LEVEL) STUDENTS OF BIOCHEMISTRY & CHEMISTRY/ BIOCHEMISTRY

COURSE TITLE:		BIOPHYSICS		COURSE CODE:PH2292
DATE:	19-5-2018	TERM: SECOND	TOTAL ASSESSMENT MARKS: 50	TIME ALLOWED: 2 HOURS

ANSWER THE FOLLWING QUSTIONS:

1- Write on: (12 mark)

    a) Radiations effects on living tissues, and

    b) GM counters applications in medicine.

2- Explain: (12 mark)

    a) Transitions of molecules in a nerve system,

    b) Bioelectrical forces and an application.

3- Discuss: (12 mark)

    a) An application of ultra=sound forces,

    c) The effect of magnetic fields on blood cells,

                                                           (14 mark)
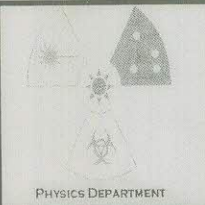
4- Write on:-

  (a) The applications of nuclear radiation in medicine.

  b) The VISION theory.

<div align="center">والله ولى التوفيق</div>

EXAMINERS:	Prof.Dr. G. FARAG	&	Prof. Dr. A. TAWFEK

TANTA UNIVERSITY
FACULTY OF SCIENCE
DEPARTMENT OF PHYSICS

FINAL EXAM. FOR MATERIALSCIENCE(LEVELTWO)

COURSE TITLE:	Mechanical Properties	COURSE CODE: MS2232

PHYSICS DEPARTMENT

DATE: 9/06/2018	SEMESTER:FIRST	TOTAL ASSESSMENT MARKS: 100	TIME: 2 HOURS

1969

Answer the following questions:

Question [1]:   [25Mark]

Write short notes about the following :

(**a**)-Energy of A Hooke's Law System, (**b**)-Resilience ,(**c**)-Tensile Strength,
(**d**)-Toughness.

....

Question [2]:   [25Mark]

i-Explan the followhng: [15Mark]

Twinning dislocation , Plastic Deformations in Polycrystalline Metals and
Strain hardening.

(ii)-Define: Ultimate tensile strength ,The yield strength, Homogeneous
Strain, Biaxial stress and Schmid's Law.   [10Marks]

....

Question [3]:   [25Mark]

(a)-Mention: Strain energy per unit volume- Relation between true stress
and true strain, The critical resolved shear stress, Hall- Petch equation and
Percent reduction in area.   [15Mark]

(b)-Deduce Strain Energy in Dislocations.   [10Marks]

....

Question [4]:   [25Mark]

1-A 8.00-cm cube of gelatin has its upper surface displaced 2.00 cm by a
tangential force0.600 N. What is shear modulus of this substance?

2-Find the pressure necessary to change a volume of water by 2.0 percent.
Express the pressure in terms of atmospheric pressure units 1 bar= 10^5 N/m^2.
B= 3.2×10^9 N/m^2.

3-A steel bar 8.00 m long and with rectangular cross section of 5.00 cm x
2.50 cm supports a mass of 3000 kg. How much is the bar stretched? Where
Y for steel is 20.0×10^{10} N/m^2.

===

Examiner	Dr. Samy El-Attar.

- **Answer the following questions:**

1. a. Define the following physical terms using units whenever possible:

   "Energy", "work done", "electrical energy", "mechanical energy", "power", "efficiency", "perfect black body", "Uranium critical mass", "electric current", and "binding energy of the nucleus" .   [20 Marks]

   b. Discuss the energy changes in the movement of the simple pendulum.   [5 Marks]

2. a. Compare between the two laws of thermodynamics.
                                                               [10 Marks]

   b. Discuss the characteristics of electrical energy.
                                                               [10 Marks]

   c. Prove that J = C V   [5 Marks]

3. a. Discuss the disadvantages of conventional energy resources.
                                                               [5 Marks]

   b. Explain the relation between the nuclear forces and the binding energy of the nucleus.   ·   [10 Marks]

   c. Compare between the fission and fusion nuclear reactions. Give equations and comment on the resulting energy in both cases.   [10 Marks]

4. a. Draw a schematic diagram to describe the conversion of solar energy to thermal energy.   [10 Marks]

   b. Discuss two schematic diagrams to describe how to utilize wind energy and biomass.   [10 Marks]

   c. Discuss the necessity of "Energy Conservation" in order to develop our country.   [5 Marks]

Answer the following questions:

First question:- (25 Marks)

(i) By observe that y = x is a solution, solve the following

$$y'' - [(x + 2)/x]y' + [(x + 2)/x^2]\, y = x\, e^{x}$$

(ii) Solve $\quad y'' - y = e^{2x}$

Second question:- (25 Marks)

Solve   (i) $y'' + 3y' + 2y = e^{x} - 3$

(ii) $\Gamma(1/4)\,\Gamma(3/4) = ??$

(iii) $\beta(x,y)$ at x=5, y=6

Third question: - (25 Marks)

Prove that, $\qquad\qquad \Gamma(x+1) = x\,\Gamma(x)$

Find, $\displaystyle\int_0^1 x^7(1-x)^8\, dx$, $\displaystyle 2\int_0^{\pi/2} \sin^7(x)\cos^8(x)\, dx$

Fourth question:- (25 marks)

(i) Write about Angular momentum operators

(ii) find, $\quad x^2 T'' + x T' + (x^2 - 1/9)T = 0$

EXAMINERS	DR. Atef Elbendary
	أطيب التمنيات بالتوفيق

First Question: (30MARKS)

I) From the principal of conservation of charge deduce the integral form and the differential form of continuity equation.

II) Use the definition of electric dipole moment; deduce the relation between the flux density, field intensity and polarization inside dielectric material.

III) A solid conductor has a net charge density ρ_o at t=0.0, use Ohm's law and continuity equation to find the net charge density ρ_v after time (t).

Second Question: (20MARKS)

I) Find the total current outward directed from a 1 meter cube with one corner at the origin and edges parallel to the coordinate axes if $J = 2x^2 a_x + 2xy^3 a_y + 2xy a_z$ (A/m^2).

II) Conducting cylinders at $\rho = 2\ cm$ and $\rho = 8\ cm$ in free space are held potentials of $60\ mV$ and $-30\ mV$ respectively.

   a) Find $V(\rho)$ b) Find $E_\rho(\rho)$ c) Find the surface on which $V = 30mV$.

Third Question: (30MARKS)

I) Evaluate the closed line integral of H about the rectangular path $P_1(2,3,4)$ to $P_2(4,3,4)$ to $P_3(4,3,1)$ to $P_4(2,3,1)$ to P_1, given $H = 3z ax - 2x^3 az$ A/m.

II) Determine $(\nabla \times H)_y$ at the center of the area.

III) Evaluate both sides of Stocks' theorem.

Fourth Question: (20MARKS)

A solid conductor of circular cross section is made of a homogenous nonmagnetic material. If the radius $a = 1mm$, the conductor axis lies on the z axis; and the total current in the az direction is $20A$, find

(a) H_φ at $\rho = 0.5mm$;

(b) B_φ at $\rho = 1.2\ mm$;

(c) The total magnetic flux per unit length inside the conductor;

(d) The total magnetic flux outside the conductor.

EXAMINER	DR. REDA EL-SHATER

☺ BEST WISHES ☺

	Tanta University
	Faculty of Science
	Physics Department
	Examination of Level 2
	Physics and Biophysics Programs
Course Title Analytical mechanics	Course Code: PH2242
Date 16-5-2018	Second semester

Question 1 (10 points):

Rewrite theses sentences. Then complete them: -

a) A particle moving in a central field its ………………….. and …………………. remain constant.

b) A particle under the effect of attractive force varies inversely as the square of the radial distance , if its kinetic energy T < the magnitude of its potential V the orbit is ……………….. and if T = V the orbit is ……….. .

c) The number of generalized coordinates for the general motion of a rigid body in space equals …………… and if the body is constrained by keeping one point fixed, the number of coordinates is ……………….. .

d) The moment of the momentum of a system of particles is equal to the total ……………………and the moment of force of a system of particles is equal to the total ……………………….

e) Hamilton's equations of motion consist of ………………………………. , whereas Lagrange's equations consist of ……………………………………. .

Question 2(30 points):

a) Prove that the total linear momentum of a system of particles about the center of mass is zero .

b) A system consists of three particles $m_1=2$,$m_2=3$,$m_3=4$ with position and velocities victories as follows:
$r_1= 2i +4j$, $r_2 =2j +k$, $r_3 = 5i$, $v_1 =2i$, $v_2 =2j$, $v_3 =I +j+ k$,Find the angular momentum of the system about the origin .

Question 3 (30 points)

a) A particle moving in a central field describing a spiral orbit $r = r_o e^{k\theta}$ .Show that the force law is inverse cube and that θ varies logarithmically with time.

b) Prove that for a particle under the effect of a central force, the radius vector sweeps out equal areas in equal times .

Question 4 (30points)

a) Set up the Lagrangian , the Hamiltonian, Lagrange's and Hamilton's equations of motion for the simple Atwood's Machine consists of two weights of mass m_1 and m_2 , connected by a light inextensible cord of length l which passes over a fixed frictionless non- rotating pully (neglect the mass of the pully)

b) If the Hamiltonian H is independent of time explicitly , prove that it is (a) a constant and is (b) equal to the total energy of the system .

with my best wishes   Prf. Salwa Saad Mohamed

ANSWER THE FOLLWING QUSTIONS:

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   b) GM counters applications in medicine.

2- Explain: (12 mark)

   a) Transitions of molecules in a nerve system,

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EXAMINERS: Prof.Dr. G. FARAG   &   Prof. Dr. A. TAWFEK

TANTA UNIVERSITY
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DEPARTMENT OF PHYSICS

SECOND YEAR (PHYSICS & MATERIAL SCIENCE)

	COURSE TITLE:	تيار متردد	COURSE CODE: PH2282 MS2242
1969			

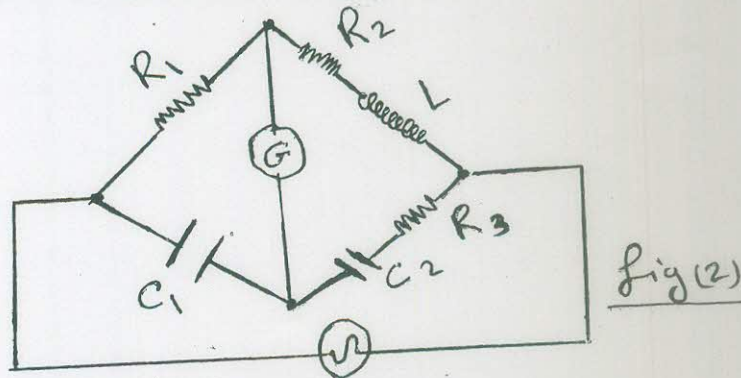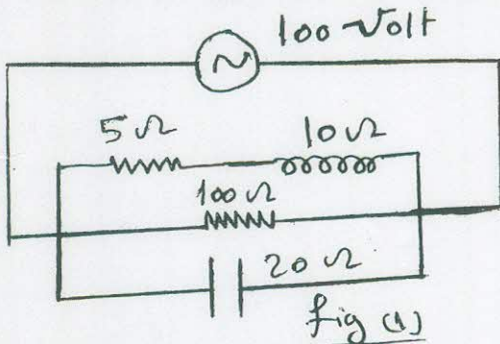| DATE:	6-6- 2018	TERM: SECOND	TOTAL ASSESSMENT MARKS:100	TIME ALLOWED: 2 HOURS

Please Answer the Following:

Question (1): (25 Marks)

(a) Define the effective current and derive its formula for a sinusoidal A.C. current.

(b) Plot a schematic of the oscilloscope and explain the factors affect the electrostatic deflection of the cathode ray tube.

(c) Calculate using the mathematical method the total impedance and the phase angle of R & C in series.
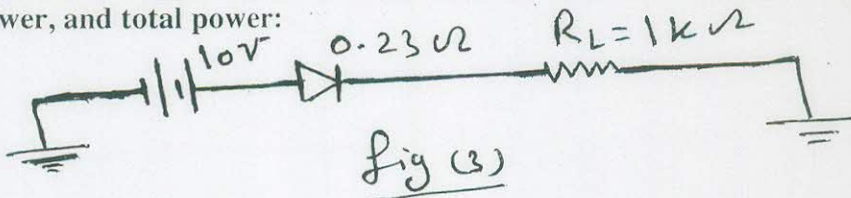
Question (2): (25 Marks)

(a) Calculate the current across and the impedance of the giving circuit in fig (1).

(b) Find the equilibrium conditions of the given Bridge as shown in fig (2).

fig (1)

fig (2)

Question (3): (25 Marks)

(a) Using the diode approximations, calculate the load current, load voltage, load power, diode power, and total power:

fig (3)

(b) Resonance ac circuit consists of a coil, a capacitor, and a resistance in series. The self-inductance of the coil is $100 \ \mu H$. The capacitance of the capacitor is $0.0001 \ \mu F$ and the resistance is 10 Ohm. If the applied voltage across the circuit is 0.1 volt, calculate the resonance frequency and the voltage across the coil and the capacitance.

Question (4): (25 Marks)

Write short notes on:

(a) Extrinsic and intrinsic semiconductors.

(b) Characteristic curve of a diode.

(c) Energy bands.

☺ ☺ Best Wishes ☺ ☺ Dr. Mohammed Shihab

- **Answer the following questions:**

1. a. Define the following physical terms using units whenever possible:

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DEPARTMENT OF PHYSICS

COURSE TITLE : Physical optics   TIME ALLOWD: 2 HOURS   pH 2222

DATE 26/5/ 2018   TERM: second   TOTAL ASSESSMENT MARKS : 100

Please Answer THE Following Questions:

1- a) Find the superposition of two wave train of same frequency and amplitude
 travelling in the same direction
b) Abiprism is placed at a distance of 5 cm in the front of a narrow slit
illuminated by sodium light $\lambda = 5890$ A and the distance between The virtual
sources is found to be 0.05 cm . Find The width of the fringes observed in
an eyepiece placed at adistance of 75 cm from the biprism

2 - a) Describe Young s experiement and calculate The distance between two
successive bright fringes
   b) Light is incident normally on a grating 0.5 cm wide with 2500 lines .
Find The angle of diffraction for the principle maximum of the two
sodium lines in the first order spectrum $\lambda_1 = 5890$ A , $\lambda_2 = 5896$ A
Are The two line resolved?

3- Disuss in detialis The fraunhofer diffraction produced by narrow slit
illuminated by monochromatic light . obtain The positions of the Maxima and
minima , and draw a digram for indicate the distribution of intensity of
light in the diffraction patteren

4- What are The common Methods used in producing polarization explain
two of Them

Answer the following questions:

First question:- (25 Marks)

(i) By observe that y = x is a solution, solve the following

$$y'' - [(x + 2)/x]y' + [(x + 2)/x^2]\, y = x\, e^{x}$$

(ii) Solve $\quad y'' - y = e^{2x}$

Second question:- (25 Marks)

Solve (i) $y'' + 3y' + 2y = e^{x} - 3$

(ii) $\Gamma(1/4)\, \Gamma(3/4) = ??$

(iii) $\beta(x,y)$ at x=5, y=6

Third question: - (25 Marks)

Prove that, $\qquad\qquad \Gamma(x+1) = x\, \Gamma(x)$

Find, $\quad \displaystyle\int_0^1 x^7(1-x)^8\, dx \quad , \quad 2\int_0^{\pi/2} \sin^7(x)\cos^8(x)\, dx$

Fourth question:- (25 marks)

(i) Write about Angular momentum operators

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| EXAMINERS | DR. Atef Elbendary |
| | أطيب التمنيات بالتوفيق |

First Question: (30MARKS)

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    a) Find $V(\rho)$ b) Find $E_\rho(\rho)$ c) Find the surface on which $V = 30mV$.

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II) Determine $(\nabla \times H)_y$ at the center of the area.

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(a) H_φ at $\rho = 0.5mm$;

(b) B_φ at $\rho = 1.2\ mm$;

(c) The total magnetic flux per unit length inside the conductor;

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EXAMINER	DR. REDA EL-SHATER

☺ BEST WISHES ☺

كتلة الالكترون 9.1×10^{-31} Kg ثابت بلانك $= 6.62 \times 10^{-34}$ شحنة الالكترون $= 1.6 \times 10^{-19}$ كولوم

ثابت كولوم $K = 9 \times 10^9$

First question

اختار الإجابة المناسبة من الإجابات الموجودة بعد كل عبارة من العبارات التالية :

١ - يتحرك جسم بسرعة $0.8\ c$ بالاتجاه الموجب لمحور السينات و يتحرك جسم اخر بسرعة $0.7\ c$ بنفس الاتجاه فان سرعة الجسم الاول بالنسبة للجسم الثاني

أ– $0.96c$ ب- $0.59c$ ج– $0.79c$ د – $0.23c$

٢- اذا كانت دالة الشغل للنحاس هي $4.77ev$ فان تردد الاشعة التي تسقط على النحاس لكي تطلق الكترونات ذات طاقة عظمى $E_{max} = 10ev$ هي

أ – $3.55 \times 10^{15}Hz$ ب – $3.55 \times 10^{11}Hz$ ج - $5.35 \times 10^{13}Hz$ د – $5.35 \times 10^{10}Hz$

٣ - اصطدم فوتون طول موجته قبل التصادم $\lambda = 0.7$ A بإلكترون ساكن وطول موجته بعد التصادم $\lambda^{\prime} = 0.724$ فان طاقة حركة الالكترون هي

أ - $825ev$ ب – $288ev$ ج – $588ev$ د – $385ev$

٤- إذا كان الطول ألموجي الأعظم لأشعة الشمس $\lambda = 4900A_{max}$ فان درجة حرارة الشمس هي (ثابت فين $b = 2.9 \times 10^{-3}$)

أ – 5918 k   ب – 9517 k   ج – 1859 k   د – 8591 k

٥- اذا كانت طاقة الاشعة السينية هي $E = 40.13kev$ فان اقل طول موجي λ_{min} للطيف المستمر للأشعة السينية هو

أ – $0.7A$ ب - $0.5A$ ج - $0.3A$ د - $0.9A$

٦ - سافر رائد فضاء بسرعة $v = 0.99c$ نحو احد النجوم البعيدة وكان عمره ٢٠ سنة ثم عاد للأرض بعد أن أمضى حسب تقويمه الشخصي ٥ سنوات فان زمن رحلته بالنسبة لمراقب من على الأرض بالسنوات

أ - 23.2 ب- 35.1 ج – 25.4 د - 13.6

٧ - سلك معدني مثبت في طائرة طوله ٥٠ مترا وسرعة الطائرة ١٠٠٠ كم / ساعة فان التغير في طول السلك بالنسبة لمراقب موجود على ارض المطار هو

أ– $0.251A$ ب– $0.521A$ ج - $0.251A$-   د- $0.521A$-

٨- الزيادة في الطاقة الاشعاعية لجسم اسود اذا تضاعفت درجة حرارته T هي

أ – $17\sigma T^4$ ب - $4\sigma T^4$ ج - $15\sigma T^4$ د - $11\sigma T^4$

حيث σ هو ثابت ستيفان للاشعاع

٩-عند سقوط اشعة ترددها 1.5×10^{15} Hz على النحاس فان جهد الايقاف للالكترونات الضوئية الصادرة من النحاس هو (تردد عتبة النحاس هو 1.13×10^{15}Hz و ثابت بلانك = 6.52×10^{-34})

أ – 1.53 ev   ب– 5.31 ev   ج – 3.15 ev   د– 0.53ev

انظر الخلف

second question

١ـ اثبت ان طول المادة يتقلص عند التحرك بسرعة v

٢ـ اثبت أن $\varphi_0 = h\vartheta_0$ حيث ϑ_0 تردد العتبة للإصدار الكهروضوئي و φ_0 دالة الشغل .

٣ـ تنتج الميزونات الغير مستقرة في طبقات الجو العليا على بعد ١٠ كم نتيجة تصادم الاشعة الكونية مع الغلاف الجوي وسرعتها $0.998c$ وفترة حياتها هي 2.2×10^{-6} ثانية . باستخدام الميكانيكا الكلاسيكية والنسبية احسب المسافة التي تقطعها الميزونات قبل ان تتفكك .

٤ـ برهن ان طاقة الحركة النسبية تؤول الى طاقة الحركة الكلاسيكية عند v » c

Third question

١ـ برهن ان سرعة الجسم تكتب على الصورة

$$v = c \left[\sqrt{1 - \left(\frac{E_0}{E}\right)^2} \right]$$

حيث E الطاقة الكلية E_0 الطاقة السكونية للجسم .

٢ـ حصل كومبتون على المعادلة التالية من قوانين حفظ الطاقة وكمية التحرك لتفسير تفاعل الفوتون مع الالكترون $h\vartheta\vartheta'(1-cos\varphi) = (\vartheta - \vartheta')m_0 c^2$ عين التغير في الطول الموجي بدلالة زاوية الاستطارة φ .

٣ـ ماهي العوامل التي يتوقف عليها معامل الامتصاص الفوتونات في المادة .

The fourth question

١ـ كيف اثبت دافيسون وجيرمر عمليا وجود الخاصية الموجية للالكترونات

٢ـ عند حدوث حيود من الرتبة الاولى للالكترونات طاقة حركتها 54ev من بلورة النيكل ذات المسافات البينية بين مستوياتها البلورية $d = 2.15$ A عند زاوية حيود $\theta = 50^0$ احسب الطول الموجي المصاحب باستخدام الخاصية الموجية والخاصية الجسيمية للإلكترون .

٣ـ اثبت انه عند فناء الالكترون بوزيترون ينتج زوج من الفوتونات لهما نفس الطاقة .