



**TANTA UNIVERSITY
FACULTY OF SCIENCE
DEPARTMENT OF PHYSICS**

EXAMINATION FOR THIRD YEAR STUDENTS OF PHYSICS AND BIOPHYSICS (SEMESTER 1)

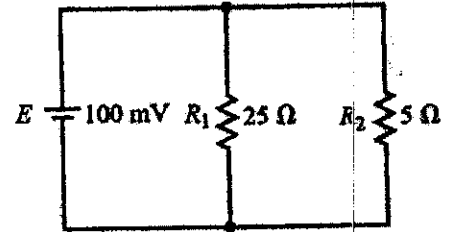
DATE: 02	JANUARY, 2018	TERM: FIRST	TOTAL ASSESSMENT MARKS: 100	COURSE CODE: PH3151 FINAL EXAM
COURSE TITLE:		ELECTRICAL CIRCUITS دوائر كهربائية		

Please Note that the questions are in two separate pages

Answer The Following:

First question (25 points):

1-(10 points) Verify the conservation of energy principle in the following circuit.



2-(10 points) Correct the following sentences:

- 1-Kirchhoff's current law states that the summation of voltage rises and drops around a closed loop equals zero.
- 2-Linear networks are any networks that operate in the same manner regardless the direction of the current in the network.
- 3-When applying the superposition theory to power, the summation of the power dissipated in a resistance is the summation of the power dissipated in this resistance due to each separate source.
- 4-The first step, when applying Nodal analysis technique, is to convert each current source into equivalent voltage source.
- 5- The time it takes transient voltages and currents to reach 99.3% of its final value is the time constant.

3-(5 points) Using Kirchhoff's Law Find the equivalent capacitance to three capacitors connected in parallel and repeat the derivation when they are connected in series.

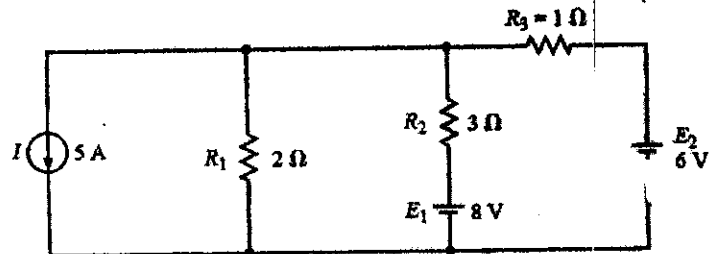
Second question (25 points):

1-(10 points) Using Branch Current analysis technique find the current in each branch.

2-(10 points) Define the following

- 1- Norton theorem
- 2- Chassis ground
- 3- Duty Cycle
- 4- Stray capacitance
- 5- Phase difference

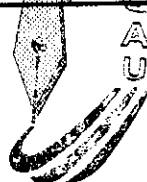
3-(5 points) Using timing diagram show the difference between rise time-pulse width and fall time.



Third Question (25 points):

1-(10 points) Using timing diagrams show the effect of the pulse width on the pulse response of the RC circuits.

Please Turn Over the page for the rest of the questions.



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TANTA UNIVERSITY
FACULTY OF SCIENCE
DEPARTMENT OF PHYSICS

COURSE TITILE: Quantum Mechanics 1 **COURSE CODE** PH 3131
DATE: 2017 **TERM:**FIRST **TOTAL ASSESSMENT MARKS:** 100 **TIME ALLOWED:**2 HOURS

Answer the following Questions:

1 – For a harmonic oscillator in the superposition state

$$\Psi(x,t) = \frac{1}{\sqrt{2}} [\Psi_0(x,t) + \Psi_1(x,t)]$$

Calculate the expectation value of momentum . (20 marks)

2- A particle of mass m moves in a three dimensional box, its lengths are a, b and C. The Potential energy inside the box is zero while outside is infinity. Derive the eigen wave functions and the eigen values of energy.

(25 marks)

3 – a- What is the expectation value of Parity for a particle in a one dimensional box with walls at $(-\frac{L}{2}, \frac{L}{2})$ in the initial state

$$\Psi(x,0) = \frac{1}{\sqrt{29}} [3\tilde{\varphi}_2 + 4\tilde{\varphi}_4 + 2\varphi_3]$$

Where $\tilde{\varphi}_n = \sqrt{\frac{2}{L}} \sin\left(\frac{n\pi x}{L}\right)$, $n = 2, 4, \dots$

$\varphi_n = \sqrt{\frac{2}{L}} \cos\left(\frac{n\pi x}{L}\right)$, $n = 1, 3, \dots$

(10 marks)

b – Derive a law covers the time development of the expectation value .

(10 marks)

c – What is the ad joint operator of the operator

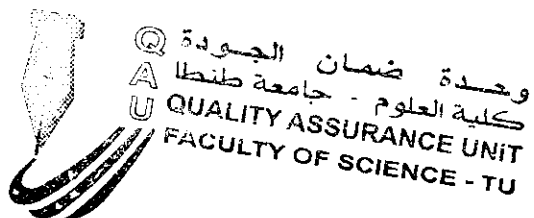
$$\frac{d}{dx} \quad ?$$

(10marks)


4 - Calculate the transmission coefficient for the case of incident particles incident on a potential rectangular barrier V_0 .

The energy of the particles less than V_0 . (25 marks)

Examiner : Prof . Dr. Nabil El-siragy



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 1969	TANTA UNIVERSITY FACULTY OF SCIENCE DEPARTMENT OF PHYSICS		
	THIRD YEAR (PHYSICS+BIOPHYSICS)		
COURSE TITLE:	Electrodynamics 1		COURSE CODE: 3171
DATE: 31-12-2017	TERM: FIRST	TOTAL ASSESSMENT MARKS: 100	TIME ALLOWED: 2 HOUR

Please Answer the Following:

- Question (1): (a) Put true or false and comment on your answer:**
- 1- A perfect conductor can have electrostatic charges inside it.
 - 2- The dielectric material is always dielectric whatever the applied external electric field.
 - 3- Isotropic conductor has a conductivity which varies with direction.
 - 4- The dielectric tensor is used to describe anisotropic dielectrics.
 - 5- The application of external electric field to the dielectric material causes the flux density to be greater that it would be in free space. (10 Marks)

(b) A dielectric cube of side L and center at the origin has a radial polarization given by $P = 100 r$, where $r = 3 x^2 a_x + 10 y a_y + 2 z a_z$. Find all bound charge densities and show explicitly that the total bound charge vanishes. (15 Marks)

Question (2): (a)- Calculate the Jacobian matrix $\frac{dx dy dz}{d\rho d\varphi dz}$ to transform from cylindrical coordinate to Cartesian coordinate. Prove that the determinant of the matrix equals 1. (10 Marks)

(b)- Given the vector field

$$D = r \sin \varphi a_r - \frac{1}{r} \sin \vartheta \cos \varphi a_\vartheta + r^2 a_\varphi$$

Determine (I) D at P(10, 50 degree, 30 degree). (II) The component of D tangential to the spherical surface r=5 at P. (15 Marks)

Question (3): (a) Discuss the uniqueness theorem of Laplace's and Poisson's equations. (10 Marks)


(b) Semi-infinite conducting planes at $\varphi = 0$ and $\varphi = \pi/3$ are separated by an infinitesimal insulating gap. If the $V(\varphi = 0) = 0$ and $V(\varphi = \pi/3) = 150$ V, calculate the potential and the electric field in the region between the planes.

(Hint: $\frac{1}{\rho} \frac{\partial}{\partial \rho} \rho \frac{\partial V}{\partial \rho} + \frac{1}{\rho^2} \frac{\partial}{\partial \varphi} \frac{\partial}{\partial \varphi} V + \frac{\partial}{\partial z} \frac{\partial}{\partial z} V = 0$) (15 Marks)

Question (4) (a) Discuss the general solution of Laplace's equation in 2D. (10 Marks)

(b) Two extensive homogeneous isotropic dielectrics meet on plane $z = 0$. For $z > 0$, $\epsilon_{r1} = 4$ and for $z < 0$, $\epsilon_{r2} = 3$. A uniform electric field $E_1 = 5 a_x + 2 a_y + 3 a_z$ kV/m exists for $z \geq 0$. Find the electric field E_2 and electric flux D_2 for $z \leq 0$. (15 Marks)

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	TANTA UNIVERSITY- Faculty of Science -Department of Physics			
	COURSE TITLE:	Energy Physics Exam		COURSECODE: PH3132
DATE:	4 JAN 2018	TERM: FIRST	TOTAL ASSESSMENT MARKS: 100	TIME ALLOWED: 2 HOURS


Answer the following questions:

- 1.a. Discuss The Two Laws of Thermodynamics (10 Marks)
- b. Compare between the energy released by fission and fusion nuclear reactions .
Give equations , and discuss the advantages of both types . (15 Marks)
- 2.a. Compare between the sensible and latent heat storage systems (10 Marks)
- b. Discuss the " Global warming " and the green house gases . (10 Marks)
- c. Discuss the energy conservation issues . (5 Marks)
- 3.a. Explain the " Energy Balance Equation " (10 Marks)
- b. Draw schematic diagrams to describe the " Flat – plate solar collector " and the " Focusing type solar collector " (10 Marks)
- c. Draw the wind mill and discuss its function . (5 Marks)
- 4.a. Define the following using units : Energy , Mechanical energy , work done , Black body and Efficiency . (10 Marks)
- b. Explain the relation between the nuclear forces and the binding energy of the nucleus . (10 Marks)
- c. Discuss the energy involved in the movement of the simple pendulum . (5 Marks)

EXAMINER	PROF. M. RAAFAT ISMAIL
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☺ BEST WISHES ☺

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 TANTA UNIVERSITY FACULTY OF SCIENCE DEPARTMENT OF PHYSICS			
EXAMINATION OF (THIRD YEAR) STUDENTS OF PHYSICS & BIOPHYSICS (CREDIT HOURS)			
COURSE TITLE:		Atomics pectroscopy	
DATE: 4/1/2018		TERM: FIRST	TOTAL ASSESSMENT MARKS: 100
		COURSE CODE: PH3141	
		TIME ALLOWED: 2 HOURS	

Question(1):-

a. Show that the spin orbit interaction energy is given by the following

$$\Delta E = -\frac{1}{2m^2c^2} \frac{1}{r} \frac{dV(r)}{dr} SL$$

expression (15Marks)

- b. Find out the longest wavelength of Lyman series transitions of hydrogen atom, then find the end of the series. (m=9.035x10⁻²⁸g, e=4.77x10⁻¹⁰e.s.u. h= 6.0547x10⁻²⁷erg sec)
(5 Marks)
- c. If you have n=9, show according the sommerfeld's elliptic orbits the shape of these orbits. (5 Marks)

Question(2):-

- a. Derive that the group velocity of the De Broglie waves is the same as that of the particle. (10 Marks)
- b. Discuss in details about:-(15Marks)
 Rutherford scattering experiment- Wien's displacement Law
 Characteristics of the Bohr circular orbits

Question(3):-

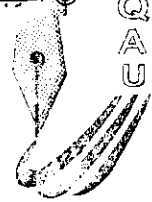
- a. Show that the energy depends only upon the semi – major axis a, not upon eccentricity. (20 Marks)
- b. The wavelength of the photoelectric threshold of Tungsten is 230 nm. Determine the energy of the electrons ejected from the surface by ultraviolet light of wavelength 180 nm.(5Marks)

Question(4):-

- a. Derive the equation that relates the scattering angle and the the impact parameter. (15 Marks)
- b. State the three Bohr's Assumptions and Write the equation of each one with meaning of each symbol .(10 Marks)


Dr. Shrouk Fathy Elashry

أطيب التمنيات بالتوفيق ☺



وحدة ضمان الجودة
 كلية العلوم - جامعة طنطا
 QAU QUALITY ASSURANCE UNIT
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	TANTA UNIVERSITY FACULTY OF SCIENCES DEPARTMENT OF PHYSICS			
	EXAMINER: <i>PROF. DR. RYAD A.M. HAZY</i>			
	TITLE:	<i><u>molecular biophysics 01</u></i> <i>Bio-Physics Students</i>	CODE: <u>BP3112</u>	
DATE:	13/01/2018	TERM: 1 st	TOTAL MARKS: 200	PERIOD: 2 H ^{rs}

فضلا اجب عن الأسئلة الآتية:

- 1- Derive an equation for rotational OR vibrational molecular energy?

- 2- Explain in details the ionic currents through a cell's electrolytes showing the following:
 - Ohm's law; - Resistance; - Conductivity; - Molar conductance;
 - Electrophoretic mobility; and Molar conductance at low dilution.

- 3- Explain the diffusion phenomena through the living cell showing the relationship between molar mass M , diffusion coefficient D and viscosity of the solution ξ ?

- 4- Write- down about the following:
 - Fick's law; - Osmosis process; - t Hoof's law;
 - plasmolysis; and - Reverse osmosis.

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