




Answer the following questions:

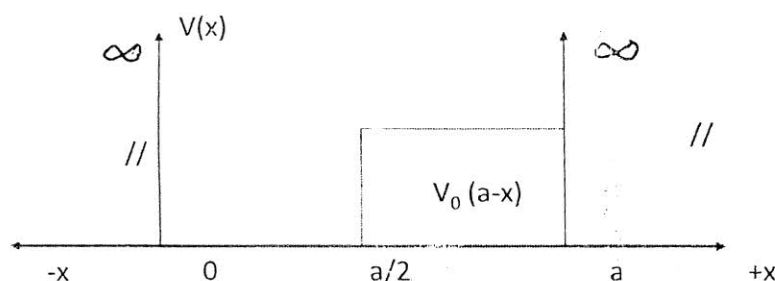
- 1- (a) Starting with the block diagram of 1-Bit digital comparator construct a 2-Bits digital comparator
(4 Degrees)
- (b) Draw 4-Bits Parallel Adder and show how it can be converted to a 4-Bits Subtractor in both positive and negative cases
(5 Degrees)
- (c) Discuss how a 4 -Bits Parallel Subtractor also can be used as 4-Bits Comparator
(2 Degrees)
- 2- (a) Starting with the Truth Table of 1-bits digital Multiplexer simplify its Min Term, draw its logic circuit, and then reconstruct this circuit using only NAND gates
(6 Degrees)
- (b) Write the different concepts of Binary Multiplication and draw a block diagram representing one of them
(5 Degrees)
- 3- (a) Using the J-K of Flip Flops show how it can be used to construct both a 4 Bits Ripple binary counter and a 4 Bits BCD Counter
(5 Degrees)
- (b) Explain the crystal structure of BaTiO_3
(5 Degrees)
- 4- Write a short note about the piezoelectric d_{33}
(11 Degrees)
- 5- What is the phenomena of electromechanical behaviour
(11 Degrees)

Best Wishes

	TANTA UNIVERSITY FACULTY OF SCIENCE DEPARTMENT OF PHYSICS			
	EXAMINATION of (Fourth year) students of physics group			
	COURSE TITLE:	QUNTUM MECHANICS	COURSE CODE:24033	
DATE:	6/6/2013	TERM:SECOND	TOTAL ASSESSMENT MARKS : 54	TIME ALLOWED: 3HOURS

Answer the following questions:

- 1- Apply the variation theory to determine the percentage error for the total energy of the helium atom? (11maks)
- 2- Use the trial wave function $\phi(r) = A r e^{-Br}$ for the ground state of the hydrogen atom. Apply the variation method to determine the variational parameter (A and B) and energy? (11maks)
- 3- Consider a particle of mass (m) in a potential well as shown in Figure.



What is the lowest allowed energy in the first order perturbation theory?

(11maks)

- 4- Deduce relationship of scattering amplitude in three directions?

(11maks)

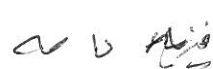

- 5- Construct the following matrices:


a-The Pauli spin matrix for neutron in the x-direction. (5marks)

b-The momentum operator for the harmonic oscillator. (5marks)

GOOD LUCK

Examiner: Prof. Dr. Neima Z.Darwish

	TANTA UNIVERSITY- Faculty of Science -Department of Physics			
	EXAM FOR SENIORS STUDENTS OF GENERAL PHYSICS			
	COURSE TITLE	Materials Science		COURSE CODE:PH4193
DATE:	4- 1 - 2014	TERM: FIRST	TOTAL ASSESSMENT MARKS: 100	TIME ALLOWED: 2 HOURS

First Question:

1. Cite the four components that are involved in the design, production, and utilization of materials, and briefly describe the interrelationships between these components. (Give example). [10marks]
2. Briefly describe ionic, metallic, and van der Waals bonds and note which materials exhibit each of these bonding types. [15marks]

Second Question:

1. State and explain Brag's law to determine the interplanar spacing for crystal structures that has cubic symmetry. [10marks]
2. List the four different Imperfections types in solids. [10marks]
3. Name two types of Impurity point defects are found in solid solutions, then Provide a brief written about the factors affect these defects in solid, and finally Given examples of these defects. [10marks]

Third Question:


1. Sketch/describe unit cells for sodium chloride, cesium chloride, zinc blende, diamond cubic, and graphite. [15marks]
2. Briefly write short notes about the structure and properties of Carbon nanotube.[10marks]

Fourth Question:

1. Name and describe the different Atomic Point Defects that are found in ceramic compounds. [10marks]
2. Distinguish between crystalline and noncrystalline ceramics in Mechanics of Plastic Deformation. [10marks]

EXAMINER	DR. REDA EL-SHATER
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☺ BEST WISHES ☺

	TANTA UNIVERSITY- Faculty of Science -Department of Physics			
	EXAM FOR SENIORS STUDENTS OF PHYSICS			
	COURSE TITLE:	Solid State Physics II		COURSE CODE: PH4171
DATE:	11 JANUARY 2015	TERM: FIRST	TOTAL ASSESSMENT MARKS: 100	TIME ALLOWED: 2 HOURS

Answer the following questions:

- 1- A- **What are** the main parameters which make a material crystalline or non-crystalline? (10Marks)
- B- **Define** shortly Drude Model. (10Marks)
- C- **Why** a conduction electron in a metal can move freely in straight path over many interatomic spacings undeflected by collisions as if the matter is transparent to it? (10Marks)

2- **Choose the correct statement from between brackets:** (20 Marks)

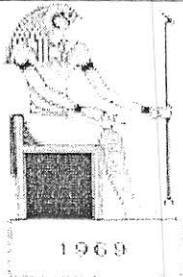
- The momentum of the free electron is related to the wave vector by ($mv = \hbar k$ - $\frac{1}{2} mv^2 = (\hbar k)^2 / 2m$).
- The rate of collisions of electrons with lattice phonons and impurity atoms are approximately (**independent** - **dependent**), so that if the field is switched off the momentum distribution would relax back to its ground state with a net relaxation time given by: ($1/\tau = 1/\tau_L + 1/\tau_i$ - $\tau = \tau_L + \tau_i$).
- The Kronig-Penney model is a simple, idealized quantum-mechanical system that consists of an infinite periodic array of (**spherical** - **rectangular**) potential barriers. It is a (**totally free** - **nearly free**) electron model.
- In the energy gaps (**no electrons** - **no wavelike electron orbitals**) exist.
- For a free electron in one dimension the Hamiltonian is ($P^2/2m$ - $P^2/2m + U(x)$).
- The term orbital in theoretical solid state physics is used to denote a solution of the wave equation for a system of (**N free electrons** - **only one electron**), the orbital model is exact only if there are (**interactions** - **no interactions**) between electrons.
- In three dimensions, the wavefunction of free electrons must (**be periodic in x,y and z** - **have the Bloch form**).

3- **Deduce** the drift velocity components of a free particle exerted to a uniform magnetic field B_z along the z-axis and to a static electric field E . (20Marks)

- 4- A- **Define:** dielectric strength and what are the factors affecting it? (10Marks)
- B- **Define:** polar and non-polar dielectrics. (8Marks)
- C- **Define:** Ferroelectricity – Piezoelectricity – Pyroelectricity. (12Marks)

EXAMINER	PROF. DR. SAMIA AHMED SAAFAN
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☺ BEST WISHES ☺



Tanta University
Faculty of Science
Physics Department

مفیزا رطاف

Examination for Biophysics and Physics Students

COURSE TITLE:

Microprocessing of
materials

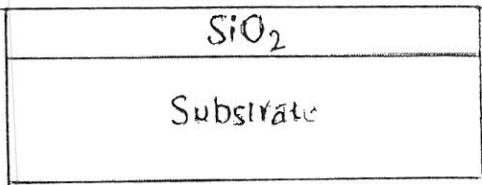
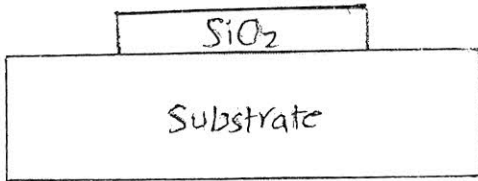
COURSE CODE:

MS 4131

TERM: First

TOTAL ASSESSMENT
MARKS:100

TIME
ALLOWED:
2 HOURS

QUESTION	ANSWER THE FOLLOWING QUESTIONS:	Marks
1.	<p>a-Complete the following sentences:</p> <p>1- Photoresist has two basic functions and</p> <p>2- The main components of the optical lithography system are, and</p> <p>3- The important characteristics of the photomask blanks are,, and</p> <p>4- Photoresist exists in two different basic forms and</p> <p>5- The process chamber types for RTP equipment employ three different chamber designs, and</p> <p>6- In conventional thermal furnaces involves heating by and</p> <p>7- Photoresist consists of three basic chemicals, and</p> <p>b- Discuss the requirements for a good etching <u>process</u> and <u>equipment</u></p>	25
2.	<p>a- Starting with the following structure (Y) and by using the major steps in the lithography process explain and sketch how you can end up with the structure (Z).</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>(Y)</p> </div> <div style="text-align: center;">  <p>(Z)</p> </div> </div> <p>b- Compare between the conventional furnaces and RTP systems.</p>	25
3.	<p>a- The CVD process of forming thin solid films on a substrate from a gas vapor involves a series of steps, Discuss these steps in details.</p> <p>b- Write in details about the sputter etching process.</p>	25
4.	<p>a- Draw and explain in details the proximity printing technique for pattern transfer.</p> <p>b- Discuss in details the horizontal tube PECVD reactor.</p>	25
EXAMINER	Dr. Hassan El Gohary	

TANTA UNIVERSITY
FACULTY OF SCIENCE
DEPARTMENT OF PHYSICS

FINAL EXAMINATION OF 4TH YEAR PHYSICS STUDENTS

COURSE TITLE:	Astronomy I		COURSE CODE: PH 4103
15/1/2015	TERM: FINAL	TOTAL ASSESSMENT MARKS:100	TIME ALLOWED: 2 HOURS

Answer the following questions:

First question:- (25 Marks)

a- What will happen to Earth if it has no magnetosphere. (5 Marks)

b-Put true or false and correct false ones: (20 Marks)

1. Titan is the largest moon of Mars.
2. Venus has evidence for plate tectonics
3. Trojan asteroids orbit at Venus's orbit.
4. The Kuiper belt exists outside the orbit of Neptune.
5. Comets from the Oort cloud not wander into the inner solar system.
6. Moon has large dark flat areas, due to lava flow, called maria.
7. Jupiter has the biggest number of moons.
8. Europa is one of the Mercury largest moons.
9. Saturn is the flattest planet in the solar system
10. Martian atmosphere is mostly nitrogen.

Second question: - (25 Marks)

Explain briefly (few lines for each):

1. What causes the colors in Jupiter's atmosphere.
2. Jupiter emits more energy than it receives from the Sun.
3. The comet's tail always points away when it moves near to the Sun.
4. How the Moon produces tides in Earth's oceans.
5. Venus is a victim of a runaway greenhouse effect.

Third question:- (25 Marks)

Answer briefly: (few lines for each)

1. Why are asteroids and meteoroids important to planetary scientists?
2. Why Mars has no magnetic field ?
3. What causes a meteor shower?
4. Name three important differences between the terrestrial planets.
5. Why small meteoroids have no trouble penetrating the Martian atmosphere?

Fourth question:- (25 Marks)

1. What is the greenhouse effect, and what effect does it have on Earth's surface temperature? (15 Marks)
2. Explain the Nebular Contraction theory and Planetary Condensation. (10 Marks)

(Best wishes ----- Dr. Yasser Abdou)

L. J. 1
2

Tanta University- Faculty of science

Physics Department-Final Exam – January 2014-2015

PH4105 for 4th year- Time: 2 h

Answer the following question:

1-Preparation of the specimen is one of the most important steps in the process

Of imaging by electron microscopy .Discuss these steps.

2-Explain the basic principles of CD and ORD and the relation between the two

Phenomenon . What's meant by Cotton effect ?

3- Discuss the different types of Microscopy ?

4-What's meant by:

a-The property of birefringence.

b-Rayleigh Criterion.

c-The aberration of lens for electron optic.

d-Optically active.

e-Chromophores.

Best wishes.

COURSE TITLE:

Physical Electronics

COURSE CODE: PH4113

DATE: 31-12-2014 TERM: FIRST TOTAL ASSESSMENT MARKS: 100 TIME ALLOWED: 2 HOURS

Answer the following questions:

- 1- A- How the metallurgical grade Si is refined further to yield "semiconductor-grade" or "electronic-grade" Si (EGS), in which the levels of impurities are reduced to parts per billion. (20 Marks)
- B- Define cathodoluminescence and electroluminescence giving a practical example of each type. (10 Marks)
- 2- Choose the correct statement from between brackets: (20 Marks)
- (GaAs - Silicon) is used for the majority of rectifiers, transistors, and integrated circuits, whereas (Silicon - GaAs) is common in fabrication of light-emitting diodes (LEDs).
 - In the fabrication of Si integrated circuits it is economical to use very (small - large) Si wafers.
 - One of the important characteristics of a semiconductor, which distinguishes it from metals and insulators, is its energy band gap. For example, the band gap of GaAs is about (1.43 - 4.31) electron volts (eV).
 - In a Si crystal when we bring individual atoms very close together, the s- and p-orbitals overlap so that they lose their distinct character, and lead to (three - four) mixed sp^3 orbitals.
 - To convert the high purity polycrystalline electronic grade Si to single crystal Si ingots, a process commonly called (Czochralski method - fractional distillation) is used.
 - The column IV semiconductor Ge ($Z = 32$) has an electronic structure similar to Si, except that the four valence electrons are outside a closed $n = 3$ shell. Thus the Ge configuration is ([Ar] $3d^{10}4s^24p^2$ - [Ne] $3d^{10}4s^24p^2$).
 - When two atoms are brought close to each other, the coulombic potential energy $V(r)$ in the region between the two nuclei is (raised - lowered) compared to isolated atoms.
 - In the valence band, hole energy increases (oppositely to - similarly to) electron energy.
 - Adding the electron and hole drift currents at (low - high) electric fields gives the following equation $\mathbf{J} = \mathbf{J}_p|_{\text{Drift}} + \mathbf{J}_n|_{\text{Drift}} = q(\mu_n n + \mu_p p) \mathbf{E}$.
- 3- a- Write short notes about: Three different bonding types in solids. (10 Marks)
- b- Draw schematic diagrams showing the coulombic potential wells of two atoms close to each other, along with the wave functions of two electrons centered on the two nuclei. Show how for such an interacting system two-electron wave functions are probable and what happens if many atoms that are brought together? (20 Marks)
- 4- In a PN junction, define: the depletion region - the reverse bias - the forward bias - the diode breakdown. (20 Marks)

EXAMINER

PROF. DR. SAMIA AHMED SAAFAN

☺ BEST WISHES ☺

المراد بنك راجية

ممتاز فاضل



TANTA UNIVERSITY
FACULTY OF SCIENCE
PHYSICS DEPARTMENT

EXAMINATION FOR FRESHMEN (FOURTH YEAR)

COURSE
TITLE:

DIGITAL ELECTRONICS

COURSE CODE: PH 4153

DATE : 23

JANUARY 2015

TERM: FIRST

TOTAL
MARKS: 100

ASSESSMENT

TIME ALLOWED: 2 HOURS

Answer all the following questions:

1- (a) Write the Truth Table of XOR gate and construct its equivalent logic circuit using both the Min Term and Max Term (15 Marks)

(b) Simplify the following Boolean Expression and draw the equivalent logic circuit before and after simplification

$$Y = A.B.C + \bar{A}.B.C + A.\bar{B}.C + A.B.\bar{C} \quad (10 \text{ Marks})$$

2-(a) Draw the logic circuit and discuss the Truth Table of both the D - type and J-K type of Flip Flops and show,

- How can the D type be used as a 1-bit memory ?
- Which type can be used in digital counters and why ?

(10 Marks)

(b) Draw a block diagram for a 4-Bits parallel counter that count from 0 up to 9 and then discuss its frequencies limits compared by the Ripple Counters (15 Marks)

3- (a)-Starting with the Truth Table of 1-Bit Comparator, use the Min Terms to construct its logic circuit (15 Marks)

(b) Normally the comparator has 3-outputs, show how it can be designed by 6 outputs and do the necessary modifications

(5 Marks)

(c) Using the building blocs and starting with 1-Bit comparator block diagram construct a 2-Bit Comparator (5 Marks)


4- (a) Write the Truth Table of binary half adder, then deduce its logical circuit, and show how it can be used for full adder bloc diagram (15 Marks)

(b) Show how to convert 4-bits parallel adder to a 4-bits parallel subtractor in case of positive results using an example (10 Marks)

Examiner

Dr. Mahmoud Moustafa Kamel

Best Wishes

	TANTA UNIVERSITY FACULTY OF SCIENCE DEPARTMENT OF PHYSICS			
	General Physics & Material Science: (LEVELFOUR)			
	COURSE TITLE:	Detectors & Accelerators	COURSE CODE: PH4163	
	TOTAL MARKS 100	SEMESTER: ONE	TIME ALLOWED: TWO HOURS	DATE: 27/12/2014

Q1: Complete the following sentences

(25 Marks)

- 1- What is the basic construction of linear accelerator?
- 2- Explain briefly: How the cyclotron works?
- 3- What are the disadvantage and advantage of circular accelerators over linear accelerators?

Q2:

A- Put (√) or (X) and then correct the false

(8 Marks)

- a- Cockcroft-Walton generator is an example of DC voltage accelerator ()
- b- The required energy to produce electron hole pair in solid is lower than the required energy to produce ion pair in gas ()
- c- Boron detectors are more efficient than ^3He counters in neutrons detection ()
- d- Silicon surface barrier detector are widely used for (p, D, ^3He , ^4He) detection ()

B- Define the following seven terms: Fissile, fissionable and fertile materials -Transmission, resolution and luminosity of spectrometer - Cyclotron Frequency.

(17 Marks)

Q3:

A- Draw block diagram of nuclear electronic system showing the function of each unit

(15 Marks)

B- Draw the relation between neutron energy and cross section, comment on your figure

(10 Marks)

Q4:

A- Write about the different probabilities for the interaction of gamma radiation with matter. Supporting your answer with the necessary formula for cross section in each one.

(15 Marks)

B- A 1 cm thick lead absorber attenuated an initial 10 MeV neutron beam to 84.5% of its value. what is total cross-section?; given that the atomic weight of Pb = 207.21 and its density is 11.3 gm/cm^3 and Avogadro's number is $6.03 \times 10^{23} \text{ atoms/mole}$

(10 Marks)

Examiner

Dr. Sherief Hamada.

أطيب التمنيات لكم بالنجاح و بالتوفيق ☺

**ANSWER THE FOLLOWING QUESTIONS:****First Question (9Marks)**

- A- 1- According to the spin-orbit interaction, prove that the magnetic moment of any magnetic atom is given by the quantity - $g_J \mu_B J$.
2- Write shortly about high quality glass fibers and Rayleigh attenuation.
- B- 1- What is meant by the following temperatures:
Glass transition, Curie, Néel, and compensation temperatures?
2- Write briefly about: the saturation magnetization, the spontaneous magnetization, internal magnetic field, and Heisenberg exchange interaction between the atomic spins.

Second Question (9Marks)

- A-1- Derive a relation which describes the temperature dependence of the magnetic susceptibility above T_c .
2- State a relation that shows the variation of the reduced magnetization with the reduced temperature for a given J of a ferromagnet which depends exclusively on $B_J(y)$.
- B-1- Write briefly about the glass formation region, concentration dependence of the paramagnetic components of susceptibility, the conductivity and electric activation energy, when tellurium or (thallium) is introduced in the binary phosphorous-selenium system along the tie line $PSe_{2.5} - Te_y (Tl_y)$.
2- Give short account on the susceptibility of a piece of polycrystalline sample of an antiferromagnetic material below T_N .

Third Question (9Marks)

- A- Represent schematically the field dependence of the total magnetization in an antiferromagnetic single crystal in which the magneto crystalline anisotropy is : 1- relatively low 2- very strong; when measurements are made with the field applied both in the hard direction and in the easy direction.
- B- 1- Calculate the quantum numbers of the ground states of the $3d^5$, and $4f^3$ ions, and the value of the Landé g -factor, then find their spectroscopic notations.
2- What is meant by transition metal-metalloid alloys?

اقاب الصفحة من فضلك (باقى الامتحان فى الصفحة التالية)

Tanta University Exam. of Nuclear Physics and Mössbauer Date 05- 1- 2013
Faculty of Science Spectroscopy for the 4th year students Time: 3 hours
Physics Department Course Number: (12035)

Answer the following questions:

- 1- Using the plot, explain the Mössbauer hyperfine interactions.
 - 2- Explain briefly how to prepare the Mössbauer source and absorber.
 - 3- (a)- write short notes on the diffusion of hydrogen in metals.
(b)- Give short account on slow – fast coincidence circuit.
 - 4- Explain the method for studying the hyperfine structure of atoms in solids by using the perturbed angular correlation technique.
 - 5- Explain the life time technique for the determination of spin and parity of nuclear states.
-



TANTA UNIVERSITY- Faculty of Science -Department of physics

EXAMINATION FOR SENIORS STUDENTS OF PHYSICS

COURSE TITLE:

Electrodynamics and Computational Physics

COURSE CODE: 14033

DATE:

21- 1- 2013

TERM: FIRST

TOTAL ASSESSMENT MARKS: 54

TIME ALLOWED: 3 HOURS

(1) Choose the right statement from between the brackets

(9Marks)

1. A scalar magnetic potential can be defined in a way similar to the scalar electrostatic potential (everywhere around a source – only in certain regions).

2. In a perfect conductor, the electromagnetic field (appreciably attenuates - must vanish) whereas in a good conductor, the electromagnetic field (appreciably attenuates - must vanish).

3. In the Hall effect, a slight potential difference is built across a sample in a direction (parallel -perpendicular) to both the magnetic field and the velocity of the charges.

4. Concerning the boundary conditions between two different magnetic materials, the normal components of **B** and **H** are given by: $B_{N2} = (B_{N1} - \mu_1/\mu_2 B_{N1})$ and $H_{N2} = (H_{N1} - (\mu_1/\mu_2)H_{N1})$.

5. The total energy stored in a steady magnetic field in which **B** is linearly related to **H** is given by($\frac{1}{2} \int_{vol} \mathbf{B} \cdot \mathbf{H} dV$ - $\frac{1}{2} \int_{vol} \mathbf{B} \times \mathbf{H} dV$).

6. The emf caused by a changing magnetic flux is in such a direction as to produce a current whose magnetic flux, if added to the original flux, would (increase - reduce) the magnitude of the emf.

7. The velocity of propagation of an electromagnetic wave in a medium is determined by (the source of the wave - the medium of propagation) .

(2) What are the three moments that contribute to the total moment of an atom; and accordingly what are the magnetic classification of different materials? **(9Marks)**

(3) a- Show how Maxwell had added a correction term to Ampère's circuital law to obtain his equation that describes how electric currents and changing electric fields produce magnetic fields. **b-** Define: The skin depth – the Poynting's vector – the reluctance – the displacement current. **(9Marks)**

(4) a-Write on: A method to accelerate the convergence of a process.

b- Discuss and give an example for: The advantages and disadvantages of Scant's method to solve a polynomial. **(9Marks)**

(5) Explain: a- A method to choose the initial values of the iteration process.


b- The degree and conditions of convergence of a process. **(9Marks)**

(6) Discuss and give an example for: a- How you can transfer a polynomial from an ordinary form to a nested multiplications form?

b- The difference between Newton, and Interval Bisection methods. **(9Marks)**

☺ BEST WISHES ☺

EXAMINERS	PROF. DR. S.A. SAAFAN	DR. G. Z. FARAG
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	TANTA UNIVERSITY, FACULTY OF SCIENCE, DEPARTMENT OF CHEMISTRY		
	EXAMINATION FOR FOURTH YEAR STUDENTS		
	Course Title	SOLID STATE CHEMISTRY	Code: CH 4143
8/1/2015	1 st term	Total Assessment Marks: 50	Time: 2 hrs

1- Choose the correct answer:-

- A. Which of the following types of order is present in an amorphous solid?
 a) short range order b) long range order c) both short and long range order?
- B. A simple cubic lattice consists of eight identical spheres of Radius R in contact, placed at the corners of the cube, what fraction of the total volume of cube is actually occupied by the cube?
 a) 100% b) 74% c) 68% d) 52%.
- C. Frankel and Schottky imperfections are.....
 a) dislocations in ionic crystals. c) Vacancies in ionic crystals.
 b) Grain boundaries in covalent crystals. d) Vacancies in covalent crystals.
- D. What type of defect creates F-centers in the crystal?
 a) Non-stoichiometric defect c) Metal excess defect due to extra cation
 b) Metal excess defect due to anion vacancies d) substitutional defect.
- E. The number of carriers in a pure semiconductor is proportional to
 a) $\exp\left(-\frac{E_g}{kT}\right)$ b) $\exp\left(-\frac{E_g}{kT^2}\right)$ c) $\exp\left(-\frac{2E_g}{kT}\right)$ d) $\exp\left(-\frac{E_g}{2kT}\right)$
- F. In a BCC unit cell of a metallic substance, the number of atoms per unit cell is.....
 a) 4 b) 1 c) 2 d) 3.
- G. Addition of trivalent impurity to a semiconductor creates many
 a) mobile holes c) bound electrons
 b) free electrons d) valence electrons
- H. Imperfection arising due to the displacement of an ion from a regular site to an interstitial site maintaining overall electrical neutrality of the ionic crystal is called...
 a) Point imperfection c) Schottky imperfection
 b) Frenkel imperfection d) Volume imperfection
- I. In intrinsic semiconductor there are.....
 a) neither free electrons nor mobile holes. c) no free electrons.
 b) as many free electrons as there are holes. d) no mobile holes.
- J. The atomic diameter of an FCC crystal having lattice parameter a is.....
 a) $\frac{a\sqrt{2}}{4}$ b) $\frac{a\sqrt{3}}{4}$ c) $\frac{a\sqrt{2}}{2}$ d) $\frac{a}{2}$

	A	B	C	D	E	F	G	H	I	J
Answer										

الترقيات فيه



TANTA UNIVERSITY
FACULTY OF SCIENCE
PHYSICS DEPARTMENT

EXAMINATION FOR FRESHMEN (FOURTH YEAR)

COURSE
TITLE:

DIGITAL ELECTRONICS

COURSE CODE: MS 4153

DATE : 23

JANUARY 2015

TERM: FIRST

TOTAL

MARKS: 100

ASSESSMENT

TIME ALLOWED: 2 HOURS

Answer all the following questions:

1- (a) Write the Truth Table of XOR gate and construct its equivalent logic circuit using both the Min Term and Max Term (15 Marks)

(b) Simplify the following Boolean Expression and draw the equivalent logic circuit before and after simplification

$$Y = A.B.\bar{C} + \bar{A}.B.C + A.\bar{B}.C + A.B.C \quad (10 \text{ Marks})$$

2-(a) Draw the logic circuit and discuss the Truth Table of both the D - type and J-K type of Flip Flops and show,

- How can the D type be used as a 1-bit memory ?
- Which type can be used in digital counters and why ?

(10 Marks)

(b) Draw a block diagram for a 4-Bits parallel counter that count from 0 up to 9 and then discuss its frequencies limits compared by the Ripple Counters (15 Marks)

3- (a)-Starting with the Truth Table of 1-Bit Comparator, use the Min Terms to construct its logic circuit (15 Marks)

(b) Normally the comparator has 3-outputs, show how it can be designed by 6 outputs and do the necessary modifications

(5 Marks)

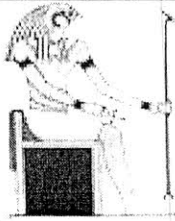
(c) Using the building blocs and starting with 1-Bit comparator block diagram construct a 2-Bit Comparator (5 Marks)

4- (a) Write the Truth Table of binary half adder, then deduce its logical circuit, and show how it can be used for full adder bloc diagram (15 Marks)

(b) Show how to convert 4-bits parallel adder to a 4-bits parallel subtractor in case of positive results using an example (10 Marks)

Examiner	Dr. Mahmoud Moustafa Kamel
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Best Wishes



1969

Tanta University
Faculty of Science
Physics Department

فيزياء

Examination for Biophysics and Physics Students

COURSE TITLE:

Microprocessing of
materials

COURSE CODE:

MS 4131

TERM: First

TOTAL ASSESSMENT
MARKS:100

TIME
ALLOWED:
2 HOURS

QUESTION

ANSWER THE FOLLOWING QUESTIONS:

Marks

1.

a-Complete the following sentences:

25

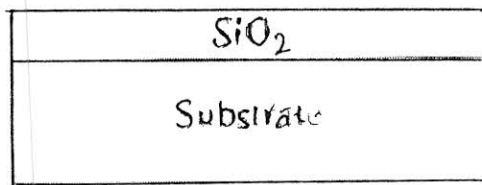
- 1- Photoresist has two basic functions and
- 2- The main components of the optical lithography system are and
- 3- The important characteristics of the photomask blanks are, and
- 4- Photoresist exists in two different basic forms and
- 5- The process chamber types for RTP equipment employ three different chamber designs
....., and
- 6- In conventional thermal furnaces involves heating by and
- 7- Photoresist consists of three basic chemicals, and

b- Discuss the requirements for a good etching process and equipment

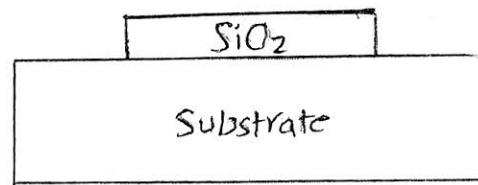
2.

a- Starting with the following structure (Y) and by using the major steps in the lithography process explain and sketch how you can end up with the structure (Z).

25



(Y)



(Z)

b- Compare between the conventional furnaces and RTP systems.

3.

a- The CVD process of forming thin solid films on a substrate from a gas vapor involves a series of steps, Discuss these steps in details.

25

b- Write in details about the sputter etching process.

4.

a- Draw and explain in details the proximity printing technique for pattern transfer.

25

b- Discuss in details the horizontal tube PECVD reactor.

EXAMINER

Dr. Hassan El Gohary

2014/15



TANTA UNIVERSITY- Faculty of Science -Department of Physics
EXAM FOR SENIORS STUDENTS OF MATERIALS SCIENCE

COURSE TITLE

Materials Design

COURSE CODE: MS4121

DATE:

31- 12 - 2014

TERM: FIRST

TOTAL ASSESSMENT MARKS: 100

TIME ALLOWED: 2 HOURS

1. a) Find the strength performance index for a solid cylindrical shaft. [15Marks]
b) Using the selection consideration developed for minimum material mass and minimum cost, describe the acceptable candidates from the following Five Engineering Materials. [10Marks]

Material	ρ (Mg/m ³)	τ_f (MPa)	\bar{c} (\$/£)
Carbon fiber-reinforced composite	1.5	1140	5
Glass fiber-reinforced composite	2.0	1060	40
Aluminum alloy (2024-T6)	2.8	300	15
Titanium alloy (Ti-6Al-4V)	4.4	525	80
4340 Steel (oil-quenched and tempered)	7.8	780	110

Density (ρ), Strength (τ_f), and Relative Cost (\bar{c}) for Five Engineering Materials.

2. a) List and briefly explain six biocompatibility considerations relative to materials that are employed in artificial hip replacements. [12Marks]
b) Name the four components found in the artificial hip replacement, and, for each, list its specific material requirements. [18Marks]

3. A spring (steel alloy) has a total length of 1.67 in. (42 mm), is constructed of wire having a diameter d of 0.170 in. (4.3 mm), has six coils (only four of which are active), and has a center-to center diameter D of 1.062 in. (27 mm). Furthermore, when installed and when a valve is completely closed, its spring is compressed a total of 0.24 in. (6.1 mm). Also, the fatigue limit for zero mean shear stress is 45000 psi; and the tensile strength of the alloy TS (psi) is $169 \times (d)^{-0.167}$. Using the Goodman's law

$$\tau_{al} = \tau_e \left(1 - \frac{\tau_m}{0.76TS} \right)$$

and Wahl's stress factor $K_w = 1.60 \left(\frac{D}{d} \right)^{-0.140}$ Study the safety of spring design. τ_{al} is the fatigue limit amplitude. [25Marks]


4. a) List The Requirements of Thermal Protection System Design on the Space Shuttle Orbiter. [10Marks]
b) Tabulate the Thermal Protection Materials Systems are employed on the Space Shuttle orbiter. [10Marks]

EXAMINER

DR. REDA EL-SHATER

☺ BEST WISHES ☺

21/1/2015 (C)

 1989	TANTA UNIVERSITY FACULTY OF SCIENCE DEPARTMENT OF PHYSICS			
	EXAMINATION FOR SENIORS (FORTH LEVEL) STUDENTS OF MATERIAL SCIENCE (SEMESTER 1)			
	COURSE TITLE:	INTRODUCTION TO NANO-TECHNOLOGY		COURSE CODE: MS4163
DATE:11	JANUARY 2015	TERM: FIRST	TOTAL ASSESSMENT MARKS: 100	TIME ALLOWED: 2 HOURS

Answer The Following:

First question: {20 Marks}

A) Define the following: (8 Marks)

1. Nanomaterials.
2. Nanotechnology.

B) Compare between nanotechnology and microtechnology. (12 Marks)

Second question: {20 Marks}

A) Write short notes on the following: (10 Marks)

The unique size dependent, at properties of nanomaterial (give examples).

B) Mention the main idea of fabrication the nanomaterial; (give an example), declare your answer by drawing. (10 Marks)

Third question: {20 Marks}

A) Compare between the following:

- 1) Grain-size, particle size, crystallite size.
- 2) Show how you could determine (the methods) every one of the above mentioned (particle size – crystallite size) (8 Marks)

B) Discuss briefly the methods for characterization of nanomaterials. (12 Marks)

Fourth question: {40 Marks}

Discuss and show the advantage of using nanotechnology of the following fields:

a) Medicine (10 Marks)

b) Environment. (10 Marks)

c) Energy. (10 Marks)

d) Information and communications. (10 Marks)

Examiners	Prof. Talaat M. Meaz	Prof. Samia . A. Saafan.
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Exam. of Electron microscope
for the 4th year students
Course Number: (MS 4123)

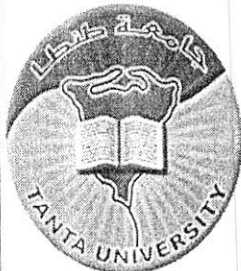
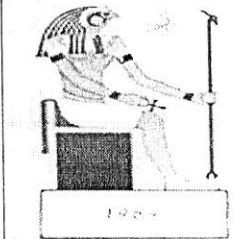
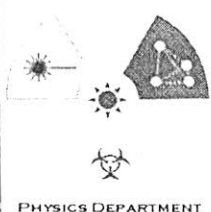
Tanta University Date: 20 -1- 2015
Faculty of science Time: 2 hours.
Physics department



جامعة طنطا
كلية العلوم
قسم الفيزياء

Answer the following questions:

- 1- Plot a schematic diagram of the transmission electron microscope indicating its units and explain briefly its work.
 - 2- Plot a schematic diagram of the scanning electron microscope indicating its units and explain briefly its work.
 - 3- Using the plot explain briefly:
 - (a) Hairpin style tungsten filament
 - (b) Cross sectional diagram of an electron gun assembly
 - (c) Magnification and resolution of electron microscope
 - (d) Gas-assisted focused ion beam etching
 - 4- Plot Block diagram of focused ion beam microscope indicating its units and explain briefly its work.
-

	<p>Tanta University Faculty of Science Physics Department</p>			
	<p>First Term Exam (Level 4, Material Science)</p>			
	<p>Course Title</p>	<p>Ceramics</p>		<p>Course Code: MS4171</p>
<p>Date</p>	<p>18 / 1 / 2015</p>	<p>Term: First</p>	<p>Total Assessment: 100 Marks</p>	<p>Time Allowed: 2 hours</p>

Please answer all the following questions:

First question: Complete the following { 30 Marks }

“In your answer, write only the missing statements or words”

- 1- The term ceramics comes from the Greek word *keramikos*, which means “.....,” indicating that desirable properties of these materials are normally achieved through
- 2- Ceramics are normally inorganic and materials, having melting points.
- 3- The overall properties of ceramic materials depend on bonding mechanism. Compounds that either have higher melting points.
- 4- is one microstructural variable that must be controlled to produce a suitable refractory bricks. The strength and the resistance of bricks to be attacked by corrosive materials could be increased by
- 5- It is important to grind cement into a fine powder to
- 6- The surface structure of ceramics as abrasives should contain some porosity to
- 7- Carbon and are very refractory, but find limited applications because at temperatures in excess of about 800 °C
- 8- Silicates are materials composed primarily of and, the two most abundant elements in the earth’s crust. Chemically, the most simple silicate material is Structurally, it is a three-dimensional network that is generated when the in each tetrahedron are shared by adjacent tetrahedra.

Examiner: Dr Salah E. El-Zohary

Page 1 of 3

Third question: { 30 Marks}

- 1- Briefly explain why glass-ceramics may not be transparent.
- 2- Give a reason that recently research is being conducted into using ceramic materials for some Microelectromechanical systems (MEMS) components.
- 3- What is the phenomenon of piezoelectricity then mention three piezoelectric ceramic materials?
- 4- Graphically show the behavior of superconducting material in comparison with nonsuperconductor.
- 5- Would you expect the physical dimensions of a piezoelectric material such as BaTiO_3 to change when it is subjected to an electric field? Why or why not?
- 6- Show graphically how a crack propagates in case of ductile material and in case of ceramic material.

Fourth question: { 15 Marks}

- 1) Show that the minimum cation-to-anion radius ratio for the coordination number 3 is 0.155.
- 2) On the basis of ionic radii of Fe^{2+} and O^{2-} are 0.077 and 0.140 respectively
What crystal structure would you predict for FeO ?
- 3) The ionic radii for K^+ and O^{2-} as 0.138 and 0.140 nm, respectively.
 - a) What would be the coordination number for each O^{2-} ion?
 - b) Briefly describe the resulting crystal structure for K_2O .
 - c) Explain why this is called the antifluorite structure.

(The following tables are helping you to answer problem 2 and 3)

Coordination Number	Cation-Anion Radius Ratio	Coordination Numbers			
		Structure Name	Structure Type	Cation	Anion
2	<0.155				
3	0.155–0.225	Rock salt (sodium chloride)	AX	6	6
		Cesium chloride	AX	8	8
4	0.225–0.414	Zinc blende (sphalerite)	AX	4	4
		Fluorite	AX_2	8	4
6	0.414–0.732	Perovskite	ABX_3	12(A)	6
				6(B)	
8	0.732–1.0	Spinel	AB_2X_4	4(A)	4
				6(B)	

With my best wishes

- 9- Oxides such as and may form polyhedral oxide structures as well as SiO_2 . These oxides are termed Some other oxides such as and substitute for silicon and become part of and stabilize the network; those oxides are called
- 10- is a metastable carbon polymorph at room temperature and atmospheric pressure. Its crystal structure is a variant of in which carbon atoms Another polymorph of carbon is; it is more stable at ambient temperature and pressure.
- 11- There are two characteristics of the component ions in crystalline ceramic materials influence the crystal structure:
-
 -
- 12- Stable ceramic crystal structures form when those anions surrounding a cation are with that cation. (**Graphically support your answer**).
- 13- Some ceramic compounds with r_c/r_A ratios greater than 0.414 in which the bonding is highly covalent (and directional) have a coordination number of 4 (instead of 6) because

Second question: { 25 Marks }

- Describe in a table the characteristics of ceramics versus metals and polymers.
- A number of ceramic crystal structures may be considered in terms of close-packed planes of ions, as well as unit cells.
 - What do close-packed planes mean?
 - What are the two different types of the interstitial positions? (**Graphically support your description**).
- The expression “defect structure” is often used to designate the types and concentrations of atomic defects in ceramics, please describe two possible defects (**graphically support your answer**).
- Nonstoichiometry may occur for some ceramic materials. Please introduce an example and show how the crystal could preserve its electroneutrality. (**Graphically support your answer**)
- A unit cell of a perovskite crystal structure is shown in the following figure; which ceramic material is following such structure? “Please describe the ions distribution”.

