

TANTA UNIVERSITY FACULTY OF SCIENCE DEPARTMENT OF PHYSICS			
EXAMINATION FOR SENIORS (FOURTH YEAR) STUDENTS OF MATERIAL SCIENCE			
COURSE TITLE:	ELECTRON MICROSCOPY		COURSE CODE: MS4123
DATE: 23/12/2017	TERM: FIRST	TOTAL ASSESSMENT MARKS:100	TIME ALLOWED: 2 HOURS

ANSWER THE FOLLOWING QUESTIONS:

Q1 (25 Marks)

Write about:

- Mass-thickness contrast in TEM. (10 Marks)
- Electro-polishing and mechanical polishing in TEM. (10 Marks)
- Importance of vacuum in electron microscopy. (5 Marks)

Q2 (25 Marks)

- What are the possible processes that might happen when an energetic electron beam interacts with a solid? Enhance your answer with drawings. (10 Marks)
- Write about X-ray wavelength-dispersive spectroscopy XWDS. (10 Marks)
- What are the disadvantages of TEM (5 Marks)

Q3 (20 Marks)

- Write about the principles of electron generation in electron microscopy. (10 Marks)
- List the possible defects of electron lenses and write briefly about one of them? (10 Marks)

Q4- Choose the correct answer

(30 Marks, 3 marks each)

- A scanning electron microscope uses _____ to produce an image.
 - Negatively charged particles
 - Positive charged particle
 - Atoms
 - Neutral particlee
- Increasing the accelerating voltage in TEM leads to
 - A reduction in the scattering cross section of electrons
 - An increase in the electron wavelength
 - A reduction in spatial resolution
 - A reduction of penetration depth in the sample

علم صول
صح

جامعة طنطا

كلية العلوم

قسم الفيزياء

امتحان الترم الأول لطلاب الفرقة الرابعة
علوم المواد للعام الدراسي (٢٠١٧-٢٠١٨)
مادة السيرامك

الزمن: ساعتان

Answer the following:

- 1- How do you determine the crystal structure of BaTiO₃ ceramic?
- 2- How do you estimate the lattice parameters of the cubic and tetragonal unit cell?
- 3- Explain the hysteresis loop of BaTiO₃ ceramic.
- 4- Write a short note about the thermal conductivity of ceramic.



	TANTA UNIVERSITY- Faculty of Science -Department of Physics			
	EXAM FOR SENIORS STUDENTS OF MATERIALS SCIENCE			
COURSE TITLE	Materials Design		COURSE CODE: MS4121	
DATE:	30- 12 - 2017	TERM: FIRST	TOTAL ASSESSMENT MARKS: 100	TIME ALLOWED: 2 HOURS

First Question:

- 1- List the thermal protection system design requirements. [15Marks]
- 2- Write short notes about material selection for **integrated circuit** packages. [15Marks]

Second Question:

- 1- Discuss the **biocompatibility** during the Artificial Total Hip Replacement. [10Marks]
- 2- Mention the required **mechanical properties** of the hip joint replaced components. [10Marks]

Third Question:

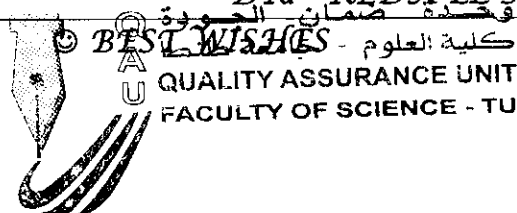
- 1- The successful operation of the Space Shuttle is dependent on-1 -----, that protects the inner airframe and its occupants from -2 ----- during the reentry phase from space into the earth's atmosphere. [30Marks]
- 2- Nylon felt, silicone rubber coating reusable surface insulation (FRSI) is employed on the Space Shuttle orbiter to save temperature from -3 ----- to -4 ----- and its location on the orbiter is-5 -----.
- 3- The Four basic components to the artificial hip-6 -----, -7 -----, -8 ----- and -9 -----.
- 4- The two models -10 ----- and -11 ----- are used for artificial hip prostheses where the principal disadvantage of the first is -12 ----- and for the second is -13 -----.
- 5- Acetabular Cup consists of -14 ----- insert that fits within the cup; this cup is fabricated from-15 -----, which, after implantation, becomes bonded to the pelvis.

Forth Question:


Helical spring of length (l), angle of deflection (θ), cross section diameter (d), modulus of rigidity (G) and spring index (C), when acted upon by torque (T), find

- 1- The stiffness of the spring ($\frac{F}{\delta}$), δ is axial deflection of spring. [10Marks]
- 2- Yield strength of spring. [10Marks]

EXAMINER	DR. REDA EL-SHATER
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علوم مواد

	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:1	JANUARY 2018	TERM: SUMMER	TOTAL ASSESSMENT MARKS: 100	TIME ALLOWED: 2 HOURS

Answer The Following:

First question:

{25 Marks}

A) Define the following:

(12 Marks)

1) Nanomaterials. 2- Bulk materials. 3- Grain size. 4- quantum dots.

B) What are the advantages of using (nanomaterials comparing to bulk materials) nanotechnology and microtechnology.

(13 Marks)

Second question:

{25 Marks}

A) Write short notes on the following:

(10 Marks)

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

B) Discuss the fabrication methods (top down-bottom up) of the nanomaterials; (give an example), declare your answer by drawing.

(15 Marks)

Third question:

{20 Marks}

A) Discuss briefly the methods for characterization of nanomaterials.

(10 Marks)

B) Discuss the application of nanomaterials in (Information and communications).

(10 Marks)

Fourth question:

{30 Marks}

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

a) Diseases treatment.

(10 Marks)

b) Environment.

(10 Marks)

c) Clean Energy.


(10 Marks)

Examiners	Prof. Talaat M. Meaz	Prof. Samia Saafan
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وحدة ضمان الجودة
كلية العلوم - جامعة طنطا
QUALITY ASSURANCE UNIT
FACULTY OF SCIENCE - TU

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 1969	TANTA UNIVERSITY FACULTY OF SCIENCE CHEMISTRY DEPARTMENT		
	FINAL EXAM FOR SENIOR STUDENTS (CHEMISTRY SECTION)		
	COURSE TITLE:	INDUSTRIAL CHEMISTRY (CH4123)	TIME ALLOWED: 2 HOURS
DATE: JANUARY 06, 2018	TERM: FIRST	TOTAL ASSESSMENT MARKS: 100	

Answer the Following Questions:-

1-(a)- Define each of the following terms:- (6 Marks)
(Crude oil – Penicillin – LPG - Drying oils - Natural gas- Octane number)

(b)- Briefly discuss:- (12 Marks)

- i) Properties of detergents.
- ii) The non-hydrocarbon compounds in petroleum.
- iii) Aromatic products and Chemical reactions carried out on benzene.

2-(a) Use the chemical equations to describe the following:- (20 Marks)

- i) Manufacture of alpha-eucaine.
- ii) Synthesis of Tramadol.
- iii) Fries rearrangement of phenolic esters.
- iv) Synthesis of Piperocaine.

(b)- Compare between:- (12 Marks)

- i) Mordant and Reactive dyes with examples.
- ii) Gasoline and Diesel Oil.
- iii) Acid and Basic dyes with examples.

3-(a) Write the Manufacture equations for: (4Marks)

- i) POX for H_2 production
- ii) H_2O_2



(b) Give reasons for the following statements: (20Marks)

- i) White phosphorous used in military.
- ii) Addition of V_2O_5 catalyst in manufacture of H_2SO_4 .
- iii) Graphite is a low density.
- iv) Using carbon in manufacture of white phosphorus.

Please turn over





	Tanta University Faculty of Science Physics Department		
	First Term Exam (Level 4, Materials Science)		
	Course Title	Microprocessing of Materials	
Date	11 / 1 / 2018	Total Assessment: 100 Marks	Time Allowed: 2 hours

Please answer all the following questions:

First question: { 25 Marks }

- 1- Compare briefly between 3 different techniques for a thin film deposition. (15 Marks)
- 2- Show graphically only the working principles of (a) the focus ion beam (FIB) milling and (b) electron beam (EB) lithography as methods for nanofabrication. (10 Marks)

Second question: { 30 Marks }

- 1- What we mean by nanoimprint lithography? Compare between thermal imprint and step-flash as two nanoimprint methods. (15 Marks)
- 2- Show graphically only the general sequence of processing steps for a typical photolithography process. (10 Marks)
- 3- Show graphically only the difference between positive and negative photoresists. (5 Marks)

Third question: { 30 Marks }

- 1- If you are requested to fabricate silicon V-grooves show two possible fabrication methods and declare the advantages and disadvantages of each method. (10 Marks)
- 2- In the fabrication process of Si micro/nano structures, is it necessary to expect and control the thickness of SiO₂? Why? (10 Marks)
- 3- Describe graphically, the basic idea of plasma etching of silicon using carbon tetrafluoride (CF₄) (10 Marks)

Fourth question: { 15 Marks }

- 1- How you can predict the photoresist thickness and why it is important predict and control the photoresist thickness? (10 Marks)
- 2- Show graphically a method enables you to grow silicon nanowires on the surface of a silicon wafer. (5 Marks)

***** With my best wishes, Examiner: Dr Salah E. El-Zohary *****



Tanta University
Faculty of Science
Physics Department



First Term Exam (Level 4, Materials Science)

Course Title

Microprocessing of Materials

Course Code: MS4131

Date

11 / 1 / 2018

Total Assessment: 100 Marks

Time Allowed: 2 hours

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	TANTA UNIVERSITY- Faculty of Science - Department of Physics			
	EXAM FOR 4 TH YEAR STUDENTS			
COURSE TITLE:	Detectors and Accelerator Physics		COURSE CODE: PH4163	
DATE:	14 JAN 2017	TERM: FIRST	TOTAL ASSESSMENT MARKS: 100	TIME ALLOWED: 2 HOURS

Answer the following questions

Question one (30 points)

A- If a proton has a total energy of 1 TeV, what is its value of β ?

(Hint: $m_p = 1.673 \times 10^{-30}$ g)

B- Put (✓) or (x) and then discuss why you choose your answer:

- 1- The detector efficiency can be classified into two types of efficiency
- 2- The advantage of ionization chamber detectors is their dead time
- 3- There are three possibilities for the wall effect in the BF_3 tube
- 4- The overall gain of a PM depends on the secondary emission factor δ only
- 5- The linearity of a PM depends strongly on the type of dynode configuration and the current in the tube only.
- 6- A high capacitance and a high frequency reduce the current dependence in the Cockcroft-Walton generator
- 7- Cyclotron is reasonable for accelerating electrons to high energies
- 8- In Betatron, the maximum energy for electrons is 300 MeV
- 9- In synchrotrons, focusing magnets are used.
- 10- The advantage of SSB detectors is their sensitivity to light
- 11- The length of the tube is the same in Wideroe's tube

Please turn the page for the other questions