	TANTA UNIVERSITY- Faculty of Science - Department of Physics			
	EXAM FOR 4TH YEAR STUDENTS			
	COURSE TITLE:	Detectors and Accelerator Physics		COURSE CODE: PH4163
DATE:	20 MAR 2021	TERM: SUMMER	TOTAL ASSESSMENT MARKS: 100	TIME ALLOWED: 2 HOURS

Answer the following questions

Question one (25 points)

Derive the following:

1- The phase space ellipse equation

2- The transfer matrix for a dipole magnet

3- Cyclotron condition

Question two (25 points)

Write about the following:

1- Photomultiplier tube

2- Output pulse versus voltage for gaseous detectors.

3- The Tandem accelerator

Question three (25 points)

Give the reason for the following:

1- Dark current in photomultipliers

2- Synchrotron cannot accelerate particles from zero energy

3- Some of the inorganic crystals are put in a protective enclosure

4- The cyclotron frequency is constant and does not depend on the particle velocity

5- In gaseous scintillation detectors, the inner wall of the photo multiplier is coated by a wavelength shifter

Please turn the page for the other questions

Question four (25 points)

A- Complete the following

1- Cotton gloves should be wear when dealing with plastic scintillators because .....

2- Energy resolution is the ability of the detector to.....

3- Coherent radiation happens when .....

4- The difference between wigglers and undulator is ....

5- Inorganic scintillators are slower in response than organic scintillators due to .....

6- In Microtron, the circumference of the orbit increases by.....

7- ..... has the highest light output of all the organic scintillators

8- In Betatron, the maximum energy for electrons is 300 MeV because.....

9- Admittance is .....

10-The principles of the cyclotron cannot be directly applied to electrons because.....

11- Coherent radiation is proportional to .....

12- The ..... is tunable in FEL.

B- Calculate the magnetic field, *B* and the Dee radius of a cyclotron which will accelerate protons to a maximum energy of 5 MeV if a radio frequency of 8 MHz is available. (Mass of proton = 1.67×10^{-24} g)

BEST WISHES

	جامعة طنطا كلية العلوم قسم الفيزياء	
	المستوى الرابع	PH4113
	Date: 13/3/2021	Final exam – First semester
	شعبة الفيزياء	Total mark =100
	ا.د/ماجدة ذكي سعيد د/فاطمة الزهراء فخري فهمي	Physical electronics

Answer the following questions:

First question:

1- Explain the PN junction theory then the forward and the revise bias PN junctions. [10 marks]

2- State the types of: [15 marks]
   a) periodic structure.
   b) cubic lattice.
   c) Bonding.

Second question:

1- Discuss the Pauli exclusion principle. [10 marks]
2- What is the extrinsic material and Explain their types? [15 marks]

Third question:

1- What is the behavior of excess carriers in semiconductors? [10 marks]
2- Find the difference between: [15 marks]
   a) Bonding energy level – Antibonding energy.
   b) Photoluminescence – Cathodoluminescence – Electroluminescence.
   c) Drift – Diffusion.

Fourth question:

3- State the reasons of: [10 marks]
   a) The electronic and optical properties of semiconductor materials are strongly affected by impurities.
   b) Silicon has a band gap about 1.1 eV while the diamond has about 5 eV.
4- Discuss and draw the electron orbitals of Silicon atom. [15 marks]

Good luck

	TANTA UNIVERSITY- Faculty of Science - Department of Physics			
	أمتحان المستوي الرابع - شعبة الفيزياء			
	COURSE TITLE:	الكترونيات رقمية		COURSE CODE: PH4153
DATE:	08 – 03 – 2021	TERM: FIRST	TOTAL ASSESSMENT MARKS: 100	TIME ALLOWED: 2 HOURS

Answer the following questions:

1- **Write the symbol , truth table and Boolean expression for each of the following gates :**

AND, NAND, OR, XOR, NOR ? **(25 Marks)**

2- **A-What we mean by comparator , explain 2 bits comparator ?**

B- What is the difference between Half adder and Full adder ? **(25 Marks)**

3- **A- Explain the JKFlip Flop and its triggering .**

B- How to use JKFlip Flop in the construction of ripple counter ? **(25 Marks)**

4- **A- Explain the serial In serial Out shift register .**

B- Write the binary bits the number 33 . **(25 Marks)**

EXAMINER	PROF. MOSTAFA EL-NIMR

☺ BEST WISHES ☺

	TANTA UNIVERSITY FACULTY OF SCIENCE DEPARTMENT OF PHYSICS		
	FINAL EXAMINATION OF 4TH YEAR PHYSICS STUDENTS		
COURSE TITLE:	**Astronomy I**		COURSE CODE: PH 4103
1/3/2021	TERM: FINAL	TOTAL ASSESSMENT MARKS:100	TIME ALLOWED: 2 HOURS

Answer the following questions:

Q1: Choose the correct answer (20 Marks)

1. The planetary orbits are _____ as we move outward from the Sun.

(a) closer (b) farther apart (c) evenly spaced (d) not changing

2. Beyond the outermost planet, Neptune, lies _____.

(a) the Kuiper belt (b) the planet Jupiter (c) the jovian planets (d) the terrestrial planets

3. The troposphere is the part of the atmosphere in which convection occurs.

(a) True (b) False

4. Earth's core temperature is comparable to the surface temperature of the Sun.

(a) True (b) False

5. An aurora occurs when trapped electrons and protons in the magnetosphere collide with the upper atmosphere.

(a) True (b) False

6. There is no volcanic activity today on the surface of the Moon.

(a) True (b) False

7. Compared with the Moon, Mercury has

(a) a much smaller core (b) a much larger core (c) a similar-sized core

8. Most craters on the surface of Venus are the result of volcanism.

(a) True (b) False

9. Compared with Earth, Venus is

(a) much smaller (b) much larger (c) about the same size

10. Jupiter is noticeably flattened due to its rapid rotation.

(a) True (b) False

Q2:Put true or false and correct the false one(s): (20 Marks)

1. Jupiter emits less energy than it receives from the Sun.
2. There is no volcanic activity today on the surface of the Moon.
3. Earth's core temperature is comparable to the surface temperature of the Sun.
4. Earth's magnetic field is the result of our planet's large, permanently magnetized iron core.
5. Mars has strong magnetic field.
6. Europa is one of the Mercury largest moons.
7. Craters on the Moon and Mercury are primarily the result of volcanic activity.
8. Martian atmosphere is mostly nitrogen.
9. Titan is the largest moon of Mars.
10. Mercury's solar day is longer than its solar year.

Q3:- (30 Marks)

Explain briefly:

(1) What causes the colors in Jupiter's atmosphere.

(2) How the Moon produces tides in Earth's oceans.

(3) The main differences between terrestrial and jovian planets.

Q4:- (30 Marks)

1. What is the greenhouse effect, and what effects does it have on Earth's surface temperature?

2. a- Give a description of Earth's magnetosphere (with drawing) and explain what will happen to Earth if it is not exist.

3. Venus is a victim of a runaway greenhouse effect.

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

	جامعة طنطا كلية العلوم قسم الفيزياء	
	امتحان لطلبة كلية العلوم الشعبة : فيزياء- علوم مواد- فيزياء حيوى	
	الفرقة الرابعة	كود المقرر : PH 4264
	Date: /12/2020	الزمن : ساعتان

Answer the following questions:

Question 1-

a- True or false :(25 deg.)

1- Neutron activation analysis has been used to study the contamination of Nile River,
2- Ion beam technique is used to measure the weight of the target,
3- Mossbauer technique is special technique for copper.

b- Write down about the applications of Mossbauer technique.

Question 2- **Write down on :(25 deg.)**

a- "Nuclear analytical techniques still suitable for study samples in all fields of life", discuss.

b- **Complete the following sentences:**

1- All nuclear analytical techniques contain three main parts ....., ..., and .....
2- XRF is a powerful technique to study .....

Question 3- **(25 deg.)**

a- How can you choose a technique to use?
b- Describe in brief ion beam analytical techniques and discuss their applications.

Question 4- **(25 deg.)**

a- **Define:** Neutron activation analysis, nuclear analytical techniques, inelastic scattering, mean free path.
b- Draw a chart for the future of nuclear analytical techniques?

With my pest wishes (Dr. Ahmed Amar)

	Tanta UNIVERSITY- FACULTY OF SCIENCE -DEPARTMENT OF PHYSICS			
	EXAM for Seniors students OF physics			
	COURSE TITLE:	Condensed Matter Physics متطلب تخرج ديسمبر 2020		COURSE CODE: PH4214
DATE:	29-12-2020	TERM:	TOTAL ASSESSMENT MARKS: 100	TIME ALLOWED: 2 HOURS

Answer the following questions:

First Question : (25 Marks)

A. Discuss briefly according to Russell- Sanders Coupling and spin- orbit interaction, the precession of vectors **L** and **S**, and their moments around constant vector **J**.

B- Name the chalcogen elements, then represent in the form of structural units for the following:

- The elemental Ge, and Selenium .
- The binary compound $GeSe_2$, and the ternary compound $TlAsSe_2$.

Second Question: (25 Marks)

A- Find the relation which expresses the variation of the reduced magnetization with reduced temperature, and which depends exclusively on the the form $B_j(y)$ function.

B- Define the following
Glass transition, Curie, Néel , and compensation temperatures, Internal magnetic field, and Heisenberg exchange interaction between the atomic spins.

Third Question: (25 Marks)

A- Give a short account on the behavior of the susceptibility of a piece of poly crystalline sample of an anti ferro magnetic material in a range of temperatures between 0K- T_N K , **and** state the relation between the susceptibility $\varkappa_{poly}$ and $\varkappa_{//}$ and $\varkappa_{\perp}$ at 0, T_N K.

B- Calculate the quantum numbers of the ground state of the $3d^7$, $4f^5$ ions, and the value of the Landé g-factor, then find their spectroscopic notations.

Forth Question: (25 Marks)

A-Explain briefly the character behavior of any three physico-chemical properties of a glassy system containing two chalcogen elements that has been changed from dielectric binary chalcogenide system to a ternary glassy semi-conductor.

B- Write a Short note about the physical properties of amorphous metallic alloys
(TM-M)

EXAMINER	PROF. HASSANEIN ELLABANY

☺ BEST WISHES ☺

	TANTA UNIVERSITY- Faculty of Science - Department of Physics		
	EXAM FOR 4RD YEAR SCIENCE STUDENTS		
COURSE TITLE:	LASER APPLICATIONS		COUESE CODE: PH 4224
DATE: 31/12/2020	TERM: SECOND	TOTAL ASSESSMENT MARKS: 50	TIME ALLOWED: 2 HR

Answer all the questions

Question one

a-what are the basic components of laser ?

b-Reflection coefficients of mirrors are 0.986 and0.94 All loss in round trip is 0.5 %, calculate the medium gain.

Question two

a- Explain the conditions which determine the radiations modes created in common laser.

b- The length of optical cavity in He-Ne laser is 50 cm and the emitted wavelength is 0.6328 mm, Calculate

1-The difference in frequency between adjacent longitudinal modes .

2- The number of the emitted longitudinal mode at these wavelengths .

3-The laser frequency.

Question three

Draw the energy levels diagram of **He-Ne laser** and discuss its operation, working and applications

Question four

Discuss in detail the construction, working of **Ruby laser, its advantage**, and **its applications.**

Good luck

	TANTA UNIVERSITY- Faculty of Science -Department of Physics			
	EXAM FOR SENIORS STUDENTS OF PHYSICS			
	COURSE TITLE:	Solid State Physics II		COURSE CODE: PH4171
DATE:	6-1-2021	TERM: FIRST	TOTAL ASSESSMENT MARKS: 100	TIME ALLOWED: 2 HOURS

Answer the following questions:

1- A- **State** Bloch's Theorem and **prove it** in 1-Dimension. **(20 Marks)**

B- **Define:** Drude model, the ground state, ε_f and k_f. **(10 Marks)**

2- A- **Find** the wavefunction of a Free Electron in Three Dimensions. **(10 Marks)**

B- **Deduce** the electrical conductivity in a metal described by the free electron model. **(10Marks)**

3 - Define: **(20 Marks)**

1. the dielectric material
2. the relative permittivity
3. the dielectric constant
4. the dielectric strength
5. polar dielectrics.

4-**Explain shortly** the four different mechanisms of polarization in dielectrics. **(20 Marks)**

5- **Mark in between brackets** right or wrong. In the case of wrong statement **write down the correction:** **(10 Marks)**

1. The atoms may be arranged in a solid in a regular geometric pattern (crystalline), or irregularly (an amorphous) depending the conditions in which it was formed but independent on the material itself. ( )
2. In the free electron theory the Hamiltonian is given by the operator of $p^2/2m$ + the operator of the potential. ( )
3. The density of states is defined as the number of orbitals per unit energy range. ( )
4. The electrical resistivity of most metals is dominated at room temperature by collisions of the conduction electrons with lattice imperfection and impurity atoms and at helium temperature with lattice phonons. ( )
5. $\psi^{(+)}(x) \propto \exp(i\pi x/a) + \exp(-i\pi x/a) \propto \cos(\pi x/a)$

   $\psi^{(-)}(x) \propto \exp(i\pi x/a) - \exp(-i\pi x/a) \propto \sin(\pi x/a)$

   These two wavefunction equations represent two standing waves that will pile-up electrons at the same potential energies. ( )

EXAMINER	PROF. DR. SAMIA AHMED SAAFAN

☺ **BEST WISHES** ☺

	TANTA UNIVERSITY FACULTY OF SCIENCE DEPARTMENT OF PHYSICS		
	EXAMINATION OF 4TH YEAR BIOPHYSICS STUDENTS		
COURSE TITLE:	Astrobiology I		COURSE CODE: PH4103
1/3/2021	TERM: FINAL	TOTAL ASSESSMENT MARKS:50	TIME ALLOWED: 2 HOURS

Answer the following questions

Question One: (15 MARKS)

1. Explain how the green-house effect and Earth's magnetic field protect our life.

2. What are the six characteristics of life?

Question Two: (15 MARKS)

Explain the following:

a) A habitable planet.
b) Galileo's contribution to astronomy.
c) Kepler's laws.

Question Three: (10 MARKS)

1. Explain why Earth is silicon rich, but life is carbon-based?

Question Four: (10 MARKS)

Explain, with drawing, how CO_2 regulates Earth's climate?

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