



Answer the following questions:

1. (a) Drive an equation for the density of electrons in the intrinsic semiconductors.
(b) The complex dielectric constant of CdS is given by the relation:

$$\varepsilon^* = 9.2 + i 3.4$$

At $\lambda = 530$ nm. Deduce the refractive index (n), the phase velocity (v), the extinction absorption coefficient (α) and the reflectivity (R).

- (c) The band gap of an alloy semiconductor zinc cadmium sulfide is 3.75 eV. Calculate the wavelength of radiation that is emitted when the direct recombination from conduction band to valence band between electrons and holes occurs.

(12mark)

2. (a) Explain in details **two** of the following:

1. Generation and recombination process of charge carriers in semiconductors.
2. Diffusion and drift currents.
3. Hall effect and its application.

- (b) Calculate the position of Fermi level and the conductivity at 300 K for germanium crystal containing 5×10^{22} arsenic atoms/ m^3 . Also, calculate the conductivity if the mobility of the electron is $0.39 \text{ m}^2 \text{ V}^{-1} \text{ sec}^{-1}$

(12mark)

3. (a) Explain in details **two** of the following:

1. Light emitting diode.
2. Inter-band optical absorption process.
3. Laser diode.

- (b) Discuss the different types of exciton absorption process in semiconductors.

(12 mark)

4. Write on different types of the following:

- (a) Experimental techniques of thin films preparation.
- (b) Photoluminescence emission process.

(14 mark)

With my best wishes
Prof. Dr. Mohamed A. Osman



Assiut University
Faculty of Science
Physics Department
M. Sc. Final Exam, Sep. 14, 2015
Course: Radiation doses measurement (662P)
Time: 3 hours
(Total mark= 100 Marks)



Answer the following questions:

Question 1

(25 marks)

Calculate the half-life of the radioactive sample from the following series of measurements:

Time (min)	0	1	2	3	4	5	6	7	8
Activity (counts/min)		820	605	447	330	243	180	133	98

Question2

(25 marks)

By using Bateman equations, distinguish between secular, transient and No equilibrium.

Question 3

(25 marks)

Distinguish between different types of radiation detectors.

Question 4

(25 marks)

Explain the electronic instrumentation for radiation detection systems.

Good luck

Course coordinator: Dr. Hany Tawfik El-Gamal

جامعة أسوط	امتحان تمهيدى ماجستير	الكلية: العلوم
كلية العلوم	"اطياف ذرية 625 ف"	القسم: الفيزياء
قسم الفيزياء	تاريخ الامتحان: 2015/9/9م	الزمن: ثلاث ساعات

أجب عن خمسة أسئلة فقط مما يأتي

السؤال الأول:

اشرح المبادئ الأساسية المبني عليها نموذج الذرة المتجه والأعداد الكمية المصاحبة له

السؤال الثاني:

اشرح تأثير زيمان العادى وكيف تفسره طبقاً للنظرية الكلاسيكية. ثم احسب ازاحة زيمان

السؤال الثالث:

اشرح التركيب الدقيق للخط الطيفى H_{α} لذرة الايدروجين

السؤال الرابع:

اشرح قاعدة هوند لايجاد الحد الطيفى الأساسى للذرة. ثم احسب الحدود الطيفية الأساسية لكل من ذرات : الكروم - الكوبلت - النحاس علماً بأن الأعداد الذرية لها هي 24، 27، 29 على الترتيب

السؤال الخامس:

اكتب مقال مختصر عن التركيب الفوق دقيق للطيف الذرى. موضحاً ذلك بمثال.

السؤال السادس:

اشرح تأثير شتارك الناتج من مجال كهربى ضعيف على الخط الطيفى H_{α} لذرة الايدروجين

=====

د. على محمود حافظ

انتهت الاسئلة مع أطيب الامنيات بالنجاح والتوفيق

Assiut University
Faculty of Science
Physics Department



Course Title: Special Course

Course Code: 667P

Program: Master in Physics

Date: Sep. 9, 2015

Time Allowed: 3 hours

Final Exam (100 Marks)

A) Answer ALL the Following THREE Questions.

Question 1 **(40 Marks, 20 per each)**

a) Discuss the distribution of radionuclides in the following environments;

Aquatic environment (including oceans, rivers and lakes); Atmospheric environment.

b) Describe the effect of nuclear activities on the environmental radioactivity levels.

Question 2 **(30 Marks, 15 per each)**

a) Define the solvent extraction technique illustrating the equipment needed to perform the extraction of nuclear materials. Support your answer with examples.

b) Discuss two of the biological indicators in radiation dose-assessment.

Question 3 **(30 Marks, 15 per each)**

a) Compare between deterministic and stochastic effects of radiation.

b) Give short notes in the industrial and medical applications of radtion.

End of the Exam.....Good Luck

Dr. Mohamed Omer

Answer all the following questions. [10 Marks for each a or b].

1-a) Discuss the optical coefficients in an optical medium.

b) GaAs has a reflective index of 3.68 and an absorption coefficient of $1.3 \times 10^6 \text{ m}^{-1}$ at 800 nm. Calculate the transmission coefficient and optical density of a sample with a thickness of 2 μm .

2-a) NaCl salt absorbs IR wavelengths. The complex dielectric constant at wavelength of 60 μm is given by $\epsilon_r = -16.8 + 91.4 i$.

Calculate: (i) the absorption coefficient (ii) the reflectivity.

b) Explain the characteristic optical physics for organic compounds as molecular materials.

3-a) Clarify the interband optical transitions.

b) Show the frequency dependence of the band edge absorption (Take InAs as an example).

4-a) If the transmission of a direct gap material at 620 nm is 0.37%. The absorption coefficient at 775 nm is $3.5 \times 10^6 \text{ m}^{-1}$. A platelet sample 1 μm is made with antireflection coated surfaces. Calculate the band gap.

b) Explain the indirect transition of an electron with showing the role of phonons.

5-a) Discuss the interband absorption above the band edge.

b) Explain with drawing the schematic diagram for measurement the absorption spectra.

With best wishes

Prof. Dr. Mostafa Boudi



Answer all the following questions

Question 1.

(30 Marks)

- i. Determine the time required to obtain a Cu deposit of thickness 1 μm when electrodeposition is done at 4 and 6 A. The surface area of the substrate is 314 cm^2 . [Hint: $\rho_{\text{Cu}} = 8.93 \text{ g/cm}^3$] (5 Marks)
- ii. When a current of 3 A flows for 8 min through a cell composed of two Pt electrodes in a solution of $\text{Cu}(\text{NO}_3)_2$ in dilute HNO_3 acid, 0.36 g of Cu is deposited on the cathode. Calculate the current efficiency for the deposition of copper. [Hint: $A_{\text{Cu}} = 63.55 \text{ g/mol}$; $F = 96487 \text{ C mol}^{-1}$] (5 Marks)
- iii. Give a short definition for FIVE only of the following: (10 Marks)
 - a. Compact nonporous barrier-type and porous-type AAOs.
 - b. The porosity.
 - c. The Pilling-Bedworth ratio (PBR).
 - d. The pore density.
 - e. The electroless deposition.
 - f. Hard and Mild anodization.
- iv. Show schematically the procedure for the fabrication of ultrathin AAO membrane on a substrate the and then show schematically how it can be used fabrication of 2D extended arrays of (a) nanoholes, (b) nanodots, (c) nanopillars, and (d) nanowires by using ultrathin AAO membranes as mask.

(10 Marks)

Question 2:

(20 Marks)

What are the anodization parameters and show the effects of each one of them on the anodic aluminum oxide structures.

Question 3:

(15 Marks)

Discuss in details the electrochemical transient curve during the galvanostatic or potentiostatic anodization of Al thin films.

Question 4:

(15 Marks)

Investigate the growth of metal films by electrodeposition on metal and glass/ITO substrates, and explain the properties of electrodeposited film including crystallinity, microstructure, adhesion, mechanical properties, and optical properties.

Question 5:

(10 Marks)

State the methods that can be used to determine the oxide thickness, and discuss ONE of them in details.

Question 6:

(10 Marks)

Discuss in details the impedance spectroscopy technique and show the advantages and disadvantages of this technique.

Best Wishes,,,

Assiut University	Graduate	Course : Nuclear Structure
Faculty of Science	Final Exam	Code : P 630
Department of Physics	September 2015	Time : 3 Hours
		Date : 16/9/2015

Answer four questions only of the following questions:

Question (1):

- Write short notes about the properties of two-nucleon potential.
- Discuss different types of equations that can be used to describe two-nucleon potential.

Question (2):

Derive the Rutherford differential cross section. What is the difference between Rutherford scattering and nucleon-nucleon scattering.

Question (3):

- Derive wavefunction of combined angular momentum by vector addition to get the Clebsch-Gordan coefficient.
- Construct and draw the singlet and triplet energy levels of excited state $1s\ 2p$.

Question (4):

- Why proton-proton scattering experiment is easier than neutron-proton experiment?
- Derive proton-proton scattering in terms of effective range calculation.

Question (5):

Find the spin dependence of scattering cross section for neutron-proton scattering at low energies.

M.Sc. Examination
Course title: plasma physics
Course Code:655P
Allowable time: three hours

بسم الله الرحمن الرحيم

Assiut University
Faculty of Science
Physics Department
Date:16/9/2015

Answer the following questions

- 1- a- Prove that the mean free path of gas molecules depends on both gas temperature and pressure.
b- Show that the relative velocities of two collided particles before and after the collision are equal
- 2- a- Deduce an expression for the diffusion coefficient of the charged particles in the absence and presence of the magnetic field in plasma medium
b- Prove that the net current of the ambipolar diffusion depends on the mobilities of electrons and ions in plasma
- 3- a- show that the magnetic moment produced from the motion of the charged particles in a time dependent magnetic field is invariable
b- Study the motion of charged particles in the constant electric and magnetic fields
- 4- a- Find an expression for the following:
i- the plasma dielectric constant
ii- the total stored energy in the plasma medium
b- Deduce the relation between the filament current and absolute temperature in the pinched plasma.
- 5- A- Deduce an expression for the angular wave number of ions proportion along x-direction in plasma medium and show when it will be maximum and minimum.
b- Prove that the Alfvén waves velocity in plasma medium depends on the magnetic field effect

Good luck

Prof. Dr. A. A. Turkey



Faculty of Science
Physics Department

Date: 16 December, 2015

Time Allowed: 3 hours

Written Examination for the Qualification of the M. Sc. Degree in Science
(Physics)

[Crystal Structure 609 F]

Teaching Staff: Prof. Dr. Abdulaziz Abualfadl

Answer 5 questions from the following: [20 marks for each]

1- (a): How the laue technique particularly convenient for checking the orientation of crystals. Show why laue method can not be used for crystal structure determination.

(b): Explain the advantage of the powder diffraction technique. What is the case if the grain size of the material used is fairly large?

2- (a)-What are the advantages and disadvantages of using neutron diffraction for structure determination?

(b)- Show that for neutrons when $\lambda = 1\text{\AA}$ this yields an energy of same order of magnitude as thermal energy (kT). What is the wavelength of thermal neutrons at 0 °C and 100 °C.

(c)- A beam of thermal neutrons emitted from the opening in a reactor come into thermal equilibrium at the temperature of 100 °C and diffracted by the (212) planes of a cubic crystal at an angle 34°. Calculate the unit cell parameter.

3- (a)- Show the technique of X-ray structure determination in which a single crystal specimen is rotated in a beam of monochromatic X-rays.

(b)- A crystal has a cubic unit cell of 4.2 °A. Using a wavelength of 1.54 °A. What is the angle (2θ) for the (111) peak.

4- (a)- Find the atomic packing factor for face centered cubic (F.C.C) crystal.

(b)- Show that if the crystal undergoes volume expansion, then the reflected beam is rotated by the angle

$$\delta\theta = -(\gamma/3) \tan\theta$$

Where γ is the volume expansion coefficient and θ the Bragg angle.

باقى الأسئلة فى خلف الصفحة

5- Find the geometrical structure factor (F_{hkl}) for body centered cubic (B.C.C) by taking the cell contain one eighth of an atom at each of its eight corners, plus one atom at the center.

6- (a) What is the meaning of the crystallographic symbols: m , $\bar{3}$, $4/m$, 4 , $X3$, X/mm , and show the equivalence of: $\bar{2}$ and $\bar{6}$.

(b)- Write on the format of the Powder Diffraction File (ICDD cards).

انتهت الأسئلة مع أطيب الأمنيات بالتوفيق

الاختبار التمهيدي لدرجة الماجستير ٢٠١٥- فيزياء احصائية ٦٠٦ ف – الزمن المتاح: ثلاث ساعات. الأسئلة متساوية الوزن. اجب عن الآتي:

1-a) Give the virial equation of state in three forms (i.e. in terms of volume, density, and pressure).

1-b) Present van der Waals equation of state as a virial equation of state and then determine the second virial coefficient. Hint: you may need the expansion: $\frac{1}{(1-x)} = 1 + x + x^2 + x^3 + \dots$, $|x| < 1$

2-a) Write down Schrodinger equation and the corresponding eigen value for a rigid rotator and for a harmonic oscillator.

2-b) Use the eigen values to express the partition function for each.

3-a) Show that the direction of spontaneous change for a gas in a pair of two connected vessels is in the direction of: low probability to one of maximum probability, i.e. obtain the famous expression for the entropy

$$S = k \ln \left(\frac{V_f}{V_i} \right)$$

V_f is the final volume and V_i is the initial volume

3-b) Use the thermodynamic laws to reach the same result.

4-a) Distinguish between different types of ensembles and give a mathematical definition of the probability density in two of them.

4-b) Obtain an expression for the partition function of the ideal gas, then calculate: Helmholtz free energy – the average energy – pressure (the ideal gas equation of state) – the entropy.

5-a) Given two fermions, each has three energy states : $\varepsilon_1, \varepsilon_2, \varepsilon_3$. Obtain the allowed energy states and then calculate the partition function.

5-b) Do the same problem (5-a) if the particles are bosons.



Computational Physics – Code: P652

Answer only four questions out of the following

1.

- Evaluate numerically $I = \int_0^{\pi/2} \sin(2 \cos x) \sin^2 x \, dx$ using the trapezoidal rule and 8 panels.
- Write a short Fortran code to use the Lagrange method for interpolation for tabular data stored in in a text file.

2.

- Discuss the secant method and show a flow chart to find the root of some function with error ϵ .
- Find the Taylor series expansion for $f(x) = \ln(1-x)$ near $x=0$. Explain why this function cannot be expanded near $x=1$.

3.

- You are given a user defined function returning n sample points (x_k) and weights (w_k) over a domain from -1 to 1. Write a Python algorithm to perform Gauss quadrature of the function $x^4 - 2x^2 + 1$ from 0 to 4 using 3 slices.
- Using the Lagrange interpolation method find $f(10.6)$ for the following function:

X	4	6	8	11.6	14
$f(x)$	0	0.569	0.791	0.224	-0.185

4.

- Use the Newton method to find the $\sqrt[3]{35}$ accurate to six decimal places with initial guess of 3.
- Visualize two planets rotating around a stationary star. Use relative values for diameters $R_{\text{star}} = 3R_{\text{planet1}} = 5R_{\text{planet2}}$. The program should ask the user for periodic time (T) then apply Kepler's 3rd law $r^3 = \left(\frac{GM_s}{4\pi^2}\right) \cdot T^2$ to calculate the distance (r) between each planet and the star. You can scale the constant $\left(\frac{GM_s}{4\pi^2}\right) = 1$ or some number of your choice.

5.

- Describe the Simpson rule for numerical integration. What are its advantages compared to the trapezoidal rule.
- Explain in detail what this part of code is doing.

```

aaa=1000.0
do i=1,n
    as1=xv-x(i,1)
    if (abs(as1).lt.aaa) then
        aaa=as1
        baseline=x(i,1)
    endif
enddo
do i=1,n
    x(i,3)= factor*(x(i,1)-baseline)
    if(x(i,3).eq.0.0) then
        m=i
    endif
enddo

```

```

xv=factor*(xv-x(m,1))
endif
enddo
gh=1.0
ffx=0.0
do k=1,n-2
    gh=gh*k
    ffx=ffx+(xv*delf(m,k)/gh)
    xv=xv*(xv-k)
enddo
ffx=ffx+x(m,2)

```




Computer Programming – Code: P611

Answer only four questions out of the following

[25 marks each]

1.

- Visualize in Python a 3D bcc crystal of spheres with dimension $10 \times 10 \times 10$ units. The crystal has two species (for example NaCl) so you should use two colors alternately.
- The Python functions range, arange and linspace are used in similar situations. Explain the uses and differences between them.

2.

- Write a short Fortran code to use the Lagrange method for interpolation for tabular data stored in a text file. Comment as necessary.

$$\begin{pmatrix} 1 & 3 \\ 2 & 4 \end{pmatrix} \begin{pmatrix} 4 & -2 \\ -3 & 1 \end{pmatrix} + 2 \begin{pmatrix} 1 & 2 \\ 2 & 1 \end{pmatrix}$$

- Write a short code to perform this operation.

3.

- You are given a user defined function returning n sample points (x_k) and weights (w_k) over a domain from -1 to 1. Write a Python algorithm to perform Gauss quadrature of the function $x^4 - 2x^2 + 1$ from 0 to 4 using 3 slices.
- Using the Lagrange interpolation method find $f(10.6)$ for the following function:

x	4	6	8	11.6	14
$f(x)$	0	0.569	0.791	0.224	-0.185

4.

- For projectile motion, write a Fortran program to read in the launch angle a , the time since launch t , and the launch velocity u , and compute the position, the velocity and the angle with the ground. Keep in mind that:
 $v_x = u \times \cos(a)$ is constant and $x = v_x \times t$
 $v_y = u \times \sin(a) - g \times t$ and $y = u \times \sin(a) \times t - g \times t^2 / 2$

Look back

- b. Describe the Simpson rule for numerical integration. What are its advantages compared to the trapezoidal rule

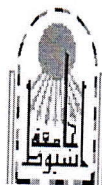
5.

- a. Visualize two planets rotating around a stationary star. Use relative values for diameters $R_{\text{star}}=3R_{\text{planet1}}=5R_{\text{planet2}}$. The program should ask the user for periodic time (T) then apply Kepler's 3rd law $r^3 = \left(\frac{GM_s}{4\pi^2}\right) \cdot T^2$ to calculate the distance (r) between each planet and the star. You can scale the constant $\left(\frac{GM_s}{4\pi^2}\right) = 1$ or some number of your choice.

- b. Explain in detail what this part of code is doing.

<pre> aaa=1000.0 do i=1,n as1=xv-x(i,1) if (abs(as1).lt.aaa) then aaa=as1 baseline=x(i,1) endif enddo do i=1,n x(i,3)= factor*(x(i,1)-baseline) if(x(i,3).eq.0.0) then m=i </pre>	<pre> xv=factor*(xv-x(m,1)) endif enddo gh=1.0 ffx=0.0 do k=1,n-2 gh=gh*k ffx=ffx+(xv*delf(m,k)/gh) xv=xv*(xv-k) enddo ffx=ffx+x(m,2) </pre>
---	---

Best wishes



Pre- Master Exam. In "Experimental Solid state Physics " (601 P)

Sep, 2014

Time allowed: 3 hours

Answer only four questions: (all questions carry the same weight 25 points)

- 1-a) Discuss, using ρ vs. T plots, the main types of the resistivity contributions at different temperatures.
- 1-b) If the scattering cross-section of the electron at Debye temperature given by: $\phi_f = \text{const.} \cdot x^2$ where x is the vibration amplitude, use the kinetic theory to deduce the total energy of an atomic oscillator.
- 1-c) Compare between the crystalline and amorphous band structure (draw a schematic graphs).
- 2-a) Use the entropy–temperature curve to find the change of entropy corresponding to the change in magnetic moment for a paramagnetic salt cooled at 4 K under applying an external magnetic field H .
- 2-b) prove that the frequency ω of the electron due to flux density given by: $\omega = \pm(\omega_0 - eB / 2m)$.
Discuss its physical meaning.
- 2-c) Describe the classification of an imperfection order in solids.
- 3-a) Using the eqn. of motion of the Na^+ , and Cl^- to prove that the ionic polarization depends on the effective Mass of the ionic dipole according to the eqn: $\alpha_i = e^2 / \omega_0^2 m^*$, where ω_0 the frequency of static field.
- 3-b) Explain three of the different methods used for structure examination for bulk specimen and thin films.
- 3-c) Illustrate with the equations the parameters that depend on the conductivity of the crystalline states.
- 4-a) According to the Closous eqn: $\frac{(K+2)}{(K-1)} = \left(\frac{3\varepsilon_0}{N\alpha}\right)$, prove that the transformation from Ferro to Para-electric phase at curie temp. T_C can be described by: $K = A(T - T_C)^{-1}$, discuss physical meaning of the catastrophe polarization.
- 4-b) Prove that the constant A represents the inverse of the expansion coefficient of the Para-electric material.
- 5-a) If E_V is the energy required for producing the Schottky vacancy, prove that the concentration of Schottky defects given by: $C = \exp(-E_V / KT)$, explain the physical meaning that the variation of resistivity with temperature can be used to study the structural properties of the material.
- 5-b) Discuss the conduction mechanism in amorphous S.C at temperature higher than T_g .



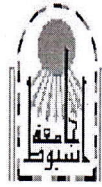
Pre- Master Exam. In "Experimental Solid state Physics " (601 P)

Sep, 2014

Time allowed: 3 hours

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N.B. Please define all symbols used in your answer

(100 Marks)

Answer **only four** of the following questions:

1- Explain what is meant by the following reactions

- i) Elastic scattering
- ii) Inelastic scattering
- iii) Knock-out reaction
- iv) Direct reaction
- v) Compound nucleus reaction

(25 Marks, 5 Marks for each item)

2- Derive the relation between the Coulomb (Rutherford) differential scattering cross section and the scattering angle in the center of mass system. (25 Marks)

3- The optical model is usually used to express the nucleus-nucleus potential. Define this model and determine the formalisms and parameters used in this model. (25 Marks)

4- Using the semiclassical (WKB) approximation find the scattering phase shift. (25 Marks)

5- What is meant by coupled-channels reaction? Use the distorted wave Born approximation (DWBA) to derive the inelastic scattering matrix. (25 Marks)

Good luck

Course coordinator: Prof. Dr. Mohamed El-Azab Farid

Faculty of Science

Assiut University

Postgraduate Exam.

Master Degree in Physics

Modern Biophysics (663 P)

Sep. 2015

Time allowed: 3 hours

Try on all of the following:

(Total Marks: 100 Marks)

I- Briefly write on:

A – Isotopes. B - The mechanism of radioactive decay.

C - The unit of radioactivity.

(10 Marks each)

II- Discuss the following phenomena:

A - Interaction of radiation with matters and its penetrating power.

B - Absorption of energy and ionization.

(15Marks each)

III- Concisely explain the following:

A - The definition of: Absorbed dose, Equivalent dose and Effective dose.

B - The dose rate and flux.

(20 Marks each)

Good luck.....



التاريخ: السبت 2015/9/5
الزمن: 3 ساعات

امتحان الدراسات العليا 2015

في مقرر

طرق الفيزياء التجريبية (633ف)



جامعة أسيوط

كلية العلوم - قسم الفيزياء

Answer on the following questions:

- 1) a) For an ideal gas, drive the relation between its pressure (p) and the number of molecules (N) which impinge on unit area of the boundary in the gas per second?
b) The unit of a gas pressure plays an important role in its experimental measurements, so, fill in the following spaces:
1 torr = mm Hg
= m bar
= Pascal.
- 2) Classify the production of vacua, and describe one of them, in details?
- 3) Find the Debye Screening Distance?
- 4) Write a short notes on Langmuir probe measurement, and state its important characteristics?
- 5) Discuss the transmission of electromagnetic waves through a plasma medium?

I WISH YOU GOOD LUCK



Assiut University
Faculty of Science

Department of Physics

Subject: Thermal analysis
Time : 3 Hours
M.Sc. Examination

Final Exam

Date 14 : /09 /2015

Answer the following questions:

(100 marks)

Question (1):

a) Using Johnson- Mehl- Avrami (JMA) equation:

$$\chi(t) = 1 - \exp(kt)^n$$

where $\chi(t)$ is the volume fraction transformed at time (t), n is the Avrami exponent and k is the crystallization rate constant.

Discuss in detail how can determine the crystallization parameter n , k and E_c (activation energy).

b) Using the following data:

Time (t) Sec	4	5	6.5	8	10	12	11.5
$\chi(t)$	0.05	0.15	0.25	0.4	0.6	0.8	0.97

Calculate the Avrami exponent (n) and the crystallization rate constant (k).

Question (2):

Compare between the Differential Scanning Calorimetry (DSC) and the Differential Thermal Analysis (DTA) techniques.

Question (3):

Discuss briefly the methods used to determine the crystallization parameters under non-isothermal conditions based on the JMA model and drive in details one of them.

Question (4):

a) Discuss the methods generally used to determine the crystallization parameters based on the isoconversional models and compare between the approximate methods and the isoconversional methods.

Question (5):

Explain in details the applications of the Thermogravimetric Analysis (TGA).

BEST WISHES



M. Sc. Exam. : Special Course – PHYS 619

Answer four of the following five questions (25 degree for every question)

- (1) Explain in details an experimental method for magnetization measurements.
- (2) Define the magnetic susceptibility and explain an experimental method to measure it.
- (3) Discuss the quantum theory of paramagnetism.
- (4) Discuss the ferromagnetic behavior using the quantum mechanical exchange force used by Heisenberg.
- (5) Explain the physical origin of magnetic anisotropy and how to extract the magnetic anisotropy constants from the magnetic curves of a single crystal.

Best wishes
Dr. Mohamed Almokhtar



التاريخ: الأثنين 2015/9/14
الزمن: 3 ساعات

امتحان الدراسات العليا 2015

في مقرر
مقرر خاص (634) ف



جامعة أسيوط
كلية العلوم - قسم الفيزياء

Answer on the following questions:

1) Discuss the different methods of gaseous ionization?

2) Write a detailed article on

Anode Corona

or

Cathode Corona

3) Give schematic diagrams on:

a) Streamer propagation

b) Trickle pulses

I WISH YOU GOOD LUCK



Course Title: Radiation Physics - Code: P623 - Final Exam

Answer for the following questions

Question 1: (20 marks)

Differentiate between two different gamma spectrometers referring to the construction parameters method of operation, efficiency of detection and the energy resolution of each.

Question 2: (20 marks)

Discuss the theory of inelastic collision between photons and free electrons inside the atom. Prove that the change in the wavelength of the scattered photon depends on the angle of scattering. Calculate the K.E. of the recoil electrons and find the relation between the two scattering angles.

Question 3: (20 marks)

- a) Any nucleus contains protons, but never electrons, Prove.
- b) Discuss Fermi's theory of beta emission referring to the essential properties of neutrino and how it be detected

Question 4: (20 marks)

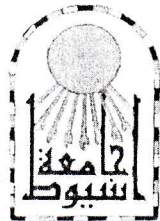
- a) Among the various methods for the measurement techniques of Radon, Thoron and their progeny are the E-PERM electret and Alpha guard. Explain the construction and mechanism of operation of each.
- b) List the most important techniques for measuring the uranium concentration in environmental media.

Question 5: (20 marks)

Whether the source of radiation is natural or man-made, whether it is small dose of radiation or a large dose, there will be some biological effects. Discuss.

End of the Exam.....Good Luck

Prof. Abdelhady Elkamel



ANSWER ALL THE FOLLOWING QUESTIONS

Question I: (25 marks)

1. Discuss, mathematically and physically, the relation between the commutation of two operators and the uncertainty principle of the two dynamical variables represented by these operators. (15 marks)

2. Derive the canonical equations of motion based on the Hamiltonian function using Euler equations that takes the form (10 marks)

$$\frac{d}{dt} \left(\frac{\partial L}{\partial \dot{q}_i} \right) - \frac{\partial L}{\partial q_i} = 0.$$

where q_i and $\dot{q}_i$ are generalized coordinate and velocities, respectively. $L(q_i, \dot{q}_i, t)$ is the Lagrangian of the physical system.

Question II: (25 marks)

1. Prove that the momentum of a charged particle p must be transformed to $p - eA$ when the charged particle interacts with an electromagnetic wave. e is the unit charge of the particle and A is the potential vector of the electromagnetic wave. (15 marks)

2. Explain, physically and mathematically, the second postulate of quantum mechanics that states "the energy of a physical system $\langle \psi | \hat{H} | \psi \rangle$ represents the average value of a series of measurements where this system is described by the state vector $|\psi\rangle$. $\hat{H}$ is the quantum mechanical energy operator. (10 marks)

Question III: (25 marks)

1. Discuss the matrix representations of the state vectors and operators. (15 marks)

2. If the wave function of a moving particle is $\Psi(z, t) = \psi(z)\phi(t)$. By the help of the momentum and energy operators, (10 marks)

- (a) $\phi(t) = e^{i\omega t}$ is allowable, true or false and why?
(b) $\psi(z) = Ae^{-ikz}$ is allowable, true or false and why?

Question IV: (25 marks)

1. Using the concepts of the creation and destruction operators, find the possible energy eigenvalues of the harmonic oscillator that consist of a mass m attached to a spring. (15 marks)

2. Prove that (10 marks, 5 per each)

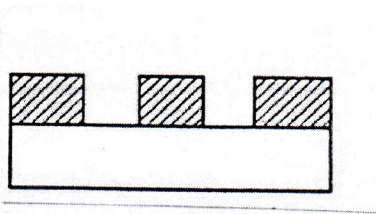
- (a) the group velocity of nonrelativistic free electrons is twice their phase velocity
(b) the group velocity of photons is equal to their phase velocity.

End of the Exam.....Good Luck!



Answer the following questions : (25 points each)

- 1 - a - Sketch the diagram of high vacuum system , then describe the function of each part .
b - Discuss the operation steps to obtain high vacuum.
- 2 - a - The melting point of Tungsten is 3410 C and its boiling point is 5660 C , discuss a method for the preparation of Tungsten films by evaporation .
b - Discuss the factors affecting the properties of evaporated films.
- 3 - a - Sketch the diagram for the flash evaporation technique then discuss its applications.
b - Sketch the diagram for each of the following , then describe how it operates :
 - i - Vacuum rotary pump
 - ii - Diffusion pump
 - iii - Cold cathode vacuum gauge
- 4 - Discuss briefly each of the following :
 - a - The use of polymerization to obtain micro printed pattern
 - b - The preparation of dielectric films using chemical methods
 - c - The use of Iodine in disproportionation reaction vessel
 - d- The steps required to produce the following pattern:





Faculty of Science

Physics Department

M. Sc. Exam / 2014/2015 / Experimental Nuclear Physics

Date : Sat. 5 / 9 / 2015

Time : 3 hours

Answer the following questions :

1 - (a) Which nucleus is more stable ${}^7\text{Li}$ or ${}^8\text{Li}$, calculate the binding energy per nucleon for both of them ,given :

$$m({}^7\text{Li}) = 7.016003 \text{ amu} , m({}^8\text{Li}) = 8.022486 \text{ amu}$$

(b) Calculate the momentum of a neutron having De Broglie wave length of 5 fm

(c) Find the nuclear density of ${}^{235}\text{U}$, if $r_0 = 1.21 \text{ fm}$

----- (20 grades)

2 - (a) Find the binding energy of ${}^{20}\text{Ne}$ and ${}^{28}\text{Si}$ in (Mev /A) units

(b) Estimate the A value and identify the nucleus if its radius is given to be 3.46 fm

(c) Find the energy required in joules to break ${}^{12}\text{C}$ into 3 α - particles. The atomic mass of ${}^{12}\text{C} = 12$ and $m({}^4\text{He}) = 4.0026 \text{ amu}$

----- (20 grades)

3 - (a) What is the radioactivity?? Deduce statistical law of radioactivity . what is : decay constant , half-life and average life of radioactive substance ??

(b) Explain the differences between x - Rays and γ - rays

(c) How atomic number and mass number change during α , β and γ emission ??

----- (20 grades)

4 - (a) What is the principle of betatron and what is its major advantage ??

(b) What is the principle of Cockroft Walton accelerator ???

(c) Electrons are accelerated to 30 Gev in the SLAC linear accelerator , calculate the difference in (m/sc) between the electron and light speeds .

----- (20 grades)

5 - (a) Explain the principle and operation of a scintillation counter

(b) Define three of the following phenomena : parity - electron capture - internal conversion - thermal neutrons .

(c) Estimate the useful life of a GM counter operating daily for 2 hours at 2000 counts per minute The guaranteed counts for GM counter are 10^9 counts .

----- (20 grades)

***** Best Wishes ***** Dr. G. S. Hassan *****

$$[m_p = 1.007825 , m_n = 1.008665 \text{ amu},$$

$$1 \text{ amu} = 1.66 \times 10^{-27} \text{ gm} = 931.4 \text{ Mev}]$$



Faculty of Science
Physics Department

Date: 9 December, 2015

Time Allowed: 3 hours

Written Examination for the Qualification of the M. Sc. Degree in Science (Physics)

[Crystal Growth 610 F]

Teaching Staff: Prof. Dr. Abdulaziz Abualfadi

Answer 5 questions from the following: [20 marks for each]

1- (a)- Write short notes on:

The probability of formation of stable nuclei in crystal growth- Dendritic growth – Crystal habit – Epitaxial growth- Protein crystallization.

(b)- Explain in brief using diagrams an example of cooling – type growth unit.

2- (a)- Single crystal fibers were of the focus of interest. Describe the method used for growing fiber materials.

(b)- Many crystals can be grown from the vapor phase. Explain the method used for crystal growing.

3- (a)- Differentiate between hydrothermal growth and flexed melt technique.

(b) Describe the method in which a molten zone is progressively passed along a single crystal rod.

4- (a)- Write on brief:

i-Crystallization by reactant diffusion ii- Crystallization by sublimation iii- Unassisted Nucleation growth.

(b)- Describe the basis of one method used for growth from melt without containing the melt in crucible.

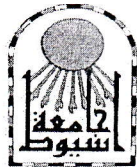
5- (a)--Show the differences between Vernul method and Gel growth method.

(b)- From the factors which affect the size of the grown crystals during crystal growth are: The solvent, The number of nucleation sites, Mechanical agitation to the system and Impurities. Explain the effect of each factor.

6- (a)- Both Kyropoulos and Czochraliski methods are used for crystal growth from the melt. Differentiate between the two methods.

(b)- Explain the method used for the growth of epitaxial films.

Good Luck



Course Title: Sources and radiological protection - Code: P666 - Final Exam

Solve the following problems? (100 Marks)

$$A_0 = 6.02 \times 10^{23} \text{ atoms/mol}, \mu_{\text{air}} (\text{STP}) = 3.46 \times 10^{-5} \text{ cm}^{-1}, \rho_{\text{air}} = 1.293 \text{ kg/m}^3$$

- 1) What is the weight of ^{226}Ra , grams, in 1-metric ton ore containing 1% (W/W) U_3O_8 ? Where $T_{1/2}$, for $^{226}\text{Ra} = 1620 \text{ yr}$ and for $^{238}\text{U} = 4.5 \times 10^9 \text{ yr}$.

Ans: (10 Marks)

- 2) A solution of $\text{Hg}(\text{NO}_3)_2$ tagged with ^{203}Hg has a specific activity of $1.5 \times 10^5 \text{ Bq/mL}$ ($4 \mu\text{Ci/mL}$). If the concentration of mercury in the solution is 5 mg/mL , (a) What is the specific activity of the mercury? (b) What fraction of the mercury in the $\text{Hg}(\text{NO}_3)_2$ is ^{203}Hg ? (c) What is the specific activity of the $\text{Hg}(\text{NO}_3)_2$?

Ans: (10 Marks)

- 3) A very small source (physically) 1.0 Ci of ^{32}P ($E_{\beta\text{max}} = 1.71 \text{ MeV}$) is inside a lead shield just thick enough to prevent any beta particles from emerging. What is the bremsstrahlung energy flux at a distance of 10 cm from the source (neglect attenuation of the bremsstrahlung by the beta shield)?

Ans:

(5 Marks)

- 4) Aluminum bronze, an alloy containing 90% Cu (atomic weight = 63.57) and 10% Al (atomic weight = 26.98) by weight, has a density of 7.6 g/cm^3 . What are the linear and mass attenuation coefficients for 0.4 MeV gamma rays if the cross sections for Cu and Al for this quantum energy are 9.91 and 4.45 b?

Ans:

(10 Marks)

- 5) Consider a gamma-ray beam of quantum energy 0.3 MeV. If the photon flux is 1000 quanta/cm²/s and the air temperature is 20°C, what is the exposure rate at a point in this beam and what is the absorbed dose rate for soft tissue at this point?

Ans:

(10 Marks)

- 6) A 10-MeV photon penetrates into a 100-g mass and undergoes a single interaction, a pair-production interaction that leads to a positron and an electron of 4.5 MeV each. Both charged particles dissipate all their kinetic energy within the mass through ionization and bremsstrahlung production. Three bremsstrahlung photons of 1.6, 1.4, and 2 MeV each that are produced escape from the mass before they interact. The positron, after expending all its kinetic energy, interacts with an ambient electron within the mass and they mutually annihilate one another to produce two photons of 0.51 MeV each, and both these photons escape before they can interact within the mass. Calculate (a) the kerma (define) and (b) the absorbed dose (define).

Ans:

(10 Marks)

7) Calculate the energy of:

- A 0.661 MeV ^{137}Cs gamma that is backscattered 180° .
- The resultant Compton electron (the Compton edge).

Ans:

(5 Marks)

8) In a laboratory where TLD badges are changed every 4 weeks, and are read 2 days later, a radiation worker is exposed on the day that he received the dosimeter, and has no further exposure. What fraction of the actual dose will be reported if the spontaneous fading rate is $1.35 \times 10^{-8} \text{ s}^{-1}$?

Ans:

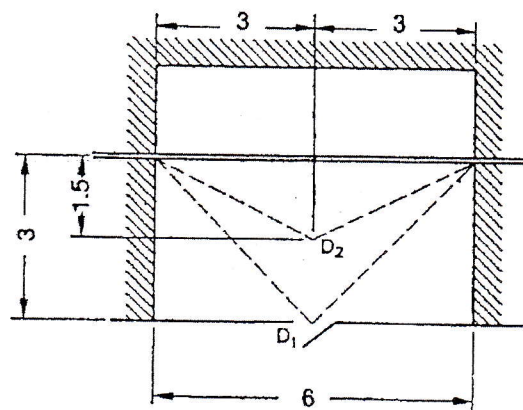
(5 Marks)

9) Induced ^{24}Na ($\Gamma=4.36\times10^{-7}$ Sv-m²/MBq-h) activity in a cooling-water line passes through a small-diameter pipe in an access room 6-m wide. The door to the room is in the center of the 6-m wall, at a distance of 3 m from the pipe, as shown in the following *Figure*. If the linear concentration of activity is 100 MBq/m, what is the

- Dose-equivalent rate H_1 in the doorway at point D_1 , at a distance of 3 m from the pipe?
- Dose-equivalent rate H_2 midway between the pipe and the door, point D_2 , at a distance of 1.5 m from the pipe?

Ans:

(10 Marks)



b) What would have been the dose to the dental hygienist if she had been at the point of measurement?

(10 Marks)

Ans:

(5 Marks)

12) For β -particles define only five from the following?

- a) Specific Ionization of beta particles
- b) Range
- c) Delta ray
- d) Mass stopping power
- e) Linear Energy Transfer
- f) Braking radiation
- g) Synchrotron radiation

Ans:

(10 Marks)

Handwritten answer area with horizontal lines.



Course Title: Special Course - Code: P619 - Final Exam

**Question 1: Circle the correct answer for the following questions
(70 marks, 1 for each)**

- 1) The task of C++ compiler is to:
 - a. Translate high-level C++ program to machine language
 - b. Translate Assembly program to machine language
 - c. Execute C++ programs
 - d. None of the above
- 2) What is the correct value to return to the operating system upon the successful completion of a program?
 - a. -1
 - b. 1
 - c. 0
 - d. Programs do not return a value.
- 3) What is the only function all C++ programs must contain?
 - a. start()
 - b. system()
 - c. main()
 - d. program()
- 4) What punctuation is used to signal the beginning and end of code blocks?
 - a. { }
 - b. -> and
 - c. BEGIN and END
 - d. (and)
- 5) What punctuation ends most lines of C++ code?
 - a. .
 - b. ;
 - c. :
 - d. '
- 6) Which of the following is a correct comment?
 - a. /* Comments */
 - b. ** Comment **
 - c. /* Comment */
 - d. { Comment }
- 7) Which of the following is not a correct variable type?
 - a. float
 - b. real
 - c. int
 - d. double

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8) Which of the following is the correct operator to compare two variables?

- a. :=
- b. =
- c. equal
- d. ==

9) Which of the following is true?

- a. 1
- b. 66
- c. .1
- d. -1
- e. All of the above

10) Which of the following is the Boolean operator for logical-and?

- a. &
- b. &&
- c. |
- d. |&

11) Evaluate `!(1 && !(0 || 1))`.

- a. True
- b. False
- c. Unevaluatable
- d. None of the above

12) Which of the following shows the correct syntax for an if statement?

- a. if expression
- b. if { expression
- c. if (expression)
- d. expression if

13) What is the final value of `x` when the code `int x; for (x=0; x<10; x++) {}` is run?

- a. 10
- b. 9
- c. 0
- d. 1

14) When does the code block following `while (x<100)` execute?

- a. When `x` is less than one hundred
- b. When `x` is greater than one hundred
- c. When `x` is equal to one hundred
- d. While it wishes

15) Which is not a loop structure?

- a. For
- b. Do while
- c. While
- d. Repeat Until

16) How many times is a do while loop guaranteed to loop?

- a. 0
- b. Infinitely
- c. 1
- d. Variable

En

17) Which is not a proper prototype?

- a. `int funct(char x, char y);`
- b. `double funct(char x)`
- c. `void funct();`
- d. `char x();`

18) What is the return type of the function with prototype: `"int func(char x, float v, double t);"`

- a. `char`
- b. `int`
- c. `float`
- d. `double`

19) Which of the following is a valid function call (assuming the function exists)?

- a. `funct;`
- b. `funct x, y;`
- c. `funct();`
- d. `int funct();`

20) Which of the following is a complete function?

- a. `int funct();`
- b. `int funct(int x) {return x=x+1;}`
- c. `void funct(int) {cout<<endl;<<"Hello"}`
- d. `void funct(x) {cout<<"Hello"}`

21) Which follows the case statement?

- a. `:`
- b. `;`
- c. `-`
- d. A newline

22) What is required to avoid falling through from one case to the next?

- a. `end;`
- b. `break;`
- c. `Stop;`
- d. A semicolon.

23) What keyword covers unhandled possibilities?

- a. `all`
- b. `contingency`
- c. `default`
- d. `other`

24) What is the result of the following code?

```
{
    int x=0;
    switch(x)
    {
        case 1: cout<<"One";
        case 0: cout<<"Zero";
        case 2: cout<<"Hello World";
    }
}
```


6. W

- a. One
- b. Zero
- c. Hello World
- d. ZeroHello World

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Ans

25) Which of the following is the proper declaration of a pointer?

- a. int x;
- b. int &x;
- c. ptr x;
- d. int *x;

26) Which of the following gives the memory address of integer variable a?

- a. *a;
- b. a;
- c. &a;
- d. address(a);

27) Which of the following gives the memory address of a pointer a?

- a. a;
- b. *a;
- c. &a;
- d. address(a);

28) Which of the following gives the value stored at the address pointed to by the pointer a?

- a. a;
- b. val(a);
- c. *a;
- d. &a;

29) Which of the following is the proper keyword to allocate memory?

- a. new
- b. malloc
- c. create
- d. value

30) Which of the following is the proper keyword to de-allocate memory?

- a. free
- b. delete
- c. clear
- d. remove

31) Which of the following accesses a variable in structure b?

- a. b->var;
- b. b.var;
- c. b-var;
- d. b>var;

32) Which of the following accesses a variable in structure *b?

- a. b->var;
- b. b.var;
- c. b-var;
- d. b>var;

En

33) Which of the following is a properly defined struct?

- a. struct {int a;}
- b. struct a_struct {int a;}
- c. struct a_struct int a;
- d. struct a_struct {int a;;}

34) Which properly declares a variable of struct foo?

- a. struct foo;
- b. foo var;
- c. foo;
- d. int foo;

35) Which of the following correctly declares an array?

- a. int anarray[10];
- b. int anarray;
- c. anarray{10};
- d. array anarray[10];

36) What is the index number of the last element of an array with 29 elements?

- a. 29
- b. 28
- c. 0
- d. Programmer-defined

37) Which of the following is a two-dimensional array?

- a. array anarray[20][20];
- b. int anarray[20][20];
- c. int array[20, 20];
- d. char array[20];

38) Which of the following correctly accesses the seventh element stored in foo, an array with 100 elements?

- a. foo[6];
- b. foo[7];
- c. foo(7);
- d. foo;

39) What is the output of the following C++ code:

```
int arr[2][3]={1,4,7,2,58};
for(int c=0; c<2; c++){
    int s=0;
    for(int r=0; r<2; r++)
        s += arr[r][c];
    cout<< s <<;}
```

- a. 3915
- b. 39
- c. 27
- d. None of the above

40) Which of the following gives the memory address of the first element in array foo, an array with 100 elements?

- a. foo[0];
- b. foo;
- c. &foo;
- d. foo[1];

6

41) Which of the following is a static string?

- a. Static String
- b. "Static String"
- c. 'Static String'
- d. char string[100];

7

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42) What character ends all strings?

- a. '.'
- b. ' '
- c. '\\0'
- d. '\\n'

tl

A

43) Which of the following reads in a string named x with one hundred characters?

- a. cin.getline(x, 100, '\\n');
- b. cin.getline(100, x, '\\n');
- c. readline(x, 100, '\\n');
- d. read(x);

44) Which of the following functions compares two strings?

- a. compare();
- b. stringcompare();
- c. cmp();
- d. strcmp();

45) Which of the following adds one string to the end of another?

- a. append();
- b. stringadd();
- c. strcat();
- d. stradd();

46) Which of the following classes handles file input?

- a. Ofstream
- b. Ifstream
- c. Instream
- d. inputfile

47) Which of the following is not a valid ofstream argument?

- a. ios::app
- b. ios::trunk
- c. ios::noreplace
- d. ios::create

48) What does ios::ate mean as an argument to ofstream?

- a. Open file, but do not create.
- b. Open file, create.
- c. Open file for read access only.
- d. Open file, set the position to the end.

49) How would you output to an open file named a_file?

- a. a_file.out("Output");
- b. a_file="Output";
- c. a_file<<"Output";
- d. a_file.printf("Output");

E1

50) What header file contains C++ file I/O instructions?

- a. `iostream.h`
- b. `fstream.h`
- c. `ifstream.h`
- d. `ostream.h`

51) Which header file do you need to include to use typecasting?

- a. `iostream.h`
- b. `ctype.h`
- c. `math.h`
- d. None

52) Which is a valid typecast?

- a. `a(char);`
- b. `char:a;`
- c. `(char)a;`
- d. `to(char, a);`

53) Why can typecasting be dangerous?

- a. Some conversions are not defined, such as `char` to `int`.
- b. You might permanently change the value of the variable.
- c. You might temporarily lose part of the data - such as truncating a `float` when typecasting to an `int`.
- d. There are no dangers.

54) Which is a good use for typecasting?

- a. To allow division of two integers to return a decimal value.
- b. To allow your program to use nothing but integers.
- c. To change the return type of a function.
- d. To swap variables rapidly.

55) Which conversion is not possible?

- a. `int` to `float`
- b. `float` to `int`
- c. `char` to `float`
- d. All are possible

56) What purpose do classes serve?

- a. data encapsulation
- b. providing a convenient way of modeling real-world objects
- c. simplifying code reuse
- d. all of the above

57) Which is not a protection level provided by classes in C++?

- a. `protected`
- b. `hidden`
- c. `private`
- d. `public`

58) What value must a destructor return?

- a. A pointer to the class.
- b. An object of the class.
- c. A status code determining whether the class was destructed correctly
- d. Destructors do not return a value.

59) Which of the following is a valid `class` declaration?

- a. `class A { int x; };`
- b. `class B { }`
- c. `public class A { }`
- d. `object A { int x; };`

60) Which functions will every class contain?

- a. None
- b. Constructor
- c. Destructor
- d. Both a constructor and a destructor

61) What does the `inline` keyword do?

- a. Indicates a function declaration
- b. Tells the compiler to use the function only within the same source code file
- c. Causes all function calls to be replaced by the code from the function
- d. Allows one-line function declarations

62) Why would you want to use `inline` functions?

- a. To decrease the size of the resulting program
- b. To increase the speed of the resulting program
- c. To simplify the source code file
- d. To remove unnecessary functions

63) Which of the following is a limit on `inline` functions?

- a. Inline functions cannot return a value.
- b. Inline functions must return a value.
- c. Inline functions must be less than ten lines.
- d. The compiler may choose to ignore an `inline` directive.

64) Which of the following is a valid `inline` for function `foo`?

- a. `inline void foo() {}`
- b. `void foo() inline {}`
- c. `inline: void foo() {}`
- d. None of the above

65) How can you ensure that an `inline` function isn't inlined for a particular function call for function `foo`?

- a. `unline x();`
- b. `noexpand x();`
- c. `x();`
- d. This is not possible on a case-by-case basis

66) What variable stores the number of arguments to a program?

- a. `Argc`
- b. `Argv`
- c. `Count`
- d. `arglen`

67) What is `argv[0]`?

- a. The number of arguments to the program
- b. The name of the program
- c. The first argument to the program
- d. This syntax is illegal

68) What type is `argv`?

- a. char *
- b. int
- c. char **
- d. It's not a variable

69) In what order do the two command line variables appear in the definition of main?

- Count then argument array

- a. Count then argument array
- b. Argument array then count
- c. They don't appear in the definition of main
- d. There is only one argument.

70) What does the `argument count` variable store?

- The number of arguments
- The number of arguments plus one
- The number of arguments minus one
- The total size of the argument array

Question 2: Solve the following problems?

(30 Marks, 5 marks for each)

1. What is the output of the program below?

```
#include <iostream.h>
main()
{
    int n;
    cout << (n = 4) << endl;
    cout << (n == 4) << endl;
    cout << (n > 3) << endl;
    cout << (n < 4) << endl;
    cout << (n = 0) << endl;
    cout << (n == 0) << endl;
    cout << (n > 0) << endl;
    cout << (n && 4) << endl;
    cout << (n || 4) << endl;
    cout << (!n) << endl;
    return 0;
}
```

Ans:

2. What is the output when the following code fragment is executed?

```
{
    int n, k = 5;
    n = (100 % k ? k + 1 : k - 1);
    cout << "n = " << n << " k = " << k << endl;
}
```

Ans:

3. The following loop is an endless loop: when executed it will never terminate. What modification can be made in the code to produce the desired output?

```
{
    cout << "Here's a list of the ASCII values of all the upper"
    << " case letters.\n";
    char letter = 'A';
    while (letter <= 'Z')
        cout << letter << " " << int(letter) << endl;
}
```

Ans:

4. Write a function named "swap_floats" that takes two floating point arguments and interchanges the values that are stored in those arguments. The function should return no value.

Ans:

5. Write a function named "sort3" that takes three floating point arguments, call them "x" , "y" , and "z" , and modifies their values, if necessary, in such a way as to make true the following inequalities: $x \leq y \leq z$. The function should return no value. To take an example, if the following code fragment is executed

```
float a = 3.2, b = 5.8, c = 0.9;
sort3 (a, b, c);
cout << a << " " << b << " " << c << endl;
```

then the output will be

0.9 3.2 5.8

The function sort3 is allowed to make calls to other functions that you have written.

Ans :

6. Write a function named "sum" that takes as its arguments the following:

(a) An array of floating point values;

(b) An integer that tells how many floating point values are in the array.

The function should return as its value the sum of the floating point values in the array. Thus, for example, if the array that's passed to the function looks like this:

0	1	2	3	4
5.8	2.6	9.0	3.4	7.1

then the function should return the value 27.9 as its value.

Ans :

End of the Exam.....Good Luck

Dr. Hani Negm



**Postgraduate English
Language Exam
19/9/2015
Total Marks: 100
Three Hours**



I-Mark the following as True or False: (20×2= 40 Marks)

1. The use of the IMRAD format is used only in primary publications, and not used in posters and verbal presentations. (.....)
2. The saying "Publish or perish" most accurately describes the importance of publishing in current scientific community. (.....)
3. It is unnecessary to become familiar with the instructions to authors of the selected journal and to carefully follow them. (.....)
4. The title of your research paper should be too general and attractive. (.....)
5. Acquisition of funding, the collection of data, or general supervision of the research group, by themselves, do not justify authorship. (.....)
6. Writing the summary requires a thorough acquaintance with the obtained results and an extraction of the most important message of the work. (.....)
7. The verbs in the introduction and conclusion parts of the summary are in the past tense. (.....)
8. Always close the summary with a phrase like "Results will be discussed." (.....)
9. Subheadings are commonly used in Material and Methods section. (.....)
10. The verbs are always in the past tense when one's own new results are described. (.....)
11. Discussion is the place to summarize all the results obtained and to list other's work. (.....)
12. A review article or a book chapter fundamentally differs from a primary paper and does not comply with the IMRAD format. (.....)
13. The thesis format has a relatively long Introduction section while the Materials and Methods as well as the Results sections are shorter due to frequent citations to the original publications. (.....)
14. The aims of a thesis study are incorporated into the Discussion section. (.....)
15. The Introduction in Posters is very short (1 to 2 sentences) clearly stating the aim of the work. (.....)
16. The use of excessive tricks offered by computer programs for slide shows could be a disadvantage. (.....)
17. The impact factor for a journal is derived by dividing the number of citations to the articles of the journal over a period of two years by the total number of articles published during the same time period. (.....)
18. A covering letter is not necessary when submitting a manuscript. (.....)
19. In most journals, the reviewers assess the manuscript with regards to the priority of publication and the quality of the manuscript. (.....)
20. Most of the journals prefer to receive the main body of the text and the illustrative material as a single PDF file and the covering letter as a separate file. (.....)

Turn to Page Two

II-Rewrite the sentences in passive voice:

(5×2= 10 marks)

1. They have collected enough money.

2. The little boy can draw pictures.

3. They will open a new restaurant.

4. The guard watched the prisoner.

5. The boy writes poems.

III- Punctuate the following sentences:

(5×2= 10 marks)

1. Carlos wants to visit Paris Italy Germany and China.

2. We can go to the zoo or we can go to the movie theater

3. Is this Titos wallet

4. Mix the oil and vinegar at a 1 2 ratio

5. The soldier shouted the following before leaving to war We shall return victorious!

IV- Read the following passage and choose the best answer:

(10×2=20 Marks)

Fleas are perfectly designed by nature to feast on anything containing blood. Like a shark in the water or a wolf in the woods, fleas are ideally equipped to do what they do, making them very difficult to defeat. The bodies of these tiny parasites are extremely hardy and well-suited for their job.

A flea has a very hard exoskeleton, which means the body is covered by a tough, tile-like plate called a sclerite. Because of these plates, fleas are almost impossible to squish. The exoskeletons of fleas are also waterproof and shock resistant, and therefore fleas are highly resistant to the sprays and chemicals used to kill them.

Little spines are attached to this plate. The spines lie flat against the flea's thin, narrow body as the flea scurries through an animal's fur in search of food. However, if anything (like fingers or a self-grooming pet) tries to pull a flea off through the hair coat, these spines will extend and stick to the fur like Velcro.

Turn to Page Three

4) Fleas are difficult to squish because they have

- I. sclerites
- II. tough spines
- III. resilin in their joints

- A. I only
- B. I and II only C. II and III only
- D. I, II, and III

5) According to the passage, which of the following statements is true?

- A. Fleas extend their little spines if threatened.
- B. Fleas have the ability to jump higher than humans.
- C. Humans can jump higher if they consume foods containing resilin.
- D. The resilin found in fleas is used to make rubber bands.

6) According to the passage, fleas are able to jump

- I. with a high rate of acceleration
- II. up and down and from side to side
- III. because the blood they eat contains resilin

- A. I only
- B. I and II only C. II and III only
- D. I, II, and III

7) Based on information in the passage, the reader can understand that

- A. fleas will die without access to blood
- B. fleas survive at a higher rate in outdoor habitats
- C. fleas will die after they produce 2,000 eggs
- D. newly hatched fleas are the size of a grain of salt

8) The author mentions the Washington Monument in order to

- A. estimate the extreme distance that a flea is able to jump
- B. illustrate a comparison made between fleas and humans
- C. clarify a point made regarding fleas and acceleration
- D. demonstrate the superiority of fleas over humans

9) It can be inferred that fleas will emerge from eggs as adults

- A. when they outgrow the cocoon
- B. after a period of 3 weeks
- C. when they sense there is access to blood
- D. if there is too much carbon dioxide in the cocoon

10) Using the information in the passage as a guide, it can be concluded that

- A. humans do not possess the physical characteristics of the flea because they have no use for them
- B. humans do not pay much attention to fleas because they do not pose a serious threat

Turn to Page Five

- C. fleas have many physical advantages, although these are outweighed by their many disadvantages
- D. fleas are designed in such a way as to give them unique physical advantages in life

V-What do you say in the following situations: (10×1=10 Marks)

1. Start a meeting.
.....
2. Explain your purpose formally.
.....
3. Present data in order.
.....
4. Ask for further details.
.....
5. Keep a meeting in order.
.....
6. Introduce yourself before a speech.
.....
7. Introduce a summary.
.....
8. Ask for evidence.
.....
9. Ask how to contact.
.....
10. Correct misunderstanding.
.....

VI- Choose the correct answer: (10×1= 10 Marks)

1. Small- scale producers (predominate- predominant) in the south.
2. He is a man of (principle- principal).
3. In case of a natural disaster, they (insured- assured) their home.
4. Glaciers are interesting natural (phenomenon- phenomena).
5. Jack David is one of Britain’s most (famous- notorious) criminals.
6. She paid me an enormous (compliment- complement).
7. To me, chocolate (denotes- connotes) pleasure.

Turn to Page Six

8. Millions of Germans (emigrated- immigrated) from Europe to America in the 19th century.
9. Have you anything (farther-further) to add?
10. You have got 20 (percentage- percent) of the answers right.

Best Wishes

Main Examiner: Dr. Abeer Mohammed Raafat Khalaf

Dr. Abeer Khalaf

[illegible]