Mansoura University
Faculty of Science
Physics Department

2nd Term Examination
May 2010
Time allowed: 2 hrs

Atomic Physics

Answer the following questions

1-a) Draw the energy level diagram for X-ray spectra of the K, L and M series. Discuss Moseley's law. [15 Marks]

b) Deduce the wavelength in A^o and the energy in eV of the spectral line of the maximum wavelength of the Lyman series. [12 Marks]

2-a) For a monovalent element, deduce the possible j values for $\ell = 0,1,2,3$ and the type of each term. Explain the spectral series of the emission transition of sodium atom. Comment on the two D lines (D_1 and D_2) of sodium atom. [15 Marks]

b) State briefly the main assumptions of the vector atom model. The orbital angular momentum vector of an atom **L=2** and the spin angular momentum vector **S=3/2.** Estimate the total angular momentum vector of the atom **J**. [12 Marks]

3-a) Define the degenerate orbits. Starting with the mass relativistic effect and the general equation of the total energy, show how Sommerfeld could explain the fine structure. [15 Marks]

b) **Draw**, without mathematical derivation, the magnetic splitting due to the interaction between the orbital magnetic dipole moment μ_ℓ and the external magnetic field H of the spectral line from P state ($\ell=1$) to S state ($\ell=0$). "normal Zeeman effect". Comment on drawing. [11 Marks]

($c=3\times10^{10}$ cm/s $h=6.625\times10^{-34}$ J.s $R=1.097\times10^{7}$ m^{-1} $1eV=1.6\times10^{-19}$ J)
($e=1.6\times10^{-19}$ C $m_e=9.11\times10^{-28}$ g)

Best Wishes

Dr. A. El-Khodary

المستوى الثانى - فيزياء حيوية - كيمياء الكربوهيدرات والسكر

Mansoura university
Faculty of science
Chemistry Department
Subject : BioChem. 271
Course : Chemistry of Carbohydrates

Second Term Examination
2009/2010
Second Year Biophysics Students
Date : 29 june, 2010
Time Allowed: 2 hours
Total Mark : 80 marks

Answer All the following questions
Provide your answer with formula, equations, pathways, figures or tables wherever possible

Q: 1

A) Mention at least 6-genes have been defected and linked to Maturity onset type diabetes of the young (MODY)? (15 marks)

B) What is the meaning of : (10 marks)

a. Galactosemia.
b. Semen sugar.
c. Mutarotation .
d. Racemic mixture.
e. Deoxy sugar.

Q: 2

A) Put (√) for write sentence and put (X) for wrong sentence: (10 marks)

1- Stereoisomerism is molecules having the same structure but differ in position of their different groups ant atoms in the space.
2- Reduction of fructose gives sorbitol and mannitol.
3- Ribose and arabinose both gave erythrose on ruff-degradation.
4- Erythrose gave a mixture of ribose and arabinose on Killiani-Fischer synthesis.
5- Arabinose gave a mixture of glucose and mannose on Killiani-Fischer synthesis.
6- Lactose is non-fermentable due to absence of lactase enzyme from yeast.
7- Sucrose is non-ozazone forming, not mutarotating and non-reducing sugar.
8- Amylopectin is the inner part of starch granules and is water soluble and give blue color with iodine.
9- Starch is the stored form of carbohydrates in animals.
10- Glucose transport via (glu T4) in the muscle cells is not under the control of insulin.

PTO

B) Write the structures of the followings: (10 marks)

a. Phytic acid
b. Chitosamine
c. L-fucose
d. L-rhamnose
e. Maltose
f. B-methylglucoside
g. Cellobiose
h. Trehalose
i. Heparin
j. Starch

Q: 3

A) What happen when add: (Rewrite the equation with structures) (15 marks)

1- Bromine water and oxygen to glyceraldehydes.
2- Hydrogen peroxide and dil.HNO_3 to D-glucose.
3- Conc.HCl or H_2SO_4 to D-galactose.
4- Dilute alkali and low heat on D-glucose.
5- Conc. HNO_3 is added to D-fructose

B) Give ONE important function for each of the following: (10 marks)

a. Ribose
b. Sialic acid
c. Glucuronic acid
d. Ribitol
e. Mannosamine
f. Saponins
g. Dextran
h. Cellulose
i. Inulin
j. Hyaluronic acid

C) Sketch the cyclic furanose structures of glucose and fructose. (10 marks)

Good Luck Prof.Dr.A.F.Abdel-Aziz Mohamed

Mansoura University
Faculty of Science
Botany Department
El-Mansoura, Egypt

جامعة المنصورة
كلية العلوم
قسم النبات
المنصورة - مصر

Final Examination in Botany
Second Term: Jun. 2010

Program (Branch): Biophysics **Educational Year:** Second Level
Course(s): Biophysics of Photosynthesis **Subject:** Bot (205)
Question mark: 20 **Full mark:** 60 **Date:** / /2010 **Time:** 2 hrs

Answer the following questions:

(Question 1)

b)-**Outline** the pathways of oxygen metabolism in active chloroplast.
c)-**Compare** between each pair of the following:
(i) C_3 and C_4 plants and give examples for each type.
(ii) the mitochondria and chloroplast regarding their adaptation for the functions.

(Question 2)

A-**Identify**: C3-plants - C4- plants – photophosphorylation – oxidative phosphorylation- C4 pathway.
B)- **Draw** labeled diagram illustrating chloroplast stru ture.
C) **Mark** with (√) or (×).
1)- Glutamate is the main substrate for photorespiration. ( )
2)- The two amino acids formed during photorespiration are serine and pyruvate.( )
3)- Tomato and oat are C_3-plants. ( )
4)-The inner membrane of mitochondria is the site for electron transport and oxidative photophosphorylation. ( )
5)-Grana of chloroplast are the site of light reactions. ( )
6)-The chloroplast has single membrane ( ).
7)-Singlet oxygen is produced from oxygen by quenching photodynamic action. ( )
8)-Hydrogen peroxide is produced from oxygen by certain oxidases. ( )
9-Thylakoid is present in mitochondria. ( )
10-Stroma is the site of dark reaction. ( )

(Question 3)

A-**Outline**:
(i) The role of PGA in plant metabolism.
ii) The conversion of ribulose-1,5-bisphosphate into fructose-6-phosphate.
iii) Chlorophyll synthesis from α-ketoglutarate..
iv)- Photorespiration.
B)**Discuss** the energetic CO_2 fixation.

Best wishes

Examiners: Prof. Mohamed Abbas, Prof. Omar El-Shehaby, Prof. Heshmat Soliman, Prof. Hamed El-Shora

Mansoura university **Faculty of Science** **Physics Department**		**Second Term** **Second Level: Biophysics** **Date: May 2010** **Allowed time: 2 hours**
Exam: Environmental Biophysics		**Full Mark: 80 Mark**

Answer All The following Questions:

[1] a- A bromine sample 50% consists of ^{79}Br and 50% ^{81}Br, Calculate the relative atomic mass of bromine ? [10 Marks]

b- Define and explain each of the followings: [10 Marks]
i-Relative atomic mass ii- Basal Metabolic Rate iii- Thermoregulation
iv- Isobars iiv- Unified atomic mass unit

c- Discuss in detail different physical process by which heat dissipation from the body? [10 Marks]

[2] a- Compare between only two items of the followings: [12 Mark]
i- Mass spectrometer and the Bainbridge mass spectrograph.
ii- Heat loss from animal body and plant leaf.
iii- α- particles and β- particles physical properties.

b- Discuss in detail the released and used heat energy during oxidation of glucose molecule during its metabolism? [8 Marks]

c- Atoms of ^{238}Pu emit 5.10 MeV α- particles; the half life time of ^{238}Pu is being 90 years. The energy from 180 mg of ^{238}Pu is used to power one particular form of e-cardiac pacemaker. Calculate the initial power supplied by the device? (Avogadro's number is 6.02×10^{23} mol^{-1}) [10 Marks]

[3] a- Give short notes on the method of dating by using: [10 Marks]
(i) Carbon dating (ii) Uranium dating

b- Discuss in detail the experimental determination procedure used to determine:
i- Confirmation of α- particle as helium nuclei by Rutherford and royd's apparatus.
ii- ^{220}Rn half life time. [10 Marks]

With best wishes

Dr. Hosam Salaheldin Mohamed **Dr. Nabil Zaky Kinawy**

المستوى الثانى

تناظر فيزياء - (ف ٢٢٤) - قياسات كهربية وأجهزة قياس

فيزياء رصد

University of Mansoura Faculty of Science Physics Department Subject: Physics (224)		Second Term Second year Physics Date : 20 June 2010 Time allowed : 2 hours
Course : Electrical Measurements & Instrumentation		Full Mark:: 80 Mark

Answer the following Questions :

[1] a - Develop a circuit using a movement galvanometer of 10 mA full scale ($R_m = 150\Omega$) for an ammeter having ranges of 1.0 and 10 amperes. (8 mark)

b- What is the sensitivity of the meter of problem 1-a. (4 mark)

c- What is the full scale voltage that can be measured with the meter of Problem 1-a. (4 mark)

d- Ten measurements of the resistance of a resistor gave 101.2, 101.7, 101.3, 101.0, 101.5, 101.3, 101.2, 101.4, 101.3, and 101.1 Ω. Assume that only random errors are present. Calculate: (i) the arithmetic mean, (ii) the standard deviation of the readings, (iii) the probable error. (12 mark)

[2] a- The solution for the unknown resistance for a Wheastone bridge is $R_x = R_2R_3/R_1$ where $R_1 = 100 \pm 0.5\ \%\ \Omega$, $R_2 = 1000 \pm 0.5\ \%\ \Omega$, $R_3 = 842 \pm 0.5\ \%\ \Omega$ Determine the magnitude of the unknown resistance and the limiting error in percent and in ohm for the unknown resistance R_x. (10 mark)

b- A slide wire potentiometer has a battery of 4 V and negligible internal resistance. The resistance of the slide wire is 100 Ω and its length 200 cm. A standard cell of 1.018 V is used for standardizing the potentiometer and The rheostat is adjusted so that balance is obtained when the sliding contact Is at 101.8 cm.
(i) Find working current of the slid wire and the rheostat setting.
(ii) If the slide wire has divisions marked in mm and each division can be interpolated to one fifth, calculate the resolution of the instrument. (15 mark)

[3] a- A CRT of an oscilloscope has an accelerating voltage of 2000 V and parallel deflecting plates 2 cm long and 5 mm apart. The screen is 30 cm from the centre of the plates. (i) Find the deflecting voltage applied to the deflecting plates required to deflect the beam by 3 cm.
(ii) Find the sensitivity of a CRT.
(iii) The deflection factor of a CRT. (13 mark)

b- The ohmmeter of the Fig.(1) uses a 50-Ω basic movement requiring full scale current of 1 mA. The internal battery voltage is 3 V. The desired scale marking for half-scale deflection is 2000 Ω. Calculate (i) the values of R_1 and R_2 ; (ii) the maximum values of R_2 to compensate for 10 % drop in battery voltage; (iii) the scale error at the half –scale mark (2000 Ω) when R_2 is set as in (ii). (14 mark)

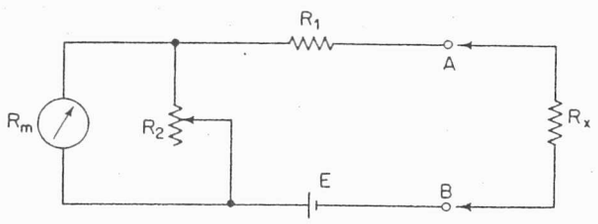

Fig .(1)

Examiners:

Prof. Dr. A. Oraby & Dr A . Lashein.

المستوى الثالث - فيزياء - فيزياء حيوى - ميكانيكا الموائع (ف ٢٢٧)

University of Mansoura Faculty of Science Physics Department		جامعة المنصورة كلية العلوم قسم الفيزياء

Second Semester May 2010

Educational Year: Second Level — Program: Physics & Biophysics
Time: 2 Hours — Subject: Physics
Date: 27/6/2010 — Course (s) code: Phys. 227 [Fluid Mechanics]
Full Mark: 80

Answer **the following** Questions

Mark

[1.a] Calculate the rate of blood flow In artery with cross-section of 2 cm^2 and the speed of the blood is 40 cm/s. Also, Determine the speed of the blood if it reached to capillary with cross – section of 0.1 cm^2. [10] Mark

[1.b] Mass of ice floating in salt water at north pole. What percent of the size of submarine to the total volume with the knowledge that the density of the ice is $\rho_i = 0.92\ g/cm^3$ and the density of salt water is $\rho_w = 1.03\ g/cm^3$. [10] Mark

Mark

[2.a] Derive the flow and particle Reynolds number. [10] Mark

[2.b] A sample of oil mist is taken at a flow rate of 1.2 L/min through a horizontal tube 1 cm in diameter. The aerosol consists of 2 μm diameter oil droplets in air at standard conditions. The particles are moving through the tube with the air but are settling at 0.01 cm/s. What is (a) the flow Reynolds number and (b) the particle Reynolds number. [10] Mark

Mark

[3.a] Deduce Bernoulli's equation to an ideal fluid. [10] Mark
[3.b] discuss the difference between Newtonian and n Newtonian fluid. [10] Mark

Mark

[4] Consider the outflow of water from a cylindrical tank with a hole at the bottom. You are asked to find the height of the water in the tank at any time if the tank has diameter 2m, the hole has diameter 1 cm and the initial height of the water when the hole is opened is 2.25 m. When will the tank be empty. [20] Mark

With my best wishes
Prof. Dr. A. Elgarayhi

Examiners: 1- Prof. Dr. S. A. El-Wakil 2- Dr. Emad Khedr

المستوى الثاني (فيزياء - فيزياء حيوية)
معادلات تفاضلية

الفرقة: الثانية		دور: مايو 2010
الشعبة: الفيزياء	كلية العلوم – قسم الرياضيات	التاريخ: 2010/6/
المادة: المعادلات التفاضلية		

أجب عما يأتي

[1] –أ) استخدم طريقة متسلسلات القوى لإيجاد الحل العام حول $x = 0$ للمعادلة

$$y'' - y' = 0$$

ب) استخدم طريقة تغيير البارامترات الحل المعادلة

$$y'' - 2y' + y = \frac{e^x}{x}$$

---

[2] –أ) $5e^{-x}, e^{-x}$ حلان للمعادلة $y'' - 2y' + y = 0$ هل الحل العام هو $y = c_1 e^{-x} + c_2 5e^{-x}$ حيث c_2, c_1 ثوابت اختيارية.

ب) أوجد عائلة المسارات المتعامدة على $x^2 - y^2 = cx$.

جـ) استخدم المؤثر D لإيجاد حل خاص للمعادلة $y'' - 5y' + 6y = x^3 e^{2x}$.

د) أوجد الحل العام للمعادلة $y'' \cos^2 x = 1$.

---

[3] –أ) اثبت أن $\mu(x,y) = x^2 y^{-2}$ هو عامل مكاملة للمعادلة $y' = \frac{3yx^2}{x^3 + 2y4}$ ومن ثم حل المعادلة.

ب) بإيجاد عامل مناسب حل المعادلة $3x^2y^2dx + (3x^3y + x^3y^4)dy = 0$.

جـ) حل المعادلات التفاضلية الآتية

a) $y' = \frac{2 + ye^{xy}}{2y - xe^{xy}}$

b) $y' = \frac{2xy}{x^2 - y^2}$

c) $y' = \frac{x+1}{y^4 + 1}$

d) $y' = 6x\sqrt{y} - xy$

مع أطيب التمنيات بالنجاح والتوفيق

د. مجدى يوسف برسوم

المستوى الثاني - فيزياء حيوية
ديناميكا حرارية للأنظمة الحيوية

Mansoura University **Faculty of Science** **Physics Department**		**2nd Year Bio-phs Students** **Thermodynamics.** **May 2010** **Time: 3 Hours**

Answer the following questions

1) a - Find the coefficient of volume expansion β, the compressibility k and the Joule – Kelvin coefficient μ_J of a gas obeying the equation of a real gas P (v-b) = RT where R and b are constant. [15]

b - A gas of volume 1000 cm^3, its temperature 127°c and pressure 2×10^6 dyne/cm^2 expands at constant temperature to a volume 2000 cm^3 and then expands adiabatically to a volume 4000 cm^3. Find the temperature, pressure and the work at the end of each expansion. [12]

2)a- Using the fact that Gibbs function remains constant during a reversible process taking place at constant temperature and pressure deduce the Clausis –Clapeyron equation. [14]

b- Find the decrease in melting point when the pressure increase by 1 atmosphere if one gram of ice and water at 0°c have volume 1.091 cm^3 and 1 cm^3 respectively and latent heat 80 cal/gm. Find also the pressure necessary to lower melting point of ice by 1°c. [12]

3)a- Find the entropy of a perfect gas [15]

(1) in terms of T and V
(2) in terms of T and P
(3) in terms of P and V

b- 50 gram of water at 0°c is mixed with an equal mass of water at 80°c. Calculate the change in antropy. [12]

أسماء المحكمين

MANSOURA UNIVERSITY
FACULTY OF SCIENCE,
ZOOLOGY DEPARTMENT

2nd Semester, Final Exam for 2nd Level Biophysics students
Biophysics of Cell Communication Z223

Date: June 2010 Time: 2hours

Answer All of the following questions:

First question 30 marks

1- Briefly Explain Two of the following: 12 marks

a- Tight junctions b- Communication junctions C- Ig Superfamily: N-CAM

2- Identify: second messenger, growth factor, neurotransmitters, hormones, 18 marks

Second question 25 marks

1- Classify the intercellular communication then Identify the Three Stages of Cellular Communication

2- Mention the general characteristics of Signal receptors? What Are the Signaling Molecules? Name the functions of Signaling cascades?

Third question 25 marks

1- Name the main Types of signaling pathway?
Explain the Redox signaling.
Then state the Importance of nitric oxide (NO) Signaling in Animals and plants.

2- What are the three major extracellular matrix components? Show the ways cell adhesion molecules interact with each other?

==========

Good luck

Prof. Azza I Othman Prof. M Amr El-Missiry