Mansoura University
Faculty of Science
Physics Department
Subject: Bioenergy

Second Term Exam
3st Year Biophysics Students
Date: 18may 2015
Time Allowed: 2 hours

1) **Define the following words**
   a)- Gibbs free energy
   b)- Enthalpy and entropy
   c)- The oxidation of glucose
   d)- actual free energy change **20 marks**

2)- **Explain in details the cellular respiration** **25 marks**

3) – a) -Explain the factors affecting transport across cell membrane and different types of transport . **10marks**

b)- describe the photo synthesis **10 marks**

4) **write short notes about**
a- Phosphoenolpyrvate.
b)- 1,3 – bisphosphoglycerate.
c)- phosphocreatine **15 Marks**

Good luck
Dr. Fatma mansour

Mansoura University		جامعة المنصورة
Faculty of Science		كلية العلوم
Physics Department		قسم الفيزياء
Mansoura - Egypt		المنصورة - مصر
Secondterm Exam For 3nd Year Biophysics Students		
Time: 2 hours	Date: 21-5-2015	Course title: Health physics
Full Mark: 80		Course code: biophys 321

Answer the following questions:

I) Choose the correct answer: **(30 marks)**

1)According to atomic theory, electrons are usually found:

a. In the atomic nucleus.

b. outside the nucleus, yet very near it because they are attracted to the protons.

c. Everywhere, there is no place it cannot be.

d. Either in the nucleus or around it - electrons are readily found anywhere in an atom

e. Outside the nucleus and often far from it - most of an atom's volume is its electron cloud.

2)Atomic mass =

a. Number of protons

b. Number of protons + electrons

c. Number of neutrons + protons

d. Number of protons, electrons, & neutrons

3) Isotopes have different amounts of...

a. Electrons b. Neutrons

c. Protons d. Both a & b

e. Both b & c

4) The element $^{32}_{16}S^{2-}$ contains:

a. 18 protons and 16 neutrons b.16 protons and 18 electrons

c. 16 protons and 16 electrons d. 18 electrons and 32 neutrons

e. 16 protons and 18 neutrons

5) The term used to describe an interaction where electrons acquire energy from a passing charged particle but are not removed completely from their atom is called:

a .Excitation b. Radiation

c. An isotope d. Diffraction

6) Which of the following is a rate measuring instrument?

a. Film badge c. TLD

b. Survey meter e. All of the above

7) Some individuals are more sensitive to the effects of radiation than others. This is called:

a. Somatic effects b. Biological effects

c. Genetic effects d. All of the above

8) Which of the following is a source of nonionizing radiation?

a. Infrared light b. Ultraviolet light

c. Microwaves d. All of the above are nonionizing radiation

9) The time required for one half of the amount of unstable material to degrade into a more stable material is called:

a. Half-time b. Half value layer

c. Half-life d. Half-sign

10) Gamma rays are produced by:

a. Radioactive atoms b. K shell disintegration

c. Bremstrahlung d. Television sets

11) When radiation interacts with a cell wall or DNA:

a. The cell becomes energized b. The cell becomes radioactive

c. The radiation shifts to a different waveform

d. The cell either dies or becomes a different kind of cell such as a cancer cell

12) One source of natural radiation is:

a. Iridium 192 b. Cobalt 60

c. Cosmic radiation d. Nuclear power plants

13) A symptom from an overexposure to radiation which occurs years later is called:

a. Somatic effects b. Biological effects

c. Latent effects d. Genealogy effects

14) Who discovered natural radioactivity?

a. Wilhelm Roentgen b. Marie Curie

c. Henri Becquerel d. None of the above

15) Depending upon the ratio of neutrons to protons within its nucleus:

a. An isotope is always unstable

b. An isotope is always stable

c. An isotope can be stable or unstable
d. The x-ray source can emit a wide variety of energy levels

16) Which action will most increase a person's exposure to radioactivity?

a. Staying in a house near a nuclear power plant
b. eating food that has been sterilised by gamma rays
c. going for a flight in a high-flying aircraft
d. opening the windows of a house

17) The results of the Rutherford experiment provide evidence for the presence of the nucleus within the atom.
What were scattered in this experiment?
a. gold nuclei b. beta-particles

c. gamma rays d. alpha-particles

18) Gas filled detectors works on the principle that as radiation passes through air or a specific gas, ionization of the molecules in the air occur
a. True
b. False

19) In gas filled detectors, How is a current formed that goes to the detector
a. Free electrons will travel to the anode which is then collected and form a small current in the wires going to the detector
b. The positive charges are collected by the anode which then forms a current in the wires that goes to the detector
c. The free electrons travel to the cathode and is it collected to create a small current
d. The current already exists in the detector

20) Since radiation cannot be seen, smelt, or tasted How do radiation protection technicians detect ionizing radiation
a. radiation protection technicians look at the signs of radiation sickness from personnel in order to indicate the presence of ionizing radiation
b. RP technicians are dependent on instruments to indicate the presence of ionizing radiation
c. There is no way to detect ionizing radiation
d. It is a guessing game. It is naturally assumed that any radiation facility will always have radiation exposure.

II) Write on: (30 marks)

1) Dose-Effect Relationship.
2) Equivalent Dose and effective dose.
3) Difference between alpha, beta, and gamma rays spectrum.
4) Electron Capture and Internal conversion.
5) Solid and Liquid Scintillation Detectors.
6) Committed dose and Annual Limit of Intake (ALI).

III) (20 marks)

1) a- During an iodine bioassay of a person using I-125, the result of a 2 minute measurement is 1200 counts (or 600 cpm). The background for a 2 minute measurement performed immediately before was 950 counts (or 475 cpm). Knowing the detection efficiency of the instrument for I-125 to be 1.42 % for a person, determine the content of I-125 in the person's thyroid.

b- What is the content of I-125 for a different person measured immediate after the first one, if the measured value is now 980 counts (or 490 cpm)?

2) Prove that 1 x unit equals 34Gy (in air).

3) Exposure from a Cs-137 point source at 10 cm is 10 R.
Find the exposure at 1 m.

مع تمنياتي بالتوفيق
د/أمل الشهاوي

Mansoura University **Faculty of Science** **Chemistry Department** **Subject: Analytical Chemistry** **Course(s) : Electro analytical & Chromatography (316)**	كلية العلوم جامعة المنصورة	**Second Term** **3rd Year Chem. Biophysics Students** **Date : May, 2015** **Time Allowed: 2 hours** **Full Mark : 80 Marks**

Answer The Following Questions

1-A- Write an account about the conditions which should be satisfied for a successful coulometric titration. **(10 Marks)**

1-B- The Al in 0.0655 gm sample of Al_2O_3 was precipitated with 8- hydroxyl quinoline The precipitate (AlQ_3) was filtered, washed and HQ after the dissolution of the precipitate by acid was brominated with electrogenerated bromine (see equation below). With a current of 0.18 A, the coulometric titration end-point was reached in 11.56 min. Calculate the percentage of Al_2O_3 in the sample. At.Wts: Al = 27, C = 12, N = 14, O = 16.0, Br = 79.9 and H = 1.008. **(10 Marks)**

$$3HQ + Al^{3+} \longrightarrow AlQ_3 \downarrow + 3\,H^+ \quad \ldots\ldots\ldots \quad (1)$$

$$C_9H_5NO + 2\,Br_2 \longrightarrow C_9H_5NOBr_2 + 2\,HBr \quad \ldots \quad (2)$$

2-A- Rationalize the following sentences **(discuss five only): (10 Marks)**

i- N_2 gas must be passed for 10 min through the reducible analyte solution before doing the polarogram.

ii- Supporting electrolyte with a concentration of 10- fold that of the reducible analyte solution should be added before carrying out the polarogram.

iii- Surfactants should be added to the reducible analyte solution before doing the polarographic wave.

iv- For the coulometric determination of As^{3+} ion, its reaction with the electrogenerated intermediate, I_2 should be carried be carried out in neutral medium.

v- Sometimes the residual currents in some polarograms have detectable positive values.

vi- In quantitative polarography the diffusion current, i_d μA depends upon both the reducible ion and electrocapillary characteristics.

2-B- i- Calculate the pH and [H^+] for the weak organic acid solution (HAc) present in the anode chamber for the following cell:

(+) Pt/ $H_{2\,(g)}$ (0.255 atm) / HAc (soln) (1.3479 M) // KCl (sat'd) / $Hg_2Cl_{2\,(s)}$ / Hg (-)

Knowing that:

E_{cell} = 0.3625 volt, $E_{calomel}$ = 0.244 volt, E^o_{2H+/H_2} = 0.0 volt.

ii- Calculate the dissociation constant, K_a for the weak organic acid, HAc present in the anode chamber. **(10 Marks)**

Please Turn Over $\longrightarrow$

Section B [Chromatography]

Q3:

a- Write the different types of detectors used in gas chromatography and explain only one. **(5 marks)**

b- If 100 g of a pollutant with concentration of (1 ppm) and molecular weight equal (100) was extracted with 100 cm^3 of organic solvent. The remaining concentration was found to be (1×10^{-6} mol/L).

Calculate:

1- Distribution ratio.
2- Total amount extracted after 4 times of extraction. **(5 marks)**

c- Complete the following statements: **(10 marks)**

1-In Tswett experiment, the column was filled with ..... to separate .....
2- In chromatography, the mobile phase can be ..... or .....
3- In gel chromatography, solute molecules separated according to ..... or .....
4- ..... is the liquid that is capable to remove solute out of the column.
5- Silica gel has ..... surface, so it can be used to absorb ..... compounds.
6- In IEC the mobile phase is .....

Q4:

a- Explain the different types of ion exchangers, with examples. **(10 marks)**

b- Put (√) or (x) with **corrections**: **(10 marks)**

1- Gas chromatography can't be used to separate volatile organic compounds.
2- Bio-specific Elution gives fast elution with narrow solute peaks.
3- In RPLC, column can retain polar analytes.
4- Retention is the time that the analyte takes to be separated on the stationary phase.
5- In paper chromatography, the pure sample will often develop as two or more spots.

With our best wishes ☺
Prof Dr. Medhat hafez
Dr. Yasmeen Gaber Abou El-Reash

Mansoura University
Faculty of Science
Zoology Department
Time: 2 hr

Program: Biophysics
Z 321, Physiology of Nervous system
Full Mark: 80 Marks
28th May 2015

Section (A) [40 Marks]

Answer (all) the following questions:

I. Choose the correct answer for (12) questions only : **[18 Marks]**

1-Body temperature is controlled by:
1-thalamus **2- hypothalamus** **3-cerebrum**

2-Norepinephrine is a neurotransmitter released by:
1-peripheral nervous system **2-CNS** **3- sympathetic nervous system**

3-Temporal lobes receive signals from:
1-auditory nerves **2-optic nerves** **3-facial nerves**

4-For afferent neurons, cell bodies & long processes are:
1-outside CNS **2- inside CNS** **3- inside PNS**

5 -Composition of cerebrospinal fluid is maintained by:
1-chroid plexus **2-blood brain barrier** **3- cerebral blood vessels**

6-Oligodendroglia form myelin sheath around axons:
1-inside CNS **2-outside CNS** **3-in PNS**

7-Cranial nerves I & II arise from:
1-midbrain **2-cerebrum** **3- thalamus**

8-Thalamus is a collection of several large nuclei separated by:
1-bundles of nerve fibers **2- third ventricle** **3- hypothalamus**

9-In human, spinal nerves are:
1-sensory **2- mixed** **3- motor**

10-Spinal cord is responsible for:
1-immediate reflexes **2-motor reflexes** **3- brain reflexes**

11-Parasympathetic system is important when individual is:
1-relaxed **2-threatened** **3-under stress**

12-Deeper parts of cerebral hemispheres consist of:
1-myelinated fibers **2- grey matter** **3- glial cells**

13-Initiation of voluntary movement is controlled by:
1-optic lobe **2-sensory lobe** **3-frontal lobe**

II.Compelete (6) only of the following (question 1 is obligatory): [14 Marks]

1- Somatic nervous system is important for controlling……., while autonomic nervous system is important for…….**(complete & compare in detail between the two systems).**

2- Anatomically, peripheral nervous system is composed of……..& ……..

3-Midbrain consists mainly of ……, which is important for connecting thalamic region with ……..

4-Cranial nerves are involved with controlling head & neck regions, except ……nerve which controls ……..

5-Sympathetic nervous system is called thoraco-lumber division because.. ……

6-Cerebrospinal fluid (CSF) is secreted by ……& circulates in ……..

7-Meninges means ……..; they include……,……., ……

III.A. Put (√) or (X) on (4) only of the following statements & give correct answer for the wrong ones: **[8 Marks]**

1-Thoracic region of spinal cord consists of 8 segments, while lumber region of 5 segments ( ).
2-Cerebrum is the largest portion of the brain which is associated with controlling voluntary movement ( ).
3-Medulla oblongata contains neuron cell bodies (nuclei) of cranial nerves IX & XI ( ).
4-Extracellular fluid differs from cerebrospinal fluid because it circulates in brain ventricles & central canal of the spinal cord ( ).
5- Parasympathetic nervous system is called thoraco-lumber division because it arises from spinal cord ( ) .

Section (B) [40 Marks].

Answer the following questions:

IV- A) Nerves are made up of neurons which can be divided into three types. Name these types and explain their function. **(10 marks)**

B) Draw a diagram to show a motor neuron. Name the parts and explain each parts function. **(5 marks)**

V- A) Rearrange the following list into the correct order to show the order of events in which the nervous system helps to initiate movement: **(10 marks)**

1. Message received at muscle fibres
2. Muscle contracts
3. Brain decides action
4. Body or limb performs action
5. Message or impulse sent through nervous system

B) What is the term given to a quick response to a stimulus by one or more organs? Give a labeled example. **(5 marks)**

VI- Describe how action potentials are generated and propagated along neurons. **(10 marks)**

Best Wishes

Prof. Dr. Azza El-Wakf *Prof. Dr. Amr El-Misiry*

Mansoura University Faculty of Science Physics Department		2nd semester, 2014-2015 Time: 2 Hours Full mark: 80 Ph. 330

Ph 330: Mathematical Phys. For none Phys.

Answer the Following Questions		Mark
1.	Solve the initial boundary value problem (diffusion problem) by the separation of variables method: $u_t = \alpha^2 u_{xx}, \quad 0 < x < 1, \ 0 < t < \infty$ $B.Cs: \quad u(0,t)=0$ $u(1,t)=0$ $I.C: \quad u(x,0)=\phi(x), \quad 0 \le x \le 1$	**20**
2.	A. Using the Chain rule to find $\frac{dZ}{dt}$. Consider that: $Z = x^3 y,$ $x = t^2,$ $y = t^4.$	**10**
	B. By using the Taylor's theorem, expand the function $f(x,y) = \sin xy$ about the point $(1, \frac{\pi}{3})$, neglecting the terms of degree three and higher.	**10**
3.	**Prove that:** 1. $\Gamma(1) = 1$	**10**
	2. $B(x+1,y)=\frac{\Gamma(x+1)\Gamma(y)}{\Gamma(x+y+1)}$	**10**
4.	A. If you have $f(x) = e^{ax}$, Give the Laplace transformation for this function.	**10**
	B. Display that the vector field $V = y\cos(2x+y^2)\mathbf{i} - \cos(2x+y^2)\mathbf{j} + (x^2 y)\mathbf{k}$ is incompressible vector.	**10**

With our Best wishes

Examiners	Prof. Dr. Abdel Razik R. Degheidy	Dr. Elkenany B. Elkenany (*)

Mansoura University **Faculty of Science** **Chemistry Department** **Code: Chem.341** **Subject : Electrochemistry**	كلية العلوم جامعة المنصورة	**Third Level - Second Term** **Program : Biophysics** **Date : June 2015** **Time Allowed : 2 hours** **Full Mark : 60 Marks**

Answer All Questions الأسئلة على الوجهين

First Question : **(20 Mark)**

[A] Write in detail on :

(i) Decomposition potential. **(8 Mark)**

(ii) Concentration overpotential,illustrating your answer by mathematical derivation of the relation between η_c and current i. **(8 Mark)**

[B] Complete : **(4 Mark)**

(i) Ohmic overpotential is due to .....

(ii) Maxwell distribution law is given by .....

Second Question : **(20 Mark)**

[A] Derive the Nernst equation relating electrode potential with concentration. **(8 Mark)**

[B] Write on: **(6 Mark)**

(i) Gas electrode. (ii) Liquid junction potential. (iii) Exchange current i_o.

[C] For the cell : **(6 Mark)**

Ag / Ag Cl / KCl / Hg_2Cl_2 / Hg

Taking : $E^o_{Hg2Cl2\,/\,Hg} = 0.280$ V ; $E^o_{Ag\,Cl\,/\,Ag} = 0.212$ V

(i) Write the electrode and cell reactions.

(ii) What is the type of the cell ? and why?

(iii) Calculate for the cell: (a) E^o (b) ΔG (c) equilibrium constant K

Third Question : **(20 Mark)**

[A] Give reason: **(6 Mark)**

1) Presence of MnO_2 in Le Chlanche' cell.

2) Saturated KCl solution is the mostly preferred in salt bridge.

3) Glass electrode is the convenient one for measuring solution pH.

[B] Complete : **(6 Mark)**

(i) Overvoltage η is the difference between ..... and .....

(ii) The transport number of the anion or the cation is .....

(iii) As an example of amalgam electrode concentration cell without transference .....

(iv) As an example of electrolyte concentration cell without transference .....

[C] The standard Weston-cadmium cell has emf given by: **(8 Mark)**

$E = [\ 1.0186 - 4.06 \times 10^{-5}\ (t - 20)\ ]$ volt

Calculate at $25^{o}C$:

(i) ΔG (ii) ΔH (iii) ΔS (iv) equilibrium constant K

Good Luck

Prof.Dr. M.A.Morsi

Mansoura University Faculty of Science Physics Department El- Mansoura , Egypt		جامعة المنصورة كلية العلوم قسم الفيزياء المنصورة – مصر

Final Exam Second Semester ; 2015

Time : Two hours — **Educational Year : Third Level**
Date : 8/6/2015 — **Subjects : biophysics**
Mark: 80 Mark — **Course Code : biophys312**
Course Title : Physics of Reactors &Neutrons

Answer All the Following Questions:-

1.I Discuss The Following:- **[20 Marks]**

(a) The macroscopic cross section and mean free path
(b) Thermal neutron fission yield of ^{235}U.
(c) Reaction rate.

1.II Define the following:- **[10 Marks]**

Neutron flux - the most probable energy

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2. I Write short account on the following:- **[20 Marks]**

(a) Different types of slow neutrons reactions.
(b) Breading reaction
(c) Nuclear chain reaction

2.II Solve the following :- **[10 Marks]**

The cross section of the $^{10}B(n, ^{4}He)\ ^{7}Li$ reaction is 753 barns for thermal neutrons (0.025 eV). What is the cross section at 50 eV.

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3. I- Find four factor formula . **[10 Marks]**
3. II- List the components of the reactor core. **[10 Marks]**

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Good Luck