٢ فيزياء حيوية - فيزياء حيوية المخ والأعصاب ٢٠١١

Mansoura University
Faculty of Science
Zoology Department

جامعة المنصورة
كلية العلوم
قسم علم الحيوان

Educational year: 3rd level
Time: 2 hr
Date: 21/6/ 2011

Program: Biophysics
Subject: Nerves System
Full Mark:80 Marks

Answer all questions:

Question (1): Choose the correct answer for **15 questions** only: **[45 Marks]**

1. Nissle bodies are present in:
   a) denderites & axon b) cell body c) ceil body & axon
2. Trillions of inter-connected neurons with rapid & short standing action is:
   a) sympathetic nervous system b) nervous system c)autonomic nervous system
3. Cells that form myelin sheath around the axon in CNS are:
   a) sensory cells b) astrogelial cells c) oligodendroglial cells
4. For efferent neurons, the cell bodies located inside:
   a) CNS b) spinal cord c) cerebellum
5. The reflexes are functionally classified into:
   a) somatic & autonomic reflexes b) spinal & cranial reflexes
   c) somatic & cranial reflexes.
6. The action potential propagates in direction from:
   a) axon to synapse b) synapse to soma c) Soma to axon terminal
7. Chemical synapse is:
   a) rare b) predominant c) rare inside brain
8. Spinal cord extends down to the space between:
   a) 1st & 2nd lumbar vertebrae b) 3rd & 4th thoracic vertebrae
   c) 4th & 5th sacral vertebrae
9. The brain area important for initiation & control of voluntary movement is:
   a) thalamus b) temporal lobe c) frontal lobe
10. All cranial nerves:
    a) contain sensory fibers b) contain motor fibers c) originate from the brain
11. The somatic motor neuron carries impulses to:
    a) skeletal muscles b) internal organs c) heart muscles
12. Parasympathetic nerves have opposite effects to:
    a) sympathetic nerves b) somatic nerves c) sensory nerves
13. The connection between two hemispheres in cerebrum is important for:
    a) speech b) motor activity
    c) transport of information between 2 hemispheres
14. Melatonin secretion being high at:
    a) night b) mid day c) early morning
15. Cerebrospinal fluid (CSE) is secreted from:
    a) chroid plexus b) brain vessels c) subarachnoid space
16. Number of cranial nerves in lower vertebrates is:
    a) 10 pairs b) 12 pairs c) 8 pairs

Question (2): Complete **10 only** of the following statements: **[20 Marks]**

1. Inside nerve cell is more negative than outside because .....
2. Chemical synapses mediate communication between ....., while electrical sympses mediate communication between .....
3. Terminal endings of axon contain ..... called synaptic vesicles, which contain .....
4. In CNS, myeline sheath is formed by ....., while in the PNS by .....
5. In human, the PNS is composed of ..... pairs of cranial nerves & ..... pairs of spinal nerves.
6. White matter in spinal cord ....., while grey matter consists of .....
7. The cranial nerves III & IV are attached to ..... , while I & II are attached to .....
8. Neurons of somatic nervous system innervate mainly ....., while autonomic neurons innervate .....
9. Hypothalamus is located at ..... and is important for .....,.....,.....
10. The deepest pant of the cerebral hemisphere contains ..... that is made of .....
11. Lobes of ceretral cortex are .....,.....,.....& .....

Question (3): Write short notes on 5 only: **[15 Marks]**

1. Parietal lobe
2. Brain ventricles
3. Meninges
4. Sympathetic nervous system
5. Electrical synapses
6. Microglial cells

With best wishes

PROF. DR. AZZA M. EL-WAKF

Mansoura University Faculty of Science Physics Department	3rd Level (Bio-Physics)	Second Semester, 2010-2011 May, 2011 (2011-06-25) Time: 2 Hours

(Ph 330): Mathematical Physics

Answer All of the Following Questions: *(Full mark:80)*		*Mark*
1.a)	Find the Fourier series expansion of the square wave $f(x) = \begin{cases} -1 & -\pi \le x < 0 \\ 1 & 0 \le x < \pi \end{cases}$	*15*
b)	Show which one of these functions are of exponential order: $t, e^{-t}, \cos t, e^{t^2}$	*15*
2.	Find Laplace transform of the following functions: (a) $t \sin 2t$ (b) $t^2 e^{-2t}$ (c) $x \int_0^x f(x)\,dx$ (d) $x^2 \frac{d^2 f}{dx^2}$	*20*
3.	Using Laplace transform for solving the following differential equations: $(a)\, x'' + 16x = \cos 4t \quad x(0) = 0,\ x'(0) = 1$ $(b)\, x' - 3x = e^{2t} \quad x(0) = 1$	*30*

With our Best wishes

Examiners:	*Prof. M. A. Madkour*	*Prof. Attala Elhanbaly (*)*

مستوى ثالث - فيزياء حيوية - (ف ٣١٢) فيزياء المفاعلات والنيوترونات

Mansoura University Faculty of Science Physics Department		Second Term May 2011 Third Level Date : 2/7/2011 Program : Biophysics Course Code : Phys312 Time allowed : 2 hours
Course Title : Physics of Reactors and Neutrons		Total Full Mark:: 80 Marks

Answer **THREE** Questions Only: السؤال الأول أجبارى

[1a] - If a homogeneous beam of neutrons is allowed to pass through a thin sheet of target material of area A, thickness t, and having N_0 nuclei per cm^3. Give :
i) Available nuclear target area ii) Probability of interaction per neutron.
iii) the number of reactions per second. **[10 Marks]**

[1b] - Derive the law of attenuation of neutrons through matter and find the relation between the macroscopic cross section and mean free path. **[10 Marks]**

[1c] – A thin sheet of Co^{59} , 0. 3 mm thick , is irradiated with a neutron beam of flux density 10^{12} neutrons per cm2 sec for a period of 2 hr . If the cross section for neutron capture by Co^{59} is 30 barns, how many nuclei of the isotope Co^{60} will have been produced at the end of the irradiation period per cm^2 .The density of Co^{59} is 8.9 grams per cm2 , and Avogaro's number = $6.03x10^{23}$ gram $mole^{-1}$. **[10 Marks]**

[2a] - Study the energy dependence of neutron cross section for epithermal neutrons. **[13 Marks]**

[2b] - Calculate the energy released when 1.00 Kg of U^{235} fissions taking the disintegration energy per event to be Q =208 MeV . **[12 Marks]**

[3a] - If the spontaneous breakup of nuclei above A = 85 is energetically possible, why does it not always take place ? **[13 Marks]**

[3b] – Draw and explain the main components of a pressurized water reactor . **[12 Marks]**

[4] - What is uranium enrichment ? How is uranium enriched ? Give the different methods of uranium enrichment and explain two methods of uranium enrichment . **[25 Marks]**

لجنة التصحيح : أ.د/ محمود أبو زيد أ.د.م/ أحمد أبوالعلا

المستوى الثالث - فيزياء حيوية - (ك ٣٤١) - كيمياء كهربية

Mansoura University **Faculty of Science** **Chemistry Department** **Code: Chem.341** **Subject : Electrochemistry**	كلية العلوم جامعة المنصورة	**Second Term** **Third Level** **Program : Biophysics** **Date : June 2011** **Time Allowed : 2 hours** **Full Mark : 60 Marks**

Answer All Questions **الأسئلة على الوجهين**

First Question: **(15 Mark)**

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

(1) For an electrode, osmotic pressure is ---------- while solution pressure is --------

(2) In testing cell reversibility, if the outer emf exactly equal the cell emf, then the cell reaction ---------- .

(3) Calculated cell emf if +ve, the cell reaction is ---------- while if –ve, the cell reaction is ----------

(4) In chemical cells, emf is due to ---------- while in concentration cells, emf is due to ----------

[B] Derive mathematically the Nernst equation relating electrode potential and concentration. **(6 Mark)**

[C] Taking : $E^{o}_{Zn^{2+}/Zn} = -0.76$; $E^{o}_{Cu^{2+}/Cu} = 0.337$ v, $\left(\frac{\partial E}{\partial T}\right)_p = 4.18x10^{-4} V/\text{deg.at } 25^{o}\text{C}$ **(5 Mark)**

Write the electrode and cell reaction. Calculate: cell emf , ΔG^{o}, Δ S and the equilibrium constant K.

Second Question: **(15 Mark)**

[A] Tick (√) for the correct answer: **(4 Mark)**

(1) For KCl solution the anion transport and cation transport number:

(i) Each equal 1 ( ) (ii) Greatly different from each other ( )

(iii) Each equal 0 ( ) (iv) Very near to each other ( )

(2) Theoretically $E_j = 0$ when

(i) $t_{(+)} = t_{(-)} > 1$ ( ) (ii) $t_{(+)} = t_{(-)} = 1$ ( ) (iii) $t_{(+)} < t_{(-)}$ ( )

(iv) $t_{(+)} - t_{(-)} = 0$ ( ) (v) $t_{(+)} > t_{(-)}$ ( ) (vi) $t_{(+)} + t_{(-)} = 0$ ( )

(3) The cell: $Pt, H_{2(g)}(P)|HCl(a)|AgCl|Ag$ is an example of:

(i) Concentration cell without transference ( )

(ii) Chemical cell with transference ( ) (iii) Chemical cell without transference ( )

(iv) Electrolyte concentration cell without transference ( )

(4) The cell: $Na(Hg)\ (a_{Na} = a_1)|Na^{+}\ a_{Na^{+}}|(a_{Na} = a_2)\ (Hg)\ Na$ is an example of:

(i) Electrode concentration cell with transference ( ).

(ii) Chemical cell without transference( ). (iii) Chemical cell with transference( ).

(iv) Electrode concentration cell without transference ( ).

[B] Give reason : **(3 Mark)**

(1) Amalgam electrode is sometimes preferred than the metal electrode.

(2) Glass electrode is preferred than other electrodes for measuring solution pH.

[C] Write with examples on: **(8 Mark)**

(i) Gas electrode (ii) Metal-insoluble salt electrode

(iii) Standard cell . (iv) Oxidation-reduction electrode

Third Question: **(15 Mark)**

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

(1) The voltage at which the current begins to flow free is known as ----------

(2) Overvoltage η is the difference between ---------- and ----------

(3) Ohmic overpotential originate as a result of ----------

(4) The decomposition potential for all alkalis and acids except ---------- acids are the same and equal ---------- v.

(5) Activation overpotential arises from ----------

[B] Write in detail on concentration overpotential . Illustrate your answer by mathematical Derivation of the relation between η_c and current i. **(9 Mark)**

Fourth Question: **(15 Mark)**

[A]Given Reason: **(5 Mark)**

1) Decomposition potential of halogen acids are different

2) Sb/Sb_2O_3 electrode is used for determination of solution pH

[B] Deduce mathematically the equation for a polarized electrode (Electrode kinetics for irreversible electrode). Illustrate the form of this equation under conditions of : (i) High overvoltage (η 0.05V, Tafel equation). (ii) Low overvoltage (η 0.02 V).

(10 Mark)

Ahlam M.A.Helmy ; Prof.Dr. Hanem Abdel-Rasoul

Mansoura University Faculty of Science Chemistry Department Subject: Analytical Chemistry Course(s):Electro-analytical & Chromatography(Chemistry,316 C)		Second Term B.Sc Students. 3rd Year Bio/Physics. Students Date: June. 2011 Time Allowed : 2 hours Full Mark: 80 Marks

ELECTRO- Analytical Chemistry Prof. Dr. I. M.Kenawy (40 Mark)

A)-complete the following: (20 Marks)

1- $E_{1/2}$= .....for E_c = -0.66 v. and E_a = -0.64 v. and the number of electrons=.... for organic compound (cyclic voltammetry).
2- Controlled potential coulometry used for analysis of .....and determine no of .....
3- Using coulometry with constant current for determination of Organic compounds using ... and.....
4- Coulometry with constant current used for titration As(III) at pH ..... with ..... solution.
5- Quantitative analysis in polarography technique depends on ..... using .....and ..... methods. while, qualitative analysis depends on .....
6- Equivalent conductance Λ° are .....and depends on ..... while α is ..... .
7- Advantages of dropping mercury electrode are ..., ...while disadvantages are..... &....
8- Glass electrode using for measurements of.....and consisting of approximately of....,...%, ...,....%,...,..%.
9- Gran's plot in potentiometric titration It doesnot require data very close to..... and drawing ..... vs. ml added of titrant.
10- Dissolved..... must be removed from polarographic analysis by passing ..... gas 15 min.
11- Anodic stripping voltammetry analysis used for analysis of .....and as .....method.

B) Define 5 only of the following: *(10 Marks)*

1-id.& I_p. 2- Faraday 's 2nd law. 3-potentiometric titration. 4- Nernst equation, E cell. 5- $E_{1/2}$ & $\Delta E_{1/2}$.

6- Amperometric titration.

C) Discuss *one only* of the following sentences: (5 Marks)

1- Selectivity of ion and molecular selective electrodes depend on their types & membrane.
2-Electro-deposition depend on several factors and have many application in chemistry.

D)- Calculate K_{sp} for $Cu(OH)_2$ from the cell potential .

NHE // OH^- (0.01 M) / Cu $(OH)_2$ s /Cu E_{cell} = 0.201 v. $E^\circ_{Cu^{2+},Cu}$ = 0.33 v. and E_{NHE} = 0. v. at 25° C

(5 Marks)

----------Good Luck

CHROMATOGRAPHY (40 Marks)

1.a- 100 g sample of a pollutant was extracted into 100 ml cyclohexane. If its concn. = 10^{-8} M . What is the initial concentration in ppm or ppb units?

b- If a pollutant concentration = 10^{-7} M(100 ml) was extracted with 100 ml solvent. The remaining concentration =2.10^{-8} M . What are the No. of extractions performed to achieve 99.2 % from initial concentration.

c- Describe the main methods of preparation and application of ion exchangers. What is meant by separation factor and capacity?

d- What do you understand by:-
(i) programm controlled gas chromatography. ;
(ii) Effect of pH. ; (iii) Gel Chromatography. ;
(iv) Affinity chromatography.

e. Discuss and compare between two of the most sophisticated techniques in chromatography.

المستوى الثالث - فيزياء حيوية - (ف ح ٣٢٢) طاقة حيوية

Mansoura University | Second Term (June2011) EXAM.

Faculty of Science | Bio-Physics EXAM.

Physics Department | Bio Energy 322 EXAMS.

Time: TWO HOURS | Total Mark: 80

الورقة الامتحانية للمستوي الثالث –فيزياء حيوية – طاقة حيوية ف ح ٣٢٢)

الفصل الدراسي الثاني ٢٠١٠\٢٠١١

الدرجة الكلية : (٨٠)

Answer the following Questions:

Q.1. Show the scientific meaning of:

1) Anabolism (10 Mark).

2) Endergonic reaction (10Mark).

3) RNA (10Mark).

4) Cellular respiration (10 Mark).

Total Mark [40Mark).

Q.2.a) Describe the experimental methods used in detection and characterization "sites of Phosphorylation". (15 Mark).

b) Interpret what is meant by Reversible phosphorylation of proteins. (5Mark).

Total Mark [20Mark].

Q.3.a) Discuss the factors affecting Photosynthesis process (10Mark).

b) Explain why Cynobacteria cannot receive the correct wavelength required to cause photo induced charge separation in conventional photosynthetic pigments (5Mark). And how to compact this problem (5Mark).

Total Mark [20Mark].

انتهت الأسئلة

لجنة التصحيح : أ.د. مصطفي كمال محمد يوسف - أ.د. أبوبكر البديوي

المستوى الثالث - فيزياء حيوية - فص ٢٠١١ فيزياء حيوية صحية

بسم الله الرحمن الرحيم

University of Mansoura Faculty of Science Physics Department		Second term Jun: 2011 Time Allowed: 2 hours المادة: المادة: فيزياء صحية
الفرقة الثالثة		Full Mark: 80 Mark

Answer Three of the Following Questions

1.
   A. **Write on: The basic clinical syndromes of radiation exposure of an organism. Consider the different stages of acute radiation sickness.**

   B. **"Radiotoxins formed after the absorption of radiation energy induce health injuries to various cell organells with consequent *structural* and *metabolic* disturbances". Explain and Discuss in details.**

2.
   A. **Write on: Radiosensitivity of tumor cells and role oxygen presence during radiotherapy.**

   B. **Write on: Radiation induction of malignant tumors and mechanism of occurrence (Radiation carcinogenesis).**

3. **Radiation damage to an organism is manifested by certain features which are usually associated with retardation in health and illness. However, a state of strictly balanced cells renewal occurs (cell homeostasis). Explain and discuss referring to the features of the degeneration curve of the cell renewal system due to radiation exposure.**

4. **Several mechanisms have been proposed to clarify the quantitative effect of ionizing radiations on biological systems target theory and what are called stochastic and non-stochastic hypothesis. Discuss in details and give examples of each effect.**

Thank you

القائمون بالتصحيح :

أ.د. رأفت محمد يسري - د. محمد سعد

Mansoura University **Faculty of Science** **Chemistry Department** **Subject: Chemistry** **Course(s):** Biochem. 378.	كلية العلوم جامعة المنصورة	**Second Team** **3rd Level, Biophysics.** **Date : Jun. 2011** **Time Allowed: 3 hours** **Full Mark: 80 Marks**

Answer all questions

1- a. How can you collect and preserve blood specimens for perfect analysis? (8 Marks).

b. Plasma proteins concentration may be altered in several diseases. Discuss with stress on changes in albumin concentration. (9 Marks).

c. Give a brief note for the use of LD in diagnosis. (8 Marks).

2- **Only 2 parts to be answered**

a. Demonstrate 2 examples of side-room chemical tests that can be done on each of blood and urine specimens. (15 Marks).

b. Inulin clearance is the reference procedure by which values for GFR can be established and against which other methods of measuring GFR are compared. Explain with reference to creatinine clearance in detail. (15 Marks).

c. Comment on the use of some red cell enzyme assays in diagnosis. (15 Marks).

3- a. Summarize the most important functions of plasma proteins. (9 Marks).

b. Plasma enzyme activities may be increased in some diseases. Mention the causes of such increase. (8 Marks).

c. Explain how plasma alkaline phosphatase varies with age. (8 Marks).

Prof. A. El-Waseef