المستوى الرابع - فيزياء حيوية - فيزياء حيوية طبية فرقة ٤٢٠

Mansoura University
Faculty of Science
Physics Department

Course code: Biophys 420

Second semester 2012-2013
Date: 28-5-2013

4th level Biophysics Students
Full Mark: 80
Allowed time: 2 hours
Course title:
(Medical Nuclear medicine)

Answer the following questions: Marks

1- a- Give the physical meaning of cumulated activity and S-factor. 10

b- Suppose a liver scan is performed in which 37 MBq of ^{99m}Tc labeled sulpher colloid is administrated to patient, then it is found from metabolic modeling that 70% of cumulated activity goes to the patient's liver, 20% goes to the spleen and 10% goes to pancreas. Use the data in the following table to calculate the dose in the liver scan knowing that $T_{1/2}$ of ^{99m}Tc is 6.03 days. 15

The absorbed dose per unit cumulated activity, S (t,s), for ^{99m}Tc (in mGy/MBq/hour)

Target Organ	Liver as Source	Spleen as Source
Bladder Wall	4.3×10^{-5}	3.2×10^{-5}
Stomach Wall	5.1×10^{-4}	2.7×10^{-3}
Liver	1.2×10^{-2}	2.6×10^{-4}
Lungs	1.4×10^{-4}	6.2×10^{-4}
Pancreas	1.1×10^{-3}	5.1×10^{-3}
Spleen	2.5×10^{-4}	8.9×10^{-2}

2- a- Explain the concept of biodistribution as an important aspect of therapy. 10

b- ^{99}Mo and ^{131}I radioisotopes are produced by nuclear fission, Write on radioisotope production via neutron capture. 15

3- a- List five different radioisotopes that are commonly used in nuclear medicine. 10

b- ^{32}P is used for some kinds of bone scans. The phosphorous tends to be held in the bones, leading to a long biological half-life =1155 day, calculate its effective half-life time knowing that the physical half life time =14.3 day. 10

C- Compare between ^{90}Y and ^{131}I which are the two most commonly used β-emitters radionuclides in Radio immunotherapy. 10

Best wishes:

Dr Hany Kamal

المستوى الرابع - فيزياء حيوية . اجهزة بصرية ف ٤٣٢

Mansoura University Faculty of Science, Physics Department	بسم الله الرحمن الرحيم **Summer Term Exam** **2012/2013** **For the 4th. Year Biophysics Students** **(Phys. 432)**	**Time Allowed : Two Hours** **Subject : Optical Instruments** **Total Marks = 80 M**

Answer the following questions:

1 - a) Report on the limitations of electron microscopy. **(13 M)**

b) What is the resolution element ? How this element depends on the so called **NUMERICAL APERTURE (NA)? (13 M)**

2 – a) Explain the structure and operation of the phase contrast microscope. **(13 M)**

b) Discuss basics of the theory of **fluorescence microscopy** referring to the role of cellular staining. **(13 M)**

3 – a) What are the main advantages of infinity corrected lens systems? Explain these advantages Graphically . **(13 M)**

b) Show how electron microscopes and acoustic microscopes could overcome limitations of the optical microscopes. **(15 M)**

Best wishes

Prof. Dr. Maher El-Tonsy

June 2013

Mansoura University
Faculty of Science
Chemistry Department
Subject: Electrochemistry

Date :June 2013
Code : Chem. 341
Full Mark : 60
Time Allowed : 2hours

Answer All Questions

First Question : (20 Mark)

[A] Write with examples on : (12 Mark)

(i) Metal- Metal ion electrode. (ii) Amalgam electrode.

(iii) Gas electrode. (iv) Metal-insoluble salt electrode.

[B] For the cell : Pt / HCl / Ag/AgCl (8 Mark)

(i) What is the type of the cell and why? (ii) Determine the emf of the cell.

(iii)Use this cell for determination the standard electrode potential of Ag/AgCl electrode

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Second Question : (20 Mark)

Discuss in detail :

[A] Decomposition potential. (10 Mark)

[B] Electrode kinetics for reversible electrode . (7 Mark)

[C] Sulphation . (3 Mark)

Third Question : (20 Mark)

[A] Give reason : (8 Mark)

(i) Dry cell is irreversible cell . (ii) E^{o} for concentration cell is zero.

(iii) The maximum emf obtainable from a simple cell is 2 V.

(iv) Use of glass electrode is the most convenient method for measuring solution pH.

[B] What is the difference between chemical cell and concentration cell. (3 Mark)

[C] Write on electrode concentration cell without transference. (5 Mark)

[D] Complete : (4 Mark)

(i) In Cd-Weston cell .....is the –ve electrode and.....is the +ve electrode.

(ii) When the electrode is polarized, the overpotential plays two roles : .....

and .....

Good Luck

Prof.Dr. Ahlam M.A.Helmy

المستوى الرابع . فيزياء حيوى . فيزياء التصوير الطبى ف ٢ ٢٠١٣

Mansoura University
Faculty of Science
Physics Department

Course code: Biophys 422

Second semester 2012-2013
Date: 18-6-2013

4th level Biophysics Students
Full Mark: 80
Allowed time: 2 hours
Course title:
Physics of Imaging Medicine

Answer the following questions: Marks

1- a- Differentiate between the secondary and backscattered electrons in the electron microscope. 8

b- Discuss the relaxation mechanism of excited atoms inside samples using electron microscope. 12

2- a- Discuss the basic principle CT. Write on reasons of using CT and mention the three steps of image formation. 10

b- What do we mean by Conventional slice-by-slice image acquisition system, list the advantages of single slice-by-slice volume CT? 10

3- a- Explain the meaning of magnetic resonance spectroscopy (MRS), different types, physical principle and steps of an MRS examination. 20

4- a- Write on Composition and function of ultrasound transducer. 8

b- The interaction of ultrasound waves with organs and tissues encountered along the ultrasound beam can be described in terms of attenuation, absorption, reflection, scattering, refraction and diffraction. Explain briefly this statement. 12

Best wishes:

Dr Hany Kamal

المستوى الرابع - فيزياء - صيف. ٤٢٤ ف

حلول بروفيسور

Mansoura University
Faculty of Science
Physics Department

جامعة المنصورة
كلية العلـــوم
قسم الفـــيزياء

Second Term Examination | Full mark: 80 mark | Educational Year: Forth Level
BioPhysics. Stud. | subject: Physics
Time: 2 hours | Course: BioPhy 423.
Date: 18/6/2013 | Biophysics calculations

Answer the following questions.

1- Discuss the difference between the donkey and the diplodocus according to their digestive system. (15 mark)

2-a Show that for a decaying population $\frac{dN}{dt} = -kN, \quad (k > 0)$, the time at which only half of the original population remains is $\tau_{1/2}$ =ln2/k. (10mark)

2-b Consider a bacterial population whose growth rate is $\frac{dN}{dt} = -k(t)N, \quad (k > 0)$, show that $N(t) = N_0 exp(\int_0^t kds)$, (10 mark)

3- a Classify the following ordinary differential equations

$i - sin(x)\ddot{y} + cox(x) = 0$, $ii - \ddot{y} + y^2 = sin(y)$, **(10 mark)**

$3 - b$. Find the steady state solution for the following system of equations

$\frac{dy}{dt} = x(1 - y)$, $\frac{dx}{dt} = x^2 - y^2$ **(10mark)**

4-a Consider the equation

$\frac{d^2x}{dt^2} - 2\frac{dx}{dt} - 3x = 0$, **show that $x_1(t)=e^{3t}$, and $x_2(t)=e^{-t}$ are solution s for this equation and show that $x(t)=c_1x_1(t)+c_2x_2(t)$ is also a solution. (10 mark)**

4.b. Solve the following system of equations

$\frac{dy}{dt} = 6x - 4y$, $\frac{dx}{dt} = 3x - y$ **(15 mark)**

With best wishes

Examiners: Dr. Abeer Awad, Prof. Dr.Hamdi Dwidar

المستوى الرابع - فيزياء حيوية - الليزر وتطبيقاته ف ٤١٠

Mansoura University	2nd Semester
Faculty of Science	Date: 25 - 5 -2013
Physics Department	Time allowed 2 hours
	Full mark: 80 marks

Subject: Physics	4th Level	Course:410ف Laser and its applications

Answer the following questions:

1-a) Describe the essential feature of argon ion laser. Explain by the aid of an energy-level diagram, how population inversion is brought. Sketch schematic diagram of tipical tube design of this laser, clarifying the principal difference between the argon ion laser and other gas laser.

18 Marks

b) A He-Ne laser emits light of wavelength 632.8 nm. What is the ratio of population of the upper level E_2 to that of the lower level E_1 in the laser transition, at 300 K. Where K= 1.38×10^{-23} j/k, h= 6.625×10^{-34} j.sec, c=3×10^{8} m/sec.

9 Marks

2-a) Deduce the condition of the population inversion for an atom having four levels. Discuss the advantage of four levels atom comparing with the three levels atom.

15 Marks

b) Describe with the help of schematic diagram the construction and reconstruction of holography. Using sandwich holograms technique explains how you can measure the distortions of an object.

12 Marks

3-a) Derive an expression for the growth of laser beam in a medium enjoying population inversion taking Doppler broadening into consideration.

16 Marks

b) Calculate the spectral broadening (half maximum line width) due to Doppler effect in carbon dioxide (co_2) laser (λ= 10.6 μm), assuming that the temperature of the pumping discharge is 400K. The relative atomic masses of carbon and oxygen are 12 and 16 respectively (K= 1.38×10^{-16} erg per degree and Avogadro's number= 6.022×10^{23} mol^{-1}).

10 Marks

With my best wishes

Prof. Dr. Taha Sokkar

القيزيائية
المستوى الرابع - كيمياء حيوية - مناعة وبيولوجيا جزيئية ع.ح
علوم البنية

Mansoura University
Faculty of Science
Zoology Department
Courses: Immunology & Molecular Biology
Academic Year: 2012-2013

Second Term - Final Exam
4th Level Students
Date: 1 June, 2013
Time Allowed: 2 hrs
Full Mark: 60

Answer All Questions

Part I Immunology

Question 1 **(15 marks)**

Write short notes on:

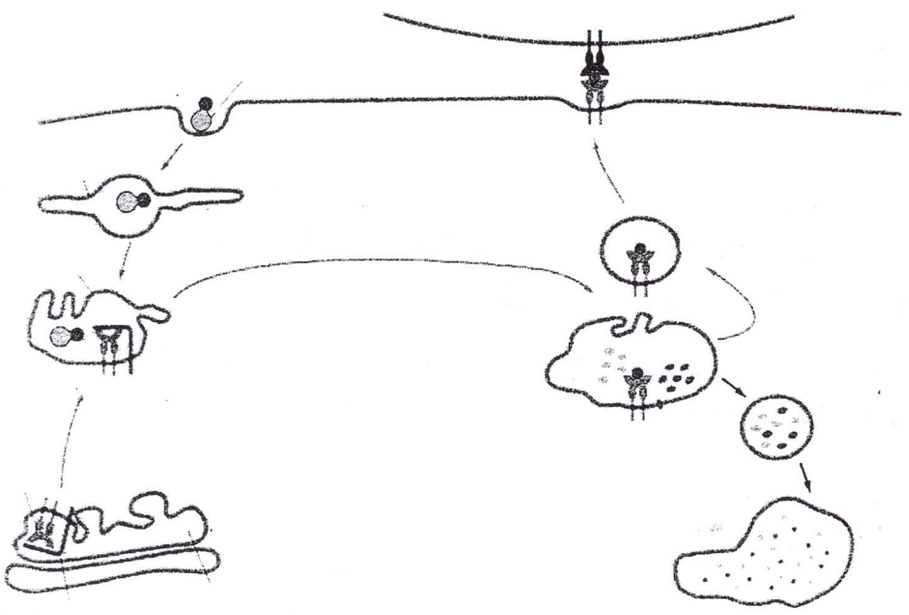
a) IgG.
b) Complement system.

Question 2 **(15 marks)**

A- Complete:

a) ..... region determines the specificity of the antibody, while ..... region determines its functional properties.
b) Antibody molecule has ..... antigen-binding sites.
c) ..... antibody has ten antigen-binding sites.
d) Helper T cells express ..... co-receptor, while cytotoxic T cells express ..... co-receptor.
e) Exogenous antigens are expressed to T_{helper} cells in the context of ....., while endogenous antigens are expressed to $T_{cytotoxic}$ cells in the context of .....

B- Identify, draw and put the labels for the following diagram:



Part II Molecular Biology

Q. 1: Discuss the Following Statements: **(20 marks, 5 Marks each)**

A: Restriction nucleases enzymes.

B: Bacterial plasmids and cloning DNA.

C: Transgenic animals carry engineered genes.

D: Compare between DNA and RNA.

Q. 2.: **(10 marks)**

A: Complete the following statements: **(5 marks, each statement of one Mark)**

1- Gel electrophoresis separates DNA molecules according to ……,……and ……

2- The vector contains three characteristics regions……,……and ……

3- Expression vectors have transcriptional promoters immediately adjacent to the ……

4- Transformation is process by which a host organism can take up ……

5- Gel matrix are ……and ……

B- States whether true or false and give the reasons for your answer:

(5 marks, each statement of one Mark)

1. Transcription uses the transcribed RNA to synthesize proteins.
2. Semi-conservative Model, the parental double helix is broken into double-stranded DNA segments that, as for the Conservative Model, act as templates for the synthesis of new double helix molecules. The segments then reassemble into complete DNA double helices, each with parental and progeny DNA segments interspersed.
3. Exons can be as large as 100,000 bases in length, while Introns length is usually 100 to 300 nucleotides in length.
4. Meiosis is the name for the way that a cell duplicates itself so that each daughter cell receives an identical copy of its genetic material. At the end of mitosis, there will be two cells instead of one. They will be identical to each other.
5. The reproduction of some organisms contains a step when gametes are produced. This involves a cell division called meiosis. In an organism, the multiplication of cells is called mitosis.

Our best wishes

Prof. Sherif Helmy Abdeen **Dr: Sayed Kamel Areida**

المستوى الرابع - فيزياء حيوية - وقاية اشعاعية فع ٤٢١

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

Final Exam Second Semester ; 2013

Time : Two hours | **Educational Year : level four**

Date : 4/6/2013 | **Subjects : Radiation protection**

Mark: 80 Mark | **Course Code : Bio-phys.421**

Answer All the Following Questions:-

1. Discuss The Following:- **`[28 Marks]**

(a) Direct and indirect effect of radiation upon biological target.
(b) The shielding for alpha ,beta and gamma radiation hazard.
(c) The three basic methods for reducing exposure to radiation ?
(d) Gamma constant and buildup factor (B)

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2. Write short account on the following:- **[28 Marks]**

(a) The portable survey instruments
(b) The name of the cells which are radiosensitive and that which are radioresistant.
(c) The types of late effect of radiation.
(d) The names and give specific examples for the types of radioactive decay processes in which particles are emitted .

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3. I- Differentiate between the following:- **[14 Marks]**

(a) Aacute lethal response and chronic exposure response.
(b) Narrow beam technique and shielding for poor geometry photon source

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

(a) The intensity of an unshielded Cs-137 source is 1rad/hr .If the source is put into a lead shield two inches thick, what would be the intensity on the outside of the shield? (density of lead =11.35 gm/cm^3 , μ_m =0.114 cm^2/gm)

Good Luck

المستوى الرابع - فيزياء حيوية - فسيولوجيا أدمي ٢٠١٣

Mansoura University
Faculty of Science
Zoology Department
Subject: Zoology (Z 423)
Courses Human Physiology

Second Term
4th Level: Biophysics
Date: 8/6/2013
Time Allowed: 2hr
Full Mark: (60)

Answer all the following questions

Q-1 A- Choose the correct answer : **(10 marks)**

1-The site of production of cholecystokinin and secretin is the ----------
a- stomach b- pancreas c- small Intestine d- large Intestine

2- A protein molecule will be hydrolyzed by enzymes secreted from the --------
a- mouth, stomach, small intestine, liver b- stomach, pancreas, small intestine
c- stomach, small intestine, liver d- mouth, pancreas, colon

3- The conversion of amino acids to glucose is an example of ----------
a- glycogenesis b- glycogenolysis c- glycolysis d- gluconeogenesis

4- HCl is formed in cells that contain an enzyme called --------- that catalyze the reaction between ---------- and water.
a- Carbonic anhydrase – CO2 b- amylase – HCO3
c- Carbonic anhydrase – HCO3 d- Pepsin – CO2

5- Sucrose contains which of the following monosaccharides?
a- glucose and galactose b- glucose and fructose
c- glucose only d- none of the above

6- Which of the following does not produce digestive enzymes?
a- Pancreas b- Liver c- Salivary glands d-Stomach

7- Which of the following is NOT produced by the pancreas?
a- Amylase b- Trypsinogen c- Pepsinogen d- Chymotrypsinogen

8- The functional unit of the kidney is called ----------
a- glomerulus b- ureter c- nephron d- corpuscle

9- ADH stimulates tubular reabsorption of ----------
a- Na+ ions b- K+ ions c- water d- all of the above

10- Most glucose molecules are reabsorbed in ----------
a- proximal convoluted tubule b- loop of Henele
c- distal convoluted tubule d- collecting duct

B- Identify five only of the following: **(5 marks)**

1- Beta oxidation 2- Glycogenesis. 3- Transamination.
4- Disaccharides 5- Phospholipids. 6- Bile.

C- Give an account on Two only of the following: **(5 marks)**

1- Physiological significance of lipids. 2- Enzymes of pancreatic juice.

3- Functions of the kidney.

Q-2 A- Complete the following: **(10 marks)**

I- Two fat-soluble vitamins are: a- -----(1)---------- b- -----(2)----------

II- Complete the table:

Site	Enzyme	Substrate	products
Mouth	amylase	---------(3)------	-------(4)-------
Stomach	-------(5)----------	Protein	--------(6)------
Small intestine	exopeptidase	--------(7)-------	-------(8)-------
Small intestine	maltase	-------(9)-------	glucose
Small intestine	------(10)-----	-------(11)-------	Fatty acids and glycerol

III- Urine is formed as a result of three processes which are:

a- ------(12)---------- b- -----(13)---------- c- -----(14)----------

IV - Two factors affecting the enzyme activity are: a- ----(15)---- b- ----(16)---

V- Two types of proteins are : ---------(17)-------, --------(18)----------

VI- One of the hormones that control digestion is -----(19)-----which secreted from ------(20)---

B- Give a possible diagnosis of the four negative results of blood sample(4 marks)

1- Decreasing in platelets 2- Decreasing hemoglobin

3- High level of Leukocyte 4- Increasing erythrocyte

C-Write short notes on **(6 Marks)**

1-Peochromcytoma 2- changes during muscle contraction

3-Role of oxygen in respiration

Q-3 A-Discuss briefly four only of the following: **(12 marks)**

a- Fate of erythrocytes. B-Mechanism of hemostasis.

c- Factors affecting erythropoiesis d- Polycythemia

e- Sources of plasma proteins

B -Select two hormones only and write in details about the following items

(8 marks)

Hormones: Growth hormone, Oxytocin, Thyroxin , Calcitonin, Aldosterone , Adrenalin

Items: 1- Types of gland that secreted them. 2- Site of their secretion

3- Target organ 4- Its function 5- Disorders

تمنياتنا بالتوفيق

د السيد الحبيبى د هناء على حسن