الفرقة الرابعة - فيزياء حيوية - نباتية وميكروبيولوجيا جزيئية ٢٠١٢

Mansoura University
Faculty of Science
Zoology Department
Subject: Zoology – Code: Z424
Courses: Immunity & Molecular Biology
Academic Year: 2011-2012

Second Term
Final Exam
4th Level Biophysics Students
Date: 26 June, 2012
Time Allowed: 2 hrs
Full Mark: 60

Answer All the Following Questions

Q. 1. Discuss the Following Statements: **(15 marks, 5 Marks each)**

1. A. Gel electrophoresis separates DNA fragments of different sizes.

1. B. DNA ligase joins DNA fragments together to produce a recombinant DNA molecule.

1. C. Transgenic animals carry engineered genes.

Q. 2. Write Short Notes on the Following: **(15 marks, 5 Marks each)**

2. A. Structure of DNA..

2. B. Production of Human Insulin.

2. C. Compare between Introns and Exons.

Q. 3. Mark (√) or (X) for the following statements: **(15 marks, each statement of one Mark)**

1- Coughing and sneezing reflex are among the mechanical barriers of the innate immunity.

2- Response is non-specific in adaptive immunity.

3- Spleen collects antigens from blood stream.

4- Artificially passive acquired immunity: Antibodies are passed through placenta to the fetus.

5- In primary antibody response the type of antibody is IgM.

6- The innate immunity is characterized by specificity and memory.

7- HCl of the stomach is a chemical & biochemical inhibitor of the adaptive immunity.

8- Phagocytosis process is done through: Chemotaxis, attachment, Ingestion & Killing.

9- B cells produce antibodies.

10 The four chains of antibody are linked by disulfide bonds.

11- Secondary antibody response has a high Ab with rapid increase.

12- Proteolytic enzyme in small intestine is a mechanical barrier of the Adaptive immunity.

13- Thymus is a primary lymphoid organ for T cell development.

14- IgD is the first Immunoglobulin made by fetus and B cells.

15- The response in adaptive immunity is not enhanced on repeated exposure to pathogen.

Q. 4A. Choose the right answer from each of the following: **(10 marks, each of one Mark)**

1- Acute phase proteins are…….

a) Plasma protein b) C reactive protein c) Fibrin d) all of them

2- They exist as free cells in blood (monocytes) & fixed cells in tissues (Kupffer) cells of liver

a) Natural killer cells b) T cells c) B cells d) Macrophages

3- In primary antibody response the type of antibody is……

a) IgA b) IgE c) IgG d) IgM

4- Lactoperxidase enzyme is among the innate immune defenses that present in …….

a) Blood circulation b) Tears c) Small intestine d) Saliva & Milk

5- Which collects antigens from tissues?

a) Bone marrow b) Lymph node c) Spleen d) Thymus

6- The type of Acquired immunity which is following vaccination with live or killed infectious agents or their products.

a) Artificial active b) Artificial passive c) Natural active d) Natural passive

7- A foreign substance, when introduced into human body, stimulate formation of specific antibodies or sensitized lymphocytes:

a) Antigen b) Antibody c) immunoglobulin d) complement

8- The function of lysozyme is……

a) Complement activation b) Phagocytosis c) Cytotoxcity d) None of them

9- The synthesis of complement occurs in ……

a) Blood b) Spleen c) bone marrow d) Liver

10- Functions of Macrophages:

a) Phagocytosis b) Opsonization c) kill tumor cells 4) all of them

Q. 4B. Complete the following sentences: **(5 marks each space of 0.5 Mark)**

1- Antitoxin …… bacterial toxins.

2- The …….. regulate other immune cells.

3- Microbe that causes disease is called ……

4- Cell-mediated immunity includes two main processes:…… & ……

5- Enumerate 3 of the beneficial biological effects of complement: ……, ……., …….

6- Proteins secreted by B cells that bind directly and specifically to pathogens are called ….

7- Memory cells …….. on re-exposure to same antigen.

انتهت الأسئلة

With our best wishes,

Dr. Sayed M. Kamel Gomaa - Dr. Mohamed Fathy Abouel-Nour Hegazy

Mansoura University
Faculty of Science
Zoology Department
Subject:Human Physiology423
Course:Blood–Excretion-
Endocrinology

Second Term
Third Level: Biophsics
Date: 19-6-2012
Time Allowed: 2hr
Full Mark: (60)

Answer all Questions

Part I : Endocrinology

I: Answer the following items: Question Mark (20 mark)

a- Mention the types of pancreas cell and its hormones [4]

b- Compare between Cretinism and Graves disease [6]

c- Discuss the mechanism of steroid hormones [6]

d-Choose the correct answer of the following: [4]

1- ADH affected by ----------
a- decrease urine volume. b- increase blood osmolarity.
c- decrease blood volume. d- all of these

2- Which of these is not a method the body uses to regulate its hormonal releases?
a- negative feedback b-direct nervous stimulation
c- release of tropic hormones d-degradation of the endocrine gland

3- A deficiency of iodine in the diet causes ----------
a- increased TSH secretion. b-decreased T3 and T4 production.
c- thyroid enlargement (goiter). d-all of these

4- Hypothyroidism in infants can result in _____.
a- Grave's disease b- cretinism c- Hashimoto's disease d- myxedema

II- Complete the following sentences: [10]

1- Parathyroid hormone is regulated by----------, Diabetes state result from ----------and treated by----------

2- Prolactin hormone is very important for ----------, glucocorticoid hormones secreted from ---------- of ---------- gland

3 ---------- is secreted from ----------cells of the thyroid gland and it is opposite to that of ---------- by ----------.

4- ACTH secreted from ----------, meanwhile, FSH secreted from----------

5- ADH secreted from ---------- and ---------- stimulates the glucagon

6- Simple goiter result from----------Intestinal hormones are----------,---------

7- ----------secrete its hormone that called ---------- during the dark

Part II: Blood & Excretion

1) Mention the different factors affecting erythropoiesis. (5 marks)

2)With the label diagram,write on: (10 marks)

a- The physiological unite of the kidney. (5)

b- Shape and function of different leucocytes. (5)

3) In detail, write on three only of the following: (15 marks)

a- Blood groups. (5)

b- Abnormalities in erythrocytes count. (5)

c- Steps of urine excretion. (5)

d- Composition and function of plasma protein. (5)

تمنياتنا بالتوفيق

اد هناء على حسن---- د هناء سراج

المستوى الرابع - فيزياء حيوية - أجهزة حيوية ف ٤٣٢

Mansoura University Faculty of Science, Physics Department	بسم الله الرحمن الرحيم 2nd. Term Exam 2011/2012 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) What are the main advantages of infinity corrected lens systems? Explain these advantages graphically . **(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 polarizing microscope. **(13 M)**

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

3 – a) Report on the limitations of optical microscopy. **(13 M)**

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

Best wishes

Prof. Dr. Maher El-Tonsy

June 2012

ع فيزياء صوتية - الليزر وتطبيقاته ف ٢٠٤١

Mansoura University
Faculty of Science
Physics department
Subject: Physics
Course: Laser and its Applications ف ٢٠٤١

2nd Semester
Date: 9 – 6 – 2012
4th Level Biophysics
Time allowed: 2 hours
Full mark: 80 Marks

Answer the following questions:

1- A) Deduce the condition of population inversion in three levels laser. Sketch curves for dependence of $\frac{\Delta N}{N}$ as a function of excitation intensity Γ expressed in terms of Γ_0?

(18 marks)

B) A three level laser emits light of wavelength 550 nm. What is the ratio of population of the upper level E_2 to that of the lower level E_1 in laser transition, at 300 K. Where $k = 1.38 \times 10^{-23}\ J/K, h = 6.625 \times 10^{-34}\ J.Sec, C = 3 \times 10^8\ cm/sec.$

(9 Marks)

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

(12 Marks)

B) Compare between double exposure holographic interferometric technique and sandwich hologram technique to measure the distortion of an object.

(8 Marks)

C) If He-Ne laser of wavelength $\lambda = 632.8\ nm$ have internal beam waist of diameter D = 0.5 mm, calculate the angular spread of the beam.

(7 Marks)

3- A) Describe the fundamental vibrational configurations of Carbon Dioxide laser (CO_2). Explain by the aid of energy level diagram how population inversion is brought. Sketch the tube of this laser.

(15 Marks)

B) What is the basis of recording data on an optical disk? Explain how data readout from these optical disks?

(11 Marks)

Good Luck

Examiner: Prof. Dr. Taha Sokkar

27
27
26
80

المستوى الرابع - فيزياء حيوية - بيوفيزيقا حاسب (ف ٣٢٠)

Mansoura University **Faculty of Science** **Physics Department** **Subject: Physics**		**2nd Term** **Credit hours Students: Biophysics** **Level: 4 Date :23/June 2012** **Time allowed : 2 hours**
Course: Physics 320, Computer Programming		**Full Mark : 80 Mark**

Answer all questions :

[1] **a-What will be the values of X and INDEX after the execution of the following instruction:**

```
      X = 8.0
      Y= 3. 0
      I = 5
10    GOTO (20, 30, 40, 50, 50), I
20    I = I+ 1
      X = X + 2.0
      Y = Y – 7.0
      GOTO 10
30    X = X – 3.0
      I=I+2
      GO TO 60
40    X = X – 4.0
      Y=Y- X
      I = I – 2
      GOTO 10
50    X = X + 2.0
      Y=Y + X
      I = I– 1
      GOTO 10
60    CONTINUE
      END
```

[10] Marks

b- Determine the values of Y, X, and J after execution of the following:

i-

```
      Y=3.0
      X=2.0
      DO 10 J=1,13,3
      IF(J*3.GE.13)X=X+3.0
      X=X+Y
      Y=Y+X
10    CONTINUE
      END
```

[10] Marks

ii-

```
      Y=5.0
      X=8.0
      J =1
4     IF (J*2 - 13) 5, 6, 6
5     Y=Y+X
      X=X+1.0
6     J = J + 2
      IF (J – 7) 4, 4, 10
10    CONTINUE
      END
```

[10] Marks

[2] **a- Write the following expressions in FORTRAN FORM:** **[12] Marks**

$i-r=\frac{\sin^3 x\cos^2 x}{5}+\frac{2}{15}\sin^3 x$ ii- $t=\tan^{-1}(\sqrt{2}\tan x)$

iii- $t=e^{5x^2-3}-\sin(x+ny)$ iv- $B=\frac{e^{x/\sqrt{2}}\cos(\sqrt{x/2}+\pi/8)}{\sqrt{2\pi x}}$

b- Determine the correct format expression, and correct the wrong from the following :

```
 i.   100  FORMAT(10X,5F5.2,5E12.7)
 ii.  200  FORMAT(4F7.2,4E13.8)
 iii. 300  FORMAT(7I2,6F5.3.3E12.5)
 iv.  400  FORMAT(3X,5I2,7F5.3,3E11.6)
```

[8] Marks

c- Write a FORTRAN program to read the parameters a, b and c which you can read from the screen, then use these parameters to evaluate the given equation

$$F=\frac{1+a}{1+\frac{b}{c+6}}$$

and write the output a, b,c and F. **[5] Marks**

P.T.O. ⟶

[3] a) Draw the flowchart for the redistribution of 100 points in Ascending form using the logical IF statement. **[10] Marks**

b) Write a Fortran program for redistribution of 100 points in Ascending form. The data are in format 12F6.2, and in a file named (ASCEN.DAT). **[15] Marks**

Good Luck

Examiners: 1- Prof. Dr. Magdy Tadros Yacoub* **2-** Dr. Shalabeia Badr

المستوى الرابع - فيزياء حيوية - فيزياء التشخيص الطبي فاع 422

Mansoura University
Faculty of Science
Physics Department

Course code: Biophys 422

Second semester 2011-2012
Date: 30/6/2012

4th level Biophysics Students
Full Mark: 80
Allowed time: 2 hours
Course title: Medical imaging

Answer all the following questions: **Marks**

1- a- Define the following: 8

a) Proton density
b) T_1 relaxation process
c) Duty factor
d) Pulse repetition frequency (PRF).

b- Discuss briefly the physical principle of electron microscope then explain what we mean by secondary electron. 10

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- Give the physical Principle of Magnetic resonance spectroscopy (MRS)? Mention the steps of an MRS examination? 12

b- What are the main metabolites of the human brain? Give the significance of each type? 8

4- a- What is the role of radiofrequency in production of MRI signal? 5

b- Differentiate between spatial and temporal resolution in ultra sound imaging? 10

C- Write on the problem of artifact in ultra sound imaging; Give examples for some of these artifacts? 5

Best wishes:

Examiners:

* د. هانى كمال أ.د/ كرمال الفرحاتى

٤ فيزياء حيوية (ف ٤٠٤) فيزياء نووية طبية

Mansoura University
Faculty of Science
Physics Department

Course code: Biophys 420

Second semester 2011-2012
Date: 5/6/2012

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

Answer all the following questions: **Marks**

1- a- Define the following: **10**

i. Radiopharmaceuticals.
ii. Nonmyeloablative and Myeloablative Radioimmunotherapy.
iii. Biological Half Life (T_B) of radiopharmaceuticals.

b- Discuss briefly the meaning of cumulated activity and S-factor. **10**

2- a- Explain the basic structure of Gamma Camera, explain your answer with explanatory diagrams. **10**

b- Mention the different types of Collimators used in Gamma camera? **10**

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

b- Explain the concept of biodistribution as an important aspect of therapy. **10**

4- a- Explain the production of ^{99}Tc from molybdenum-99/technetium-99m generator. **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 80% of cumulated activity goes to the patient's liver, 20% goes to the spleen. Calculate the dose in the liver scan knowing that $T_{1/2}$ of ^{99m}Tc is 6.03 days, S-factor is 1.2×10^{-2} for liver and 2.6×10^{-4} for spleen. **10**

Best wishes:

Examiners:

* د. هانى كمال د. محمد منصور

المستوى الرابع - الفيزياء الطبية - وقاية إشعاعية ف ع ٤٢١

جامعة المنصورة
كلية العلوم
قسم الفيزياء
المنصورة – مصر

Mansoura University
Faculty of Science
Physics Department
Mansoura – Egypt

May Examination 2012

Subject: Physics 421		Level Four
Radiation Protection		Time: 2 hours
Full Mark: 80		Date: 12-6-2012

Answer the following question:

			Marks
1	a	*What is meant by;* • Internal dosimetry • Bragg-Gray cavity theory • Energy Imparted • Relative Biological effectiveness • Energy fluence and particle fluence	10
	b	*Complete the following* • There are a few routes of intake (of radionuclide) namely, …. • Aerodynamic diameter model based on …….. • Microwave frequency range between …… while their wavelength varies between …… • There are three main factors that you must consider in minimizing exposure to radioactive sources other than natural radiation the first is ….. , second ……. and third …… • Protection from external sources can be achieved by …….. while protection from internal sources can be afforded by …..	10
	C	Write on details about whole body counter, bottle mannikin absorber phantom and their uses.	10
			(30)

Answer only two questions from the following

2	a	How much Aluminum is required to reduce the intensity of a 200 keV gamma-ray beam to 10% of its incident intensity? Assume that the Half Value Layer for 200 keV gamma-rays in Al is 2.14 cm.	10
	b	Discuss with aided figure the working of scintillation counter.	10
	c	Discuss acute and chronic radiation effects in multicellular organisms	5
			(25)
3	a	Discuss with aided figure the working of Giger Muller counter	10
	b	How foods get cooked through microwave ovens.	10
	c	A gamma source produces a dose rate of 2.0 rem/h at a distance of 1.0 m. (a) How far away must an occupational worker be so as not to exceed the MPD? (b) If the occupancy is 20 h per week how far away must he work? (c) What thickness of lead (μ = 60 m^{-1}) is required as a shield to enable him to work at 1.0 m for a full 40 h week?	5
			(25)
4	a	Differentiate between direct action and indirect action mode of radiation with mammalian system and discuss in details the indirect action mode.	10
	b	The linear absorption coefficient of body tissue for 1MeV γ-ray is 7 m^{-1}. Calculate the thickness of tissue which reduces the incident intensity by a factor of 2.	5

	c	***Check correctness of the following statements***	10
		1. For qualitative description of physical quantities we need to know a numerical value and a unit. 2. Becquerel and gray are two new special units for radiation measurements proposed by ICRU. 3. Gray is a unit used to describe a radiation dose. 4. Directly ionizing particles are charged particles that have sufficient kinetic energy to produce ionization by collision. 5. Both gamma rays and X-rays are electromagnetic radiations, that is, photons, of high enough energy to produce ionization. 6. The special unit of absorbed dose is the rad. 7. A unit of equivalent doses depends only on units of absorbed dose. 8. Half life time is the time needed for parent nuclei to decay 9. The spread of counts follows a modified Gaussian distribution 10. All level of radioactive exposure is dangerous	
			(25)

With our best wishes:

Dr. Amr Mohamed Abdelghany