Mansoura University Faculty of Science Zoology Department Date: 29 /5 /2013 Time: 2 hrs Total marks: 80	Mansoura University	Academic year: Second level Program: Biophysics group. Subject: Biophysics of Cell Communication (Z223) 2nd semester Final Exam.

Answer all the following questions:

1 a- True (√) or false (X) and correct the false one: (10 marks)

-Pheromones are chemical signals that carry information from one individual to another of the same species.(   )

-Dance language is an acoustic communication system performed in horizontal surface of the honey comb.(   )

-Paracrine signals occurs between adjacent cells that possess connexons.(   )

-Gap junction keeps the distance of the node of Ranvier constant.(   )

-Fluidity of the lipid bilayer increases with decreased saturation of the fatty acyl tails.(   )

b-Define: (15 marks)

- Allelochemicals.   -Zonula occludens.   -Extracellular matrix and its components.

-Integrins.   -Notch signaling mechanism.

2-With drawing compare between each of the following: (25 marks)

-Endocrine signals and autocrine signals.

-Different responses of a signaling molecule in different cell type.

-Peripheral proteins and integral proteins in plasma membrane.

-Desmosomes and hemidesmosomes.

-Different modes of cell adhesions.

3-Write short notes on each of the following: (30marks)

-Advantages and disadvantages of tactile and visual communications.

-Characteristics and importance of NO signal signaling in animals.

-Molecular structure of fluid mosaic model of plasma membrane.

-Different types of selectins and their locations.

-Cellular signaling cascade.

Best Wishes
Examiner: Dr. Amira Othman.....

المادة : معادلات تفاضلية (204)
دور مايو ٢٠١٣
المستوى : الثاني (فيزياء + فيزياء حيوى)
الزمن : ساعتان
أستاذ ألمادة ا.د.على شمندى
كلية العلوم – قسم الرياضيات

أجب عن الاسئله التاليه :

السؤال الاول: اوجد حل المعادلات التفاضلية التالية

i) $y \dfrac{d^2 y}{dx^2} + \left(\dfrac{dy}{dx}\right)^2 + 1 = 0$.

(10 marks)

ii) $\dfrac{d^2 y(x)}{dx^2} - y(x) = \sin x + 7$.

(10 marks)

السؤال الثانى :

a)   أوجد مجموعه المسارات المتعامدة مع المجموعه $y = c_1 (\sec x + \tan x)$.

(10mars)

b)   اوجد حل المعادله التفاضلية $(y' + 1).\mathrm{Ln}\left(\dfrac{y+x}{x+3}\right) = \dfrac{y+x}{x+3}$.

(10mars)

السؤال الثالث:

a)   اوجد حل المعادله التفاضلية $\left(\cos^2\left(\dfrac{x}{y}\right) + \dfrac{x}{y}\right) \dfrac{dy}{dx} = 1$

(6mars)

b)   اوجد قيمه كل من التحويلات العكسية التاليه :

$L^{-1}\left\{\dfrac{s^2}{(s^2 + w^2)^2}\right\}$, $L^{-1}\left\{\mathrm{Ln}\,\dfrac{s^2 - 36}{(s + 6)^2}\right\}$, $L^{-1}\left\{\dfrac{1}{(s + 2)^{12}}\right\}$

(١٢marks)

السؤال الرابع : اوجد حل المعادلات التفاضلية التاليه :

a) $\dfrac{d^2 y}{dx^2} - 3\dfrac{dy}{dx} + 2 = \dfrac{1}{1 + e^{-x}}$

(10mars)

b) $(\sin^{-1} y).(x^3 - 6x^2 + 11x - 6)\, dy + \sqrt{1 - y^2}\, dx = 0$

(10mars)

Mansoura University
Faculty of Science
Physics Department

Course code: Biophys 220

Second semester 2012-2013
Date: 5-6-2013

2nd level Biophysics Students
Full Mark: 80
Allowed time: 2 hours
Course title: Thermodynamics of biological systems

Answer all the following questions: Marks

1-	a-	Draw Carnot cycle on (P-V) and on (T-S) diagram and find the efficiency of the cycle in term of temperature.	25
	b-	Calculate the increase in entropy when 5 gm of ice is converted to steam. Latent heat of ice 80 cal/ gm and latent heat of steam 540 Cal/gm	
2-	a-	Using Maxwell's thermodynamic equation to deduce the first and second TdS equation	25
	b-	Prove that Joule –Kelvin coefficient $\mu_j = \dfrac{V}{c_P}(\beta T - 1)$ and then find μ_j for i. an ideal gas ii. Van der wall's gas	
3-	a-	One kilogram of an ideal gas $C_p = 1.356 \times 10^3$ Joule/Kgm k at pressure 1.4×10^3 N/m^2 and temperature 327 $^\circ$C expands adiabatically until its pressure becomes 100 N/m^2, then the gas was heated at a constant volume until its temperature return to 327 $^\circ$C and pressure becomes 200 N/m^2 and finally the gas compressed isothermally back to its initial pressure 1- Draw the cycle on (P-V) and (T-S) diagram 2- Find γ for the gas 3- Find the change in internal energy during the adiabatic expansion 4- Calculate the work and the change of entropy of the gas for each of the three processes.	30

Best wishes:

Dr. Anwar Megahed

Mansoura University
Faculty of Science
Physics Department

Course code: Biophys 221

Second semester 2012-2013
Date: 9-6-2013

2ⁿᵈ level Biophysics Students
Full Mark: 80
Allowed time: 2 hours
Course title:
(Environmental Biophysics)

Answer the following questions: Marks
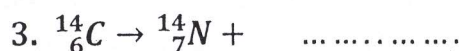
1- a-   Define only **five** from the following: 10

      1. Pollutant   2. Absolute humidity

      3. Radiation pollutions   4. Relative atomic mass

      5. Thermoregulation   6. Rontgen Equivalent in man

      7. Basal metabolic rate

b-   Discuss the phenomena of gamma rays absorption.   10

C-   Find the linear attenuation coefficient (μ) of lead as the intensity of   5
gamma rays falls to one half of its original value knowing that the
thickness of absorber material is 1.37 cm.

2- a-   Uranium $^{238}_{92}U$ in some rocks allows estimating their ages from their
ratio of $^{206}_{82}Pb$ to $^{238}_{92}U$. Explain this sentence with an example in   10
which $\frac{N_{Pb}}{N_U} = 0.6$ and half- life of $^{238}_{92}U$=4.5x10⁹ years.

b-   The mass spectrometer is used to determine the proportions of
various isotopes of the element. Explain this sentence with
explanatory diagram, and then derive an equation for charge to mass   10
ratio.

3- a-   **Write true or False:**

    i.   Air pollutants have negative impacts on human, animals and
plants.

    ii.   Bacteria, fungi, yeasts and algae are considered as chemical air
pollution.   10

    iii. CO_2 is a reddish brown toxic gas has a characteristic sharp, biting
odor and is the most prominent air pollutant.

    iv. β -particles are the most energetic form of radiation produced by
radioactive decay with kinetic energy=6 MeV.

v. About 90% of energy liberated from metabolism as heat.

vi. Body temperature is regulated by an area of the kidney called Hypothalamus.

vii. The three physical processes serve to remove heat from the body are radiation, evaporation and conduction to air and objects.

viii. Many factors can influence the basal metabolic rate (B.M.R) are age, sex, body size and activity level.

ix. B.M.R ≈ 60 Kcal/hour for young adult female and B.M.R ≈ 50 Kcal/hour for young adult male.

x. The absorption of beta particles increases with the atomic number of material's absorber.

b- <u>Complete the following nuclear reactions:</u>

1. $^{238}_{92}U \rightarrow$ .... $+ ^{4}_{2}\alpha$

2. $^{14}_{7}N + ^{1}_{0}n \rightarrow$ .... $+ ^{1}_{1}P$

6

3. $^{14}_{6}C \rightarrow ^{14}_{7}N +$ ....

4- A- An isotope of Krypton $^{87}_{36}Kr$ has a half-life of 78 minutes. Calculate the activity of 10 µg of $^{87}_{36}Kr$ (Avogadro's number=6x10²³ mol⁻¹).

9

B- Calculate the net power dissipation by an adult human being with emissivity e ≈ 1 and the area of the skin ≈ 1.2 m², temperature of the skin is 33 °C and the ambient temperature is 22 °C (Stefan's constant = 5.67x10⁻⁸ W/m²K⁴).

10

Best wishes:

Dr Hany Kamal

University of Mansoura		Educational Year: Second Level
Faculty of Science		Program: Physics & Biophysics
Physics Department		Date : 12 June 2013
Subject: Physics		Time allowed : 2 hours
Course (s) code: Phys. 227 [Fluid Mechanics]		Full Mark: 80 Mark

Answer the following questions: Each Question (20) Mark

[Q1] Choose the correct answer [20] Mark

[Q1-1] A person ride up a lift to a mountaintop, but the person's ears fail to "pop" that is , the pressure of the inner ear doesn't equalize with the outside atmosphere. The radius of each eardrum is 0.40 cm. The pressure of the atmosphere drops from 1.010×10^5 pa at the bottom of the lift to 0.998×10^5 pa at the top.

a) The pressure on the inner ear at the top of the mountain is:
 1) 1.2×10^3 Pa   2) 2.1×10^3 Pa   3) 4.2×10^3 Pa

b) The net force on each eardrum is:
1) 6.0×10^{-2} N   2) 4.0×10^{-2} N   3) 12.0×10^{-2} N

[Q1-2] A woman wearing snowshoes stands safely in the snow. If she removes her snowshoes, she quickly begins to sink. Is it because:

1) With snowshoes, her weight is applied over a larger area, so the pressure is small and without snowshoes, the force is applied over a small area, so the pressure is large.

2) With snowshoes, her weight is applied over a smaller area, so the pressure is small and without snowshoes, the force is applied over a small area, so the pressure is large.

3) With snowshoes, her weight is applied over a larger area, so the pressure is small and without snowshoes, the force is applied over a large area, so the pressure is small.

[Q1-3] A container is filled with water to a depth of 20 cm. on top of the water float a 30cm thick layer of oil with density of 0.7×10^3 kg/m^3. The pressure at the surface of the water is:

1) 1.03×10^5 Pa   2) 3.05×10^5 Pa   3) 5.07×10^5 Pa

[Q1-4] Which of the following exerts the most pressure while resting on a floor?
1) a 25 N box while with 1.5m sides
2) a 15 N cylinder with a base radius of 1m
3) a 25 N box while with 2m sides

[Q2] Choose the correct answer [15] Mark

[Q2-1] A room on the first floor of a hospital has a temperature of 20° c. A room on the top floor has a temperature of 22° c. In which of these two rooms is the average kinetic energy of the air particles greater? Is it:
1) Room on the top floor   2) Room on the first floor

[Q2-2] Bernoulli's principle says:
1) The pressure in a fluid decreases as its velocity increases.
2) The pressure in a fluid increases as its velocity increases.
3) The pressure in a fluid decreases as its velocity decreases.

[Q2-3] Ideal fluid is:
1) A fluid that has no internal friction or viscosity and is incompressible.
2) A fluid that has internal friction or viscosity and is incompressible.
3) A fluid that has no internal friction or viscosity and is compressible.

[Q2-4] A fluid is said to be Newtonian if:
1) The viscous stresses that arise from its flow, at every point, are proportional to the local strain rate.
2) The viscous stresses that arise from its flow, at every point, are proportional to the local stress rate.
3) The viscous stresses that arise from its flow, at every point, are proportional to the local stress and strain rates.

[Q3] Choose the correct answer [20]Mark

[Q3-1] Non-Newtonian fluid is:
1) A fluid whose viscosity depends on shear rate.
2) A fluid whose viscosity depends on stress rate.
3) A fluid whose viscosity do not depend on shear rate.

[Q3-2] The flow is irrotatinal, this means:

1) The fluid has no angular momentum about any point.

2) The fluid has angular momentum about any point.

3) The fluid has angular momentum and constant speed about any point.

[Q3-3] The Reynold's number is:

1) Dimensionless number which describes the type of flow occurring around the body.

2) Dimensional number which describes the type of flow occurring around the body.

3 Dimensional number which does not describe the type of flow occurring around the body.

[Q3-3] For an open tank, the speed of liquid coming out through a hole a certain distance (say h) below the surface is:

1) Equal to that acquired by an object falling freely through a vertical distance h.

2) Not equal to that acquired by an object falling freely through a vertical distance h.

3) Equal to that acquired by an object falling freely through a vertical distance 2h.

[Q4] Choose the correct answer and give reasons   [25] Mark

[Q4-1] You have inverted spacesuit with a straw passing through the faceplate so that you can drink from the glass while on the surface of the planet. Out on the surface of the moon, you attempt to drink through the straw of an open glass of water. The value of g on the moon is about one sixth of that on earth. Compared to the difficulty in drinking through a straw on earth, you find drinking through a straw on the moon to be harder. This is because:

1) There is no atmosphere on the moon, so there is no atmospheric pressure to provide a force to push the water up the straw.

1) There is atmosphere on the moon, so there is no atmospheric pressure to provide a force to push the water up the straw.

1) There is no atmosphere on the moon, so there is atmospheric pressure to provide a force to push the water up the straw.

[Q4-2] An apple is held completely submerged just below the surface of a container of water. The apple is then moved to deeper point in the water. Compared to the force needed to hold the apple just below the surface, the force needed to hold it at a deeper point is

1) The same 2) larger 3) smaller

[Q4-3] You are shipwrecked and floating in the middle of the ocean on a raft. Your cargo on the raft includes a treasure chest full of gold that you found before your ship sank, and the raft is just barely afloat. To keep you floating as a high as possible in the water, should you

1) Secure the treasure chest to the underside of the raft

2) Hang the treasure chest in the water with a rope attached to the raft.

3) Leave the treasure chest on top of the raft

[Q4-4] You tape two different soda straws together end to end to make a longer straw with no leaks. The two straws have radii of 3mm and 5mm. You drink a soda through your combination straw . In which straw is the speed of the liquid is highest?

1) The one of the radius 3mm   2) Whichever one is nearest your mouth

3) The one of the radius 5mm

[Q4-5] You observe two helium balloons floating next to each other at the ends of strings secured to a table the facing surfaces of the balloons separated by 1-2 cm. you blow the small space between the balloons. What happen to the balloons?

1) They move toward each other   2) They move away each other

3) They are unaffected.

With my best wishes

Prof. Dr. A. Elgarayhi

Examiners: 1-   Prof. Dr. A. Elgarayhi   2- Prof. Dr. Goma Aldamarawy

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

جامعة المنصورة
كلية العلوم
قسم النبات
المنصورة ـ مصر

Final Examination in Botany
Second Term: Jun. 2010

Educational Year: Second Level   Program (Branch): Biophysics
Subject: Bot (205)   Course(s): Biophysics and Photosynthesis
Time: 2 hrs   Date:16/6/2013   Full mark: 60   Question mark: 20

Answer the following questions:

Q1: Complete the following sentences (20 marks);

- Fatty acids are important for .... but the most critical function is the formation of ....
- ATP functions are ...., ..., and ....
- .... and .... are accessory photosynthetic pigments and their function is ....
- Generally, there are two methods to drive energy by the cell, the first one is .... and the second one is ....
- During carbon dioxide fixation, CO_2 is fixed by .... to produce ....
- Phytochrome is composed of two parts, the first one is called .... which is synthesized in .... and the second part is called .... which is synthesized in ....
- The Pr form of phytochrome absorbs .... light at wave length ...., however Pfr form absorbs .... light at wave length ....

Q2: Explain the following terms (20 marks);

- Third hand users of sunlight
- Lithotrophic organisms
- Energetically favorable reactions
- The special pair of chlorophylls
- C4 plants
- Palisade and mesophyll cells
- Localization of phytochrome
- Type II phytochrome

Q3: What would happen if (20 marks);

- The universe received heat energy from the cell
- Sunlight passes through green plant leaves
- An excited Chlorophyll a molecule loses its energy
- O_2 is received by ribulose 1,5- bisphosphate carboxylase
- Lettuce seeds were subjected to red- far red- red-far red light intervals
- Long day plants were subjected to long night intervals

Best wishes,
Dr. Amr M. Mowafy

University of Mansoura Faculty of Science Physics Department Subject: Physics (224)		Second Term Second Level Physics and Biophysics Date: June.16, 2013 Time allowed: 2 hours
Course: Electrical Measurements & Instrumentation		Full Mark: 80

Answer the Following Questions

1)

   a) Develop a circuit using a movement galvanometer of 1 mA full scale (R_m = 100Ω) for an ammeter having ranges of 1.0 and 10 amperes. (8 marks)

   b) What is the sensitivity of the ammeter of problem 1- a? (6 marks)

   c) What is the full scale voltage that can be measured with meter of problem 1-a? (6 marks)

2)

   a) Six determination of a quantity, as entered on the data sheet and presented to you for analysis, are 12.35, 12.71, 12.48, 10.24, 12.63, and 12.58.

   Examine the data and on the basis of your conclusions calculate :

   i) The arithmetic mean.

   ii) The standard deviation.

   iii) The probable error in percent of the average of the readings.

         (10 marks)

   b) Three resistor have the following ratings:

   R_1 = 200Ω ± 5%, R_2 = 100Ω ± 5%, R_3 = 50Ω ± 5%

   Determine the magnitude of resultant resistance and the limiting errors in percentage , if the above resistances are connected in :

   i) Series.

   ii) Parallel. (10 marks)

3)

   a) Draw a circuit for measuring an unknown resistance, and then explain the procedure of using it.   (5 marks)

   b) A slide wire potentiometer has a working battery voltage of 4.0 V with negligible internal resistance. The resistance of slide wire is 100Ω and its length is 200 cm. A standard cell of 1.018 V is used for standardizing the potentiometer and rheostat is adjusted so that balance is obtained when the sliding contact is at 101.8 cm.

     i) Find the working current of the slide wire and the rheostat setting.

     ii) If the slide wire has divisions marked in mm and each division can interpolate to one fifth, calculate the resolution of the Instrument.

                                                   (15 marks)

4)

   a) Classify the different sources of error then discuss each of them.

                                                   (10 marks)

   b) A CRT of an oscilloscope has an accelerating voltage of 2000 V and parallel deflecting plates of 1.5 cm long and 5 mm apart. The screen is 50 cm from the center of the plates.

     i) Find the beam speed.

     ii) Find the deflection sensitivity of the tube.

     iii) Find the deflection factor of the tube.   (10 Marks)

Constants: Charge of electron = 1.6×10^{-19} C

Mass of electron = 9.1×10^{-31} Kg

Examiners:

    1)   Prof. Dr. Ahmed H. Oraby   2) Prof. Dr. Alaa Elkhodary

Mansoura University

2nd Level Exam.

Faculty of Science

May 2013

Physics Department

Time allowed: 2 hrs

Atomic Physics   ف 222

Answer the following questions

1-a- The application of elliptical orbits as a trial to explain the fine structure leads to degenerate orbits. Discuss. (15 marks)

b- Estimate the wavelength in A$^\circ$ and the energy in eV of the spectral line of minimum wavelength of the Paschen series. (13 marks)

2-a- Deduce the possible j values for $\ell = 0,1,2,3$ and the type of each state for a monovalent element.
Explain the spectral series of the emission transition of sodium atom.
Discuss the transition of two D lines of sodium atom (D_1 and D_2). (15 marks)

b- Explain briefly the two main concepts of the vector atom model, **L-S** coupling and j-j coupling. Estimate the total angular momentum vector **J** of an atom where the orbital angular momentum vector **L** = 3, and the spin angular momentum vector **S** = 2. (11 marks)

3-a- Discuss and draw the fine structure of the energy level diagram for the characteristic X-ray spectra (only K and L series). (15 marks)

b- The empirical equation describing K_α line derived by Moseley can be compared with the equation of the spectral series of H like ions. Explain. (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

Prof. A. El-Khodary

Mansoura University
Faculty of Science
Chemistry Department
Subject: Biochem. 271
Course(s): Chemistry of
 Biomolecules (Chemistry
 of Carbohydrates)

Second Term
Final Exam
Second Level (Biophysics)
Date: 26th May 2013
Time Allowed: <u>Two hours</u>
Full Mark: 80 Marks

Answer <u>ALL</u> the Following Questions

[1] A- Choose the most suitable answer:

1. The general formula of monosaccharides is
   (A) $C_nH_{2n}O_n$ (B) $C_{2n}H_2O_n$ (C) $C_nH_2O_{2n}$ (D) $C_nH_{2n}O_{2n}$
2. The aldose sugar is
   (A) Ribulose   (B) Glyceraldehyde   (C) Erythrulose   (D) Dihydoxyacetone
3. A pentose sugar is
   (A) Dihydroxyacetone   (B) Erythrose   (C) Ribulose   (D) Glucose
4. The number of isomers of glucose is
   (A) 2   (B) 4   (C) 8   (D) 16
5. The most important epimer of glucose is
   (A) Galactose   (B) Fructose   (C) Arabinose   (D) Xylose
6. A polysaccharide which is often called animal starch is
   (A) Starch   (B) Glycogen   (C) Chitin   (D) Dextrin
7. Glucose on oxidation does not give
   (A) Gluconic acid   (B) Saccharic acid   (C) Glycoside   (D) Glucuronic acid
8. Iodine gives a red colour with
   (A) Starch   (B) Glucose   (C) Inulin   (D) Glycogen
9. Amylose is a constituent of
   (A) Starch   (B) Cellulose   (C) Glycogen   (D) None of these
10. α-D-glucose $+112° \rightarrow +52.5° \leftarrow +19°$ β-D-glucose for glucose represents
    (A) Optical isomerism   (B) Mutarotation   (C) Epimerisation   (D) D and L isomerism
    [20] Marks

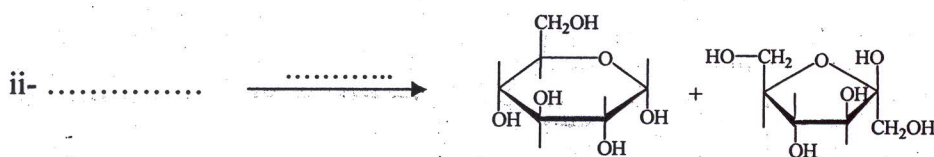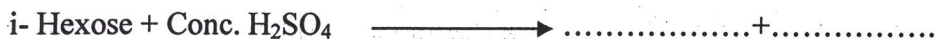B- Write short notes on <u>TWO ONLY</u> of the following:
 i- Achromic point.   **[3] Marks**
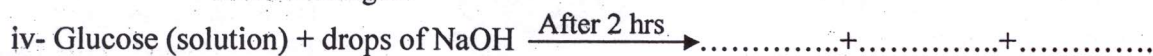 ii- Anti-coagulant properties of Heparin.   **[3] Marks**
 iii- Abundance of Hyaluronic acid in the human body.   **[3] Marks**

[2] A- Complete the following equations with names and structural formulae:
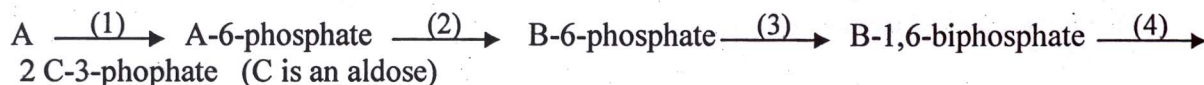
 i- Hexose + Conc. H_2SO_4 $\longrightarrow$ ....+................

 ii- .... $\xrightarrow{\quad\quad}$

P. T. O.

iii- Fructose $\xrightarrow[\text{Sodium amalgum}]{\text{Na/Hg}}$ .... + ...

iv- Glucose (solution) + drops of NaOH $\xrightarrow{\text{After 2 hrs}}$ ....+..............+.............
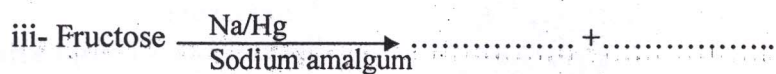
[18] Marks

B- Fill in the following table:

Carbohydrate	Classification	Structural Units
Lactose	............(1)............	......(2)...., β-D-Galactose
......(3).....	...........(4)............	β-N-Acetylglucoseamine
Hyaluronic acid	Heteropolysaccharide	......(5)...., ...(6).......

[6] Marks

[3] The following scheme represents a part of a biochemical metabolic pathway:

A $\xrightarrow{(1)}$ A-6-phosphate $\xrightarrow{(2)}$ B-6-phosphate $\xrightarrow{(3)}$ B-1,6-biphosphate $\xrightarrow{(4)}$
2 C-3-phophate   (C is an aldose)

A- Identify A,B, and C. Give the structural formula for each one of them.   **[9] Marks**

B- What enzymes are involved in steps 1,2,3, and 4.   **[6] Marks**

C- Illustrate with equations each of the following:
   i- Fehling's reaction for A.   **[3] Marks**
   ii- Osazone formation of B.   **[3] Marks**
   iii- Kiliani's reaction for C   **[3] Marks**

D- Mention ONE example and Draw the chemical structure for each of the following:
   i- A polymer of A (β-form).   **[3] Marks**
   ii- A polymer of B (β-form).   **[3] Marks**

Examiner: Dr. Ahmed EL-Sokkary

-Good Luck-