Mansoura University **Faculty of Science** **Chemistry Department** **Subject: Biochem. 271** **Course: Chemistry of carbohydrates**	**Second Term Exam. 2014/2015** **Second Year Biophysics** **Full Mark: 80 Marks** **Date: 17 /5/ 2015** **Time Allowed: 2 hour**

Answer all the following Questions

Provide your answer with formula, equations and figures wherever possible

Question I: **(30 Marks)**

A- Complete the following equations with the expected product (s): (15 Marks)

1) **D-Ribose** $\xrightarrow[3\ H_2O]{Conc.\ H_2SO_4}$ .....

2) **Inositol** $\xrightarrow{6\ H_3PO_4}$ .....

3) **D-Glucose** $\xrightarrow{NaBH_4}$ ..... $\xrightarrow[Pyridine]{excess\ (CH_3CO)_2O}$ .....

4) **D-Fructose** $\xrightarrow{Conc.HNO_3}$ ..... **OR** .....

5) **D-Glucose** $\xrightarrow[H_2O]{H_2NOH}$ ..... $\xrightarrow[H_2O]{}$ ..... $\xrightarrow{HCN}$ .....

6) **D-Glucose** $\xrightarrow{CH_3OH,\ H_2O}$ ..... **OR** .....

7) **D-Fructose** $\xrightarrow[H_2SO_4]{Na\ amalgum}$ ..... **OR** .....

8) **D- Ribose** $\xrightarrow[boiling]{CuSO4/NaOH}$ ..... + ...

B- Draw the chemical structure of the following: **(12 Marks)**

1- β-N-acetyl-Galactosamine.
2- β-L-Iduronic acid.
3- Chondroitin sulfate A.
4- Chondroitin sulfate B.
5- L-Rhamanose.
6- Sialic acid.

C- Put (√) for right sentence and (X) for false sentence: (3 Marks)

1- Glycoproteins are considered as non-nitrogenous heteropolysaccharides.
2- The treatment of a monosaccharide solution with HI and heating, it converts to n-hexane.
3- Both ribose and arabinose give erythrose on Ruff-degradation.

Question II: (34 Marks)

A- Give the name and draw the structure (if possible) of each of the following:

1- Cyclic sugar alcohol present in muscles.	Draw?
2- C2 epimer & C4 epimer of glucose.	Draw?
3- Compound used for determination of glomerular filteration rate.	
4- Deoxy sugar obtained from L-galactose.	Draw?
5- Invert sugar.	Draw?
6- A trisaccharide formed of one unit of each of glucose, galactose and fructose.	
7- 2 isomers differ in position of OH at the anomeric C atom.	
8- Enzyme having a physiological role in fertilization.	
9- Reducing disaccharide containing β–glucose.	
10- Homoglycans used as plasma volume expander to restore blood pressure in cases of shock.	
11- Laxative, non-fermentable disaccharide.	Draw?
12- Polysaccharide used as Laxative.	
13- The change in he degree of the angle of rotation of optically active compound.	
14- Glycosaminoglycans containing L-Iduronic acid, found in skin, cornea, heart, and valve.	
15- Disaccharide linked by α-1, 1-glucosidic linkage.	
16- Very small protein core attached to very long unbranched carbohydrate chains (more than 50 monosaccharide), and constitute 5% of cellular membrane.	
17- Sulfer-free nitrogenous heteropolysaccharide.	Draw?

Question III: (16 Marks)

Give a brief account on FOUR of the following:

1- Kiliani-Fischer synthesis of glucose (discuss by equations).
2- Mechanism of fructosazone formation (discuss by equations).
3- Lactose intolerance and the effects of presence of lactose in intestine.
4- Mechanism of absorption of carbohydrates by active transport and the types of the most important glucose transporters.
5- Differences between Amylose and Amylopectin. (make a comparisom)

The questions are finished
With my best wishes

Dr. Nivin A. S. Islam

المادة : معادلات تفاضليه. المستوى الثاني : الفيزياء و الفيزياء الحيوية أستاذ المادة:ا.د.على شمندى	كلية العلوم – قسم الرياضيات	دور مايو : ٢٠١٥ الزمن : ساعتان تاريخ الامتحان : ٢٤-٥-٢٠١٥

أجب عن ثلاثه اسئلة فقط ممايلى : (ممنوع استخدام القلم الرصاص)

السؤال الاول:

اوجد حل المعادلات التفاضلية التالية:

i) $\frac{d^2y}{dx^2} - 6\frac{dy}{dx} + 5y = x e^{2x} + \cos x + 21$

ii) $1 + \frac{dy}{dx} = e^{\ln(\tan(x+y))}$

السؤال الثانى:

اوجد حل المعادلات التفاضلية التالية :

i) $(x y^2 + x)dx + (x^2 y^2 + x^2 + y^2 + 1)\, dy = o$

ii) $(x^2 + y^2\sqrt{1 + \frac{y^2}{x^2}})dx - x y\sqrt{1 + \frac{y^2}{x^2}}\, dy = 0$

السؤال الثالث:

a) اوجد قيمه كل من

i) $L^{-1}\left\{\frac{1}{(s^2 - 16s + 65)^2}\right\}$

ii) $L\left\{\frac{1+\cos t}{t}\right\}$, iii) $L\left\{t e^{-t}\sin 2t\right\}$

b) اوجد حل المعادلة التفاضلية

$$\sin 2y\,\frac{dy}{dx} - \frac{9\sin 2x}{1+\cos 2x}\sin^2 y = 1 \quad , \quad x: 0 \to \frac{\pi}{2}$$

السؤال الرابع : a) اوجد حل المعادلة التفاضلية :

$$(\frac{dy}{dx} + 1)\ln(\frac{y+x}{x+3}) = \frac{y+x}{x+3}$$

b) اوجد مجموعه المسارات المتعامدة مع ألمجموعه :

$$y^2 = c e^x + x + 1$$

Mansoura University Faculty of Science Physics Department	بسم الله الرحمن الرحيم Final Exam in Physics (May. 2015) Second Level Biophysics students	Time Allowed :2 hours Subject : PHYSICS (Thermodynamics) 80 Marks

Answer the following questions

1-a) State Carnot principles

b) If P is a function of T and V find dP in terms of the coefficient of volume expansion and isothermal compressibility

c) Carnot engine operates as refrigerator between two temperatures 250°k and 300 k receives 500 calories of heat from the cold reservoir

1- How many calories does it reject to the hot reservoir

2- How much work is done by the engine in this case [25 Marks]

2-a) Deduce the second TdS equation where S = f(T,P) and then prove that the Joule – Kelvin coefficient $\mu_j = [T(\frac{\partial v}{\partial T})p - V]$

b- find μ_j for 1)- an ideal gas 2)- a gas obeying the Van der Wall equation of state [25 Marks]

3- An ideal gas C_p=29.6 Joile\gm mole K , temperature 277K and pressure $5X10^6$n/m ^{2} expands adiabatically to pressure $1X10^6$ n/m ^{2}, the gas then heated at a constant volume to temperature 227K and finally the gas compressed isothermally back to its initial condition (R= 8.3 Joule/gm mole K) . Draw the cycle on (P-V) and on (T-S) diagram and calculate 1) the work done during the cycle 2) the change in entropy in case of the change at constant volume and during the isothermal process

3) the change in internal energy during adiabatic process

4) the change in enthalpy during the change at constant volume. [30 Marks]

Best wishes Dr Anwar Megahed

Mansoura University
Faculty of Science
Physics Department

2nd Level Exam.
May 2015
Time allowed : 2 hrs

Atomic Physics Phys 222

Answer the following questions.

1-a) The application of elliptical orbits to one electron model leads to degenerate orbits. Discuss. (15 marks)

b) Paschen series contains several spectral lines. Deduce the wavelength in A° and the energy in eV of the spectral line of minimum wavelength of the Paschen series. (15 marks)

2-a) Using the vector atom model, discuss **L-S** coupling and **j-j** coupling. The orbital angular momentum vector of an atom **L=2** and the spin angular momentum vector of the atom **S=3/2** . Calculate the total angular momentum vector of the atom **J**. (15 marks)

b) For a monovalent element, deduce the possible j values for $\ell = 0,1,2,3$ and the type of each term. Draw the energy level diagram of Na atom and explain the spectral series of this atom. Comment on the two D lines (D_1 & D_2) of sodium atom. (15 marks)

3-a) Draw and explain the splitting of the "first & second" spectral lines of the Balmer series using the elliptical orbits. (10 marks)

b) Draw and explain the energy level diagram of boron ion (B^{4+}). "H like ion" The atomic number of boron Z=5. (10 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 Regards

Prof. A. El-Khodary

Mansoura University Faculty of Science Physics Department Subject: Physics		Second Term Second Year :Bio-Phys.& Physics Date : June 2015 Time allowed : 2 hours
Course (s): **Fluid Mechanics phys. 227**		Full Mark:: 80 Marks

Answer **THE FOLLOWING** Questions: Each Question (20) Marks

[1] a- Determine the amount of power per unit are for a wind moving through a cylindrical column of cross-sectional area **A** with speed **v** . **[8] Marks**

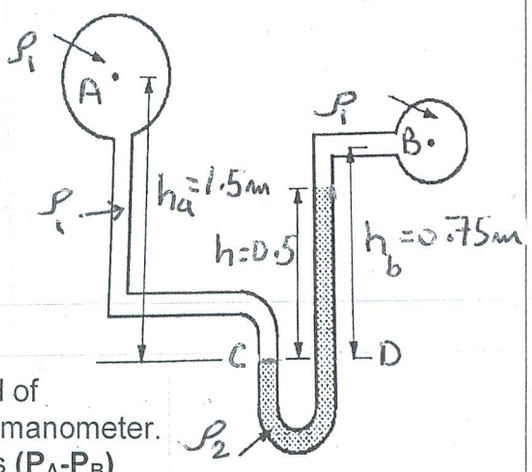
b- Steel ball of radius **0.001 m** falls freely in certain fluid having density of **1420 Kg/m^3** and viscosity coefficient of **0.83 Kg/m.s**. **i)** What is the velocity when the acceleration becomes ***half*** of the free fall acceleration? **ii)** Find the velocity under steady state condition. **steel density = 7.8 x 10^3 Kg/m^3** **[12] Marks**

[2] a- Define the following terms: **i** – Plastic flow. **ii** – Dilettante flow. **iii-** Coefficient of viscosity. **iv-** Irrotational flow. **v-** Viscosity. **vi-** Laminar flow. **vii-** incompressible fluid **[14]Marks**

b- A Venturi tube may be used as a fluid flow meter. If the difference in pressure is $P_1 - P_2$ **=18x10^3 Pa**, find the fluid flow rate, given that the radius of the outlet tube is **2 cm**, the radius of the inlet tube is **4 cm**, and the fluid is gasoline. (ρ = 700 kg/m^3). **[6] Marks**

[3] a- Write briefly on :
i- Why does dust adhere (stick) to a fast rotating fan.
ii- Reynolds number and turbulent flow.
iii- Newtonian and non-Newtonian fluids. **[6] Marks**

b- For a rectangular container of area **A** and height **h**.
i) Find the amount of flow under varying head during input and output discharge.
ii) Find the time interval **(t_2-t_1)** when the inlet discharge **Q_o** is zero. **[7] Marks**



c- In the figure shown, two pipes containing the same fluid of density ρ_1 = 990 Kg/m^3 are connected using a **U-** tube manometer. What is the pressure difference between the tow tubes **(P_A-P_B)** if the manometers contains fluid of density ρ_2 = **13.6x10^3 Kg/m^3** **[7] Marks**

[4] A vertical tank **2 m** diameter has at the bottom a **0.05 m** diameter sharp edged orifice (hole) .
a- If water enters the tank at constant rate of **0.012 m^3/s.** Find the height of water above the orifice when the level in the tank becomes stable. **[6] Marks**

b- Find the time interval for the level to fall from **3 m** to **1 m** above the orifice when the inflow is turned off. **[6] Marks**

c- If water, now, runs into the tank at rate of **0.02 m^3/s** and the orifice remaining open, find the rate of rise in water level when the level has reached a depth of **1.7 m** above the orifice. **[8] Marks**

Examiners: 1- Dr. Nabil Kinawy **2-Prof. Dr. G. El-Damarawy**