Mansoura University
Faculty of Science
Chemistry Department

Eductional Year: First level — Program: Chemistry & Biochemistry
Time: 2 hours — Course: Chem 121
Date: 2009 — Total mark: 60

Answer FOUR of the following questions (5 marks for a; b or c)

1- a) Nitrogen reacts with oxygen to form NO_2. If 8 g of N_2 reacts with 7.5 g of O_2, calculate the amount of NO_2. (At. Weights; N = 14; O = 16)

b) Draw Lewis structure for the following: ONF, CO_3^{--}, BF_4^-
(At. No.; O = 8, N = 7, F = 9, C =- 6, B = 5)

c) Which bond is more polar? i) N-O or C-O, ii) S-F or O-F

2- a) Calculate the wavelength (nm) of the line of Na when its last electron jumps to its fifth level. ($R = 109678\ cm^{-1}$)

b) Calculate the four quantum numbers for the last three electrons in Cl (At. No. = 17)

c) How many grams of oxygen (O_2) are needed to burn 5.6 g C_2H_5OH according to its balanced equation?

3- a) A compound containing by mass 40% C, 6.71%H and 53.3%O. What is the Empirical formula of this compound? A 0.32 mol sample of this compound weighs 28.8 g. What is the molecular formula of this compound?

b) Calculate the number of atoms of Fe in 0.89 g of Fe_2O_3

c) On the basis of molecular orbital theory (MOT), comment on the following: i) C_2 is paramagnetic while N_2 is diamagnetic
ii) O_2 is more stable than O_2^{--}

4- a) How many ml's of 0.2 M NH_4OH are needed to react with 12 ml of 0.55 M $FeCl_3$

b) On the basis of VSEPR, predict the shape of the following:
SCl_2, XeF_4, NH_3 (At. No.: S=16, Cl=17, Xe=54, F=9, N=7, H=1)

c) Write the electronic configuration of Cu (z=29) and deduce if it is stable and calculate the four quantum numbers of the last electron in Cu^{2+}.

5- a) Draw the resonance structure for N_2O and CO_3^{--}

b) What hybrid orbitals would be expected for the central atom in the following: CH_4 $BeCl_2$ SF_6
(At. No: C = 6, H = 1, Be= 4, Cl = 17, S=16, F = 9)

c) Comment on the basis of MOT i) Bond order of He_2 is zero
ii) NO^+ is more stable than NO.

Examiners: Prof Dr Ahmed Fawzy El-Asmy& Prof Dr Magdy Bekhiet

جامعة المنصورة كلية العلوم - قسم الرياضيات المادة: رياضيات أساسية تفاضل وتكامل (ر112)		امتحان دور مايو2009م الفرقة الأولي – المستوي الأول: برامج* الزمن: ساعتان - التاريخ:2009/5/27 الدرجة الكلية: 80 درجة

*برامج: كيمياء –وكيمياء ونبات – ميكروبيولوجي – كيمياء حيوي – جيوفيزياء – جيولوجيا – كيمياء وحيوان – علوم البيئة

أجب عن الأسئلة الآتية

السؤال الأول: (20 درجة – 5 درجات لكل جزء)

(أ) أوجد مجال تعريف ومدي الدالة $f(x)=\sqrt{4-x^2}$

(ب) أوجد معكوس الدالة $f(x)=\dfrac{3}{2x-5}$

(ج) أوجد النهاية $\lim\limits_{x\to 1}\left[\dfrac{2}{1-x^2}-\dfrac{1}{1-x}\right]$

(د) أوجد النهاية $\lim\limits_{x\to 0}\dfrac{3^x-1}{x}$

السؤال الثاني: (20 درجة)

(أ) أوجد $\dfrac{dy}{dx}$, إذا كانت $y=\dfrac{(1+x)^5\sqrt{x^3+2}}{(x-1)^3(x^2+1)}$ [6]

(ب) أوجد قيمة الثابت A , بحيث تكون الدالة $f(x)=\begin{cases}\dfrac{x^2-4}{x-2} & x\neq 2\\ A & x=2\end{cases}$, متصلة عند $x=2$ [6]

(ج) أوجد معادلتي المماس والعمودي للمنحني $y=f(x)=\sqrt{2x+1}$, عند النقطة $(4,3)$. [8]

السؤال الثالث: (20 درجة- 5 درجات لكل جزء):

أوجد المشتقة الأولي $\dfrac{dy}{dx}$ لكل من الدوال الآتية:

(أ) $y=\operatorname{sech}\left(\cos^{-1}2x\right)$

(ب) $\cos(xy)=y^2+x$

(ج) $y=2\ln(\cot t),\ x=\tan t+t^3$

(د) $y=x^{\sec x}$

السؤال الرابع: (20 درجة- 5 درجات لكل جزء):

احسب التكاملات الآتية:

(أ) $\int_1^2\dfrac{x^3-3x^2+1}{\sqrt{x}}dx$

(ب) $\int\dfrac{\sqrt{9-x^2}}{x^2}dx$

(ج) $\int xe^{5x}dx$

(د) $\int\dfrac{2x-8}{x^2-3x}dx$

مع أطيب أمنيات أسرة التدريس بالتوفيق

Mansoura University
Faculty of Science
Physics Department

جامعة المنصورة
كلية العلوم
قسم الفيزياء

Second Term Examination June2009

Academic Level: First Level
Time: 2 Hours
Subject: Electricity & Magnetism &Optics
Full Mark: 60 Marks

Program: Geo&Chem Zool&,Bio Chem,Bot,Enviro,Chem
Date: 6 June. 09
Courses: Physics 102

Answer the Following Questions

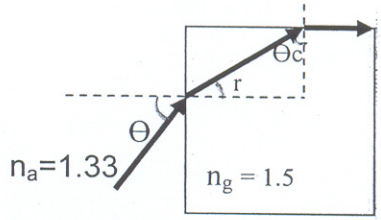
[1] a- Define the following terms: i - Refractive index , ii - Dispersive power, iii - wave front, iv - vergence , v - numerical aperture of optical fibers. **[5] Mark**

b- Through the electro static course, you obtained the electric field at a point located at a distance r from a positive point charge (Q) by different ways .Explain three methods of them in detail. **[10] Mark**

[2] a- Lens aberration is a problem facing the use of lenses. Explain how it occurs and the way to correct it. **[5] Mark**

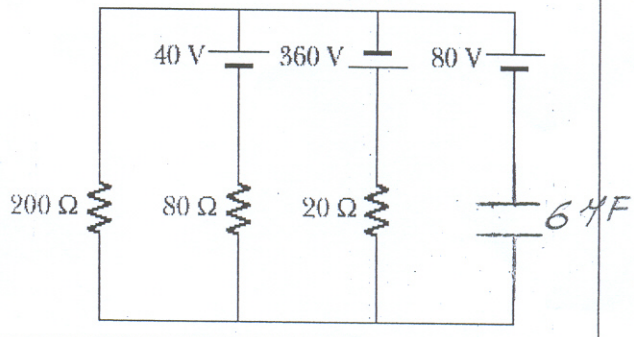
b- Explain how Pulfrich Refractometer can be used to measure the refractive indices of solids and liquids. **[5] Mark**

c- For the configuration and the data shown in the figure , use Snell's law of refraction to find the incidence angle Θ . **[5] Mark**



[3] a- Calculate the net torque τ on an electric dipole placed in a uniform electric field E ,where the dipole moment makes an angle Θ with the field. **[5] Mark**

b- In the circuit shown, determine the current in each resistor, after a long time of operation, and the energy stored in the capacitor. **[10] Mark**



[4] a- Define the following terms: i - Coulombs force, ii - Electric field, iii - Electric potential and electric potential energy difference, iv -Equipotential surface, v - Electric flux ,vi - Dielectric constant **[7] Mark**

b- An insulating sphere of radius ***a*** has a uniform charge density ρ and a total positive charge Q .Calculate the electric field at a point outside the sphere ($r \geq a$) , and at a point inside the sphere ($r < a$) . Comment on your answer **[8] Mark**

Examiners: 1- Prof. Dr. Fikry Reicha **2- Prof Dr. Maher Eltonsy**
3- Dr. Mohamed Mansour **4-. Dr.Mohamed Kabeel** **5-Dr. Hesham Gomaa**
6- Dr Abd-Elkareem Abu Elwafa **7- Dr. Nabil Kinawy**

Mansoura University
Faculty of Science
Chemistry Department
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جامعة المنصورة
كلية العلوم
قسم الكيمياء
المنصورة – مصر

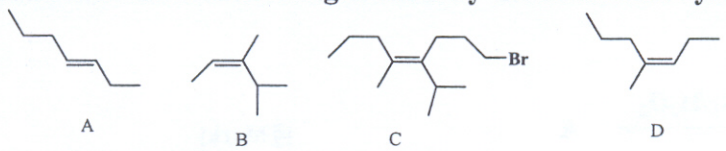
Second Semester May 2009

Educational Year: First Level
Time: 2 hours
Date: 30 / 5 /2009

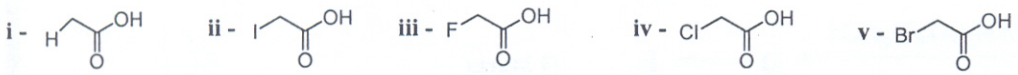
Program: Chemistry
Subject: Organic Chemistry
Course Code: Chem. 131
Full Mark: 60

Answer the following questions:-

[1] a-Name each alkene and show the configuration by the cis/trasns system or E/Z system [5] Mark



b- List the following acid in order of increasing acidity: [5] Mark



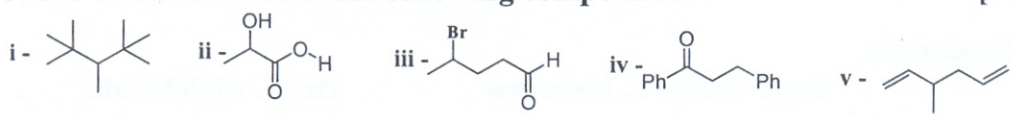
c- Draw the Lewis Structure for each of the following compounds and calculate the formal charge.

i - $NO_3^{\ominus}$ ii -$(CH_3)_2SO$

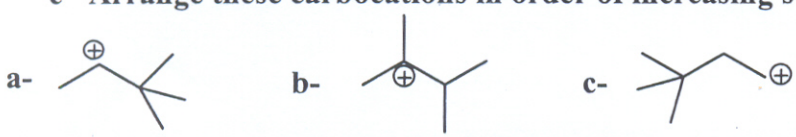
[5] Mark

[2] a- i-Draw all the staggered and eclipsed conformers that result from rotation about the C-2¬C-3 bond of pentane. ii- Draw a potential-energy diagram for rotation of the C-2¬C-3 bond of pentane through 360°, starting with the least stable conformer. [5] Mark

b- Give the IUPAC name for each of the following compounds: [5] Mark



c- Arrange these carbocations in order of increasing stability. [5] Mark



[3] Answer Three of the following Only: Each Part[5] Mark

a- Starting with benzene, outline a synthesis of (two only):
i- *p*-Chlorobenzoic acid ii- *m*-Chlorobenzoic acid
iii- *p*- Bromobenzenesulfonic acid vi- *m*-Bromobenzenesulfonic acid

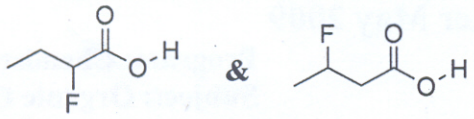
b-Determine the type of isomerism and draw all possible isomers for each of the following formula

i- C_4H_9Cl ii- C_4H_8 iii- $C_3H_6ClCOOH$

P.T .O ⟶

c- Acid-catalyzed dehydration of 2,2-Dimethyl-1-propanol gives 2-methyl-2-butene & 2-methyl-1-butene. Write plausible mechanisms that explain this result.

d- In each of the following compounds has lower $_pK_a$ value



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[4] [A] Complete Three of the following equations and supply structures and name for compounds: A through F.

[9] Mark

1- $(CH_3)_2C{=}CH_2 \xrightarrow{HBr/H_2O_2} A$ **[3 Mark]**

2- $CH_3Br \xrightarrow{Mg/\ Dry\ ether} B \xrightarrow{CH_3CHO} C$ **[3 Mark]**

3- $CH_3C{\equiv}CH \xrightarrow{70\%H_2SO_4/HgSO4} D \rightleftharpoons E$ **[3 Mark]**

4- $CH_3\underset{\underset{Br}{|}}{CH}\text{-}CH_2CH_3 \xrightarrow{Alc.KOH} F$ **[3 Mark]**

[B] Each of the following names is incorrect, give a more suitable name in each case [6] Mark

i- *t*-butylmethane ii- 2-chloro-3-pentene iii- 5-ethylhexane

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GOOD LUCK

Examiners:

Prof. Wafaa S. Hamama Dr. E. Abdel-Galil