Mansoura University Faculty of Science Chemistry Department Subject: Chemistry Course(s: Principal Inorganic (Chem 121)		First Term First level Date: Jan. 2009 Time Allowed : 2 hours Full Mark: 60 Points

ANSWER THE FOLLOWING QUESTIONS

1) What is the empirical formula for a compound composed of 43.7% P and 56.3% O by mass? **(5 points)**

2) Ethylene, C_2H_4 (1.93 gm) burns in air , O_2 (5.92 gm) to form CO_2 and H_2O. **(10 points)**
   (i) Which reactant is the limiting reactant?
   (ii) How many grams remain from the remaining reactant?
   (iii) How many grams of CO_2 produced?
   (iv) If the actual yield of CO_2 is 4.0 gm; Calculate the yield percent of CO_2.

3) For elements with Z = 3, Z = 8. What are the four quantum numbers for the last electron in each element? **(4 points)**

4) Diagram the Lewis structure for ClO_3^-. **(4 points)**

5) What are the frequency and wave length of the line in the hydrogen spectrum that corresponds to an electron transition from n = 3 to the n = 2 level ? **(4 points)**

6) Using Valence Shell Electron Pair Repulsion model (VSEPR-model), predict the geometry of the following molecules:
   (i) $BeCl_2$ (ii) $SnCl_2$ **(8 points)**

7) On the bases of the Molecular Orbital Theory (MOT), calculate the bond order for NO and O_2 molecules? **(7 points)**

8) What hybrid orbitals would be expected for the central atom in BF_3? **(3 points)**

9) Chose the most correct answer: **(15 points)**

1- The atom with Z = 15 is
   a) [Ne] $3s^0\ 3p^5$ b) [Ne] $3s^1\ 3p^4$ c) [Ne] $3s^2\ 3p^3$ d) [Ar] $3s^2\ 3p^3$ e) [Ne] $4s^2\ 4p^3$

2- The element with electronic configuration $1s^2\ 2s^2\ 2p^4$ is present on
   a) Second period b) s-block c) Second group d) All the above e) Non of the above

3- The geometry of CO_2 is
   a) Octahedral b) Tetrahedral c) T-shape d) Linear e) Non of the above

4- The ionization energy of B is .....than that of Be
   a) Same b) lower c) higher d) no relation e) non of the above

5- On the bases of the Molecular Orbital Theory (MOT), the bond order of O_2 molecule is
   a) 2.5 b) 3 c) 1 d) 0.5 e) 2

⟶

6- The antibonding molecular orbital energy is ..... than that of the bonding
a) Lower b) Same c) Higher d) Not present e) All the above are wrong

7- The angle in NH_3 is 107^o while in CH_4 is 109.5^o due to
a) Temperature change b) Presence of unshared electron pairs c) Pressure effect
d) Non of the above e) All the above

8- All the compounds are covalent except
a) O_2 b) CH_4 c) NO d) CaO e) F_2

9- The persent composition of S in SO_2 is
a) 40% b) 32% c) 50% d) 74% e) 91%

10- The molarity of NaOH (40 g dissolved in 500 ml) solution is
a) 1M b) 2M c) 0.35M d) 0.5 M e) 6M

(Molar mass: H = 1, C = 12, O = 16, Na = 23, P = 31, S = 32)

(Atomic number: H = 1, Be = 4, B = 5, C = 6, N = 7, O = 8, F = 9, Mg = 12, Cl = 17, Sn = 50)

Best Wishes

Prof. Kamal Ibrahim
Prof. Nagwa Nawar
Prof. Sahar Mostafa
Dr. Raafat Mansour

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Mansoura University
Faculty of Science
Chemistry Department
Course: Physical Chemistry (Chem141)
Date ; January 2009

First term Examination
Subject: Chemistry
First Level Chemistry Students
Full Mark : 60 Marks
Time Allowed : 2 hours

1- أكتب الاجابة الصحيحة فى ورقة الاجابة 2- وضح حل المسائل فى ورقة الاجابة

Answer The Following Questions (60 marks):

Choose the response that best complete each statement and solve the problems:

Question 1

1- For the system $CaO(s) + CO_2(g) \rightarrow CaCO_3(s)$ the equilibrium constant expression for Keq is **(2 marks)**

(a) [CO2] (b) 1 / [CO2]
(c) [CaO] [CO2] / [CaCO3] (d) [CaCO3] / [CaO] [CO2]

2-The value of Kp for the reaction $2NO_2(g) \leftrightarrow N_2O_4(g)$ is 1.52 at 319 K. What is the value of Kp at this temperature for the reaction: **(3 marks)**

$$N_2O_4(g) \leftrightarrow 2NO_2(g)$$

(a)-1.52 (b) 1.23 (c) 5.74 x 10-4 (d) 0.658

3- To an equilibrium mixture of: $O_{2\,(g)} + 2N_{2\,(g)} \rightleftharpoons 2N_2O_{(g)}$ the pressure is increased by pumping in some inert He gas. **(3 marks)**

A. Shift left B. Shift right C. No affect

4- At 250°C the equilibrium constant for the $PCl_{5(g)} \Leftrightarrow PCl_{3(g)} + Cl_{2(g)}$ is 4.0×10^{-2} If $[Cl_2]$ and $[PCl_3]$ = 0.30M and $[PCl_5]$ = 3.0M, is the system at Equilibrium? If not, which direction will it proceed? **(3 marks)**

5-Calculate Δ H° for the following reaction using the ΔH_f° values. $SiO_2(s) + 4\ HF(g) \leftrightarrow SiF_4(g) + 2\ H_2O(g)$

The following ΔH_f° values were obtained for $SiF_4(g)$: $\Delta H_f^\circ = -1614.9$ kJ/mol $H_2O(g)$: $\Delta H_f^\circ = -241.826$ kJ/mol $SiO_2(s)$: $\Delta H_f^\circ = -910.9$ kJ/mol and $HF(g)$: $\Delta H_f^\circ = -273$ kJ/mol. **(4 marks)**

Question 2

1- Which of the following gases will effuse at the fastest rate? **(3 marks)**

a. N_2 b. H_2 c. NH_3 d. He

2- A real gas will behave least like an ideal gas under conditions of **(2 marks)**

a) high temperature and high pressure. b) low temperature and low pressure.

c) high temperature and low pressure. d) low temperature and high pressure.

3-The "a" term in the van der Waals equation arises because: **(2 marks)**

a. real gas molecules occupy a finite volume. b- real gas molecules experience intermolecular forces.

c. at high pressures the observed pressure is greater than the ideal pressure.

d. the average kinetic energy of gas molecules is proportional to temperature in Kelvin.

4- Molecules of different gases have the same average kinetic energies at the same **(3 marks)**

a. pressure. b)temperature. c) volume. d. density

5- A sample of an unknown gas at STP has a density of 1.25 grams per liter. What is the gram molecular mass of this gas? **(5 marks)**

Question 3

1- Vapour pressure lowering is related to and can be used to help explain **(3 marks)**

i- boling point elevation ii- Freezing point lowering iii- Osmotic pressure iv- all of these

2- Raoult's low states that the vapour pressure of a solute **(3 marks)**

a. depends on the solvent b- equals the vapour pressure of solvent

c. ii- is equal to the vapour pressure of the pure solute times the mole fraction of solute

d- none of these answers.

3- The unite for expressing concentration in terms of moles of solute per liter solvent is **(2 marks)**

a- mole fraction b- molarity c- molality d- mass percentage

4- A solution containing all the solute that a solvent can dissolve at a certain temperature and pressure is called a. **(3 marks)**

a. saturated solution b. concentrated solution
c. supersaturated solution d. unsaturated solution

5- At what temperature will a solution that is composed of 0.73 moles of glucose in 225 g of phenol boil?

(4 marks)

Question 4

1- An acid is a substance that when added to water. **(2 marks)**

a. produces hydronium ions b. produces hydrogen atoms
c. raises the pH of the solution d. produces hydroxide atoms

2- According to the Bronsted-Lowry theory, a base is defined as ? **(2 marks)**

a. an electron pair acceptor b. a proton donor
c. a proton acceptor d. an electron pair donor

3- What is the molar solubility of $Ba_3(PO_4)_2$ in terms of K_{sp}? **(3 marks)**

(a) $s = K_{sp}^{1/2}$ (b) $s = K_{sp}^{1/5}$ (c) $s = [K_{sp}/27]^{1/5}$ (d) $s = [K_{sp}/108]^{1/5}$ (e) $s = [K_{sp}/4]^5$

4- The K_b of ethylamine is 4.30×10^{-4}. What is the pH of a 0.0847M aqueous solution of ethylamine? **(4 marks)**

5- What is the solubility of $Cr(OH)_3$ at pH 9.55? K_{sp} for $Cr(OH)_3 = 6.30 \times 10^{-31}$. **(4 marks)**

GOOD LUCK Prof.Dr. Awad I. Ahmed

جامعة المنصورة كلية العلوم قسم الرياضيات المادة: رياضيات أساسية (١) جبر وهندسة (ر١١١)		امتحان دور يناير ٢٠٠٩م الفرقة الأولي – المستوي الأول: برامج* الزمن: ساعتان - التاريخ: ٢٠٠٩/١/١٤ الدرجة الكلية: ٨٠ درجة

*برامج: كيمياء – نبات وكيمياء – ميكروبيولوجي – كيمياء حيوي – جيوفيزياء – جيولوجيا – فيزياء حيوي – علوم البيئة

أجب عن الأسئلة الآتية

السؤال الأول: (20 درجة)

(أ) أثبت باستخدام مبدأ الاستقراء الرياضي أن: $\frac{1}{1\times3}+\frac{1}{3\times5}+\ldots+\frac{1}{(2n-1)(2n+1)}=\frac{n}{2n+1}$ (10درجات)

(ب) حلل الكسر $\frac{x+8}{x^3-16x}$ إلي كسوره الجزئية. (10 درجات)

السؤال الثاني: (18 درجة)

(أ) أوجد قيمة $(1+i)^{3/4}$. (9 درجات)

(ب) بدون فك المحدد، أوجد قيمة x التي تحقق: $\begin{vmatrix} 1 & -1 & 1 \\ 1 & x & x^2 \\ 1 & x^2 & x^4 \end{vmatrix}=0$ (9 درجات)

السؤال الثالث: (22 درجة)

(أ) باستخدام معكوس المصفوفات، حل نظام المعادلات الخطية الآتية: (12 درجات)

$$\begin{aligned} x+y+2z&=9\\ 2x+4y-3z&=1\\ 3x+6y-5z&=0 \end{aligned}$$

(ب) أوجد معادلة الخط المستقيم الذي يمر بنقطة تقاطع المستقيمين $2x+3y+5=0,\ x-3y+5=0$ ،

وعمودي علي المستقيم $x-2y+1=0$. (10 درجات)

السؤال الرابع: (20 درجة)

(أ) أوجد كل من: الرأس ومعادلة المحور ومعادلة الدليل والبؤرة وطول الوتر البؤري العمودي للقطع المكافئ :

$x^2-2x-4y-3=0$ ، ثم ارسمه. (10 درجات)

(ب) عين معادلة القطع الناقص الذي مركزه $(3,-5)$ ، وإحدى بؤرتيه $(3,-3)$ وطول محوره الأصغر يساوى $4\sqrt{3}$.

(10 درجات)

مع أطيب أمنيات أسرة التدريس بالتوفيق

جامعة المنصورة — المستوى الأول — دور يناير ٢٠٠٩

كلية العلوم — المادة: جبر و هندسة (ر١١١) — الزمن: ساعتان

قسم الرياضيات — برامج:رياضة- فيزياء- إحصاء و حاسب-فيزياء حيوي — التاريخ: ٢٠٠٩/١/١٤

أجب عن الأسئلة الآتية: (٨٠ درجة)

السؤال الأول: (٢٠ درجة)

(أ) أثبت باستخدام مبدأ الاستقراء الرياضي أن : $1^2+3^2+5^2+\ldots+(2n-1)^2=\frac{n(4n^2-1)}{3}$

(ب) أوجد حل مجموعة المعادلات الآتية **باستخدام المصفوفات:**

$$3x+2y+z=3, x+y+z=2, x-3y+z=6$$

السؤال الثاني: (٢٠ درجة)

(أ) حلل الكسر الآتي إلى كسوره الجزئية: $\frac{4x-2}{(x^2-2x+1)(x^2+1)}$.

(ب) أوجد حل معادلة الدرجة الثالثة الآتية باستخدام طريقة كردان: $x^3-6x-4=0$.

السؤال الثالث: (٢٠ درجة)

(أ) أوجد مفكوك $\cos^5\theta$ بدلالة جيوب و جيوب تمام الزاوية θ .

(ب) أوجد قيمة c بحيث تمثل المعادلة $x^2-5xy+4y^2+x+2y+c=0$ خطين مستقيمين ، ثم أوجد المعادلة المشتركة للمستقيمين المارين بنقطة تقاطع هذين المستقيمين و عموديين عليهما.

السؤال الرابع: (٢٠ درجة)

(أ) أوجد المحل الهندسي لنقطة تتحرك في المستوى بحيث يكون بعدها عن النقطة (5,0) يساوي نصف بعدها عن المستقيم $x=20$.

(ب) أوجد إحداثي كل من البؤرة و الرأس ومعادلتي الدليل و المحور و طول الوتر البؤري العمودي للقطع الذي معادلته $y=x^2-4x+2$ ثم ارسمه.

تمنياتنا بالتوفيق و التفوق ،،،

كيمياء - ميكروبيولوجي

Mansoura University
Faculty of science
Physics Department
El-Mansoura, Egypt

جامعة المنصورة
كلية العلوم
قسم الفيزياء
المنصورة- مصر

First Term Examination Jan. 2009

Educational Year: First Year
Time: 2 Hours
Date: 17 / 1 / 2009

Subject: Physics
Course(S): 101 Phy.
Properties of matter &Heat
Full Mark: 60

Answer the following questions :

1) A- Define the following : Stefan' s law – The black body – Mechanical heat equivalent – Specific heat capacity . [6]Mark
   B- The melting point of gold is 1064 ^{o}C , express this temperature (i) in degree Fahrenhiet and (ii) in Kelvin . [4]Mark
   C- Discuss the change of phase for water. [5]Mark

2) A- Explain and drive an expression for
   i)Temperature distribution along a uniform perfectly lagged bar. [5]Mark
   ii) Relation between the coefficient of area expansion and the coefficient of linear expansion. [5]Mark
   iii)Bunsen' s ice calorimeter . [5]Mark

3) A- Define the following : Hooke's law –Shear modulus – Kepler' s laws for planetary motion – Pascal's principle – Viscosity. [9]Mark
   B- A 80 Kg mass is hung on a steel wire having 18 m long and 3mm diameter. What is the elongation of the wire, knowing Young' s modulus for steel is $21x10^{10}$ N/m^2. [6]Mark

4) A- Prove that Bernoulli's equation in fluids mechanics is a good example of conservation of energy (derive the equation and explain). [8]Mark
   B- Find the escape speed for an atmospheric particle 1000 Km above the earth's. Earth's radius is R= $6.4x10^6$ m and g = 9.8 m/sec^2 on the earth's surface. [7]Mark

Examiners Dr. Nivine Radwan & Dr. M.Kabeel

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

جامعة المنصورة
كلية العلوم
قسم علم الحيوان
المنصورة - مصر

First Semester, Jan. 2009

Educational year: First Level | **Program: Chemistry**
Time: 2hr | **Subject: Functional Morphology**
Date: 21/1/2009 | **Course (s): Z 122**
Full Mark: 60

Answer all the following questions

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

1- The chemical digestion of ---------- begins in the stomach through the action of the enzyme ----------
   a- Fat – lipase b- Fat – bile
   c- Carbohydrates – salivary amylase d- Protein – pepsin.

2- Sucrose contains which of the following monosaccharides ?
   a- Glucose and galactose b- Glucose and fructose
   c- Glucose only d- None of the above

3- The end product of lipid digestion are ----------
   a- Peptones b- amino acids
   c- Monosaccharides d- Fatty acids and glycerol

4- Secretin produced by the mucosa of the duodenum is stimulated by --
   a- Fatty chime b- Increased bile
   c- acidity of the chyme d- Gastrin

5- HCl is formed in cells that contain an enzyme called ---------- which catalyzes the reaction between ---------- and water.
   a- Carbonic anhydrase – CO_2 b- amylase – HCO_3
   c- Carbonic anhydrase – HCO_3 d- Pepsin – CO_2

6- Night blindness can be caused by the deficiency of
   a- A b- B1 c- B12 d- C

7- The mineral deficiency which leads to one type of anemia is -----
   a- Iron b- Iodine c- Calcium d- Phosphorus

8- The first product of fatty acid catabolism is ----------
   a- Glycerol b- Pyruvate c- Acetyl CoA d- Triglycerides

9- The formation of glycogen from glucose in liver is ----------
   a- Glycogenesis b- Glycogenolysis
   c- Glycolysis d- gluconeogenesis

10- The conversion of one molecule of glucose to two molecules of pyruvate results in the net formation of ----------
   a- 2 molecules of ATP b- 6 molecules of water
   c- 3 molecules of ATP d- 38 molecules of ATP

11- The digestion of protein is completed in the ----------
a- stomach b- small intestine c- large intestine d- mouth
12- ADH stimulates tubular reabsorption of ----------
a- Water b- Na+ ions c- K+ ions d- all of the above
13- ---------- is an enzyme produced by the kidney helps to regulate blood pressure
a- Aldosterone b- renin c- erythropoietin d- creatinine
14- The functional unit of the kidney is called ----------
a- Glomerulus b- Nephron c- Corpuscle d- Ureter
15- Most glucose molecules are reabsorbed in the ----------
a- Proximal convoluted tubule b- Collecting duct
c- Distal. convoluted tubule d- Loop of Henle
16- The dendrite of a neuron ----------
a- Conducts nerve impulses towards the nerve cell body
b- Conducts nerve impulses away from the nerve cell body
c- Is the single main cell process of a multipolar neuron
d- Both b and c above are correct.
17- Synaptic transmission is made possible by ----------
a- Membrane transport b- An ion pump
c- Saltatory conduction d- Neurotransmitters
18- The different charge between the outside and the inside of a neuron at rest is called ----------
a- Equilibrium potential b- Synaptic potential
c- Resting membrane potential d-Action potential
19-The central nervous system (CNS) includes the ----------
a- Brain and cranial nerves b- Brain and spinal nerves
c- Brain and spinal cord d- Brain only
20- The stage in an action potential that immediately follows depolarization is----------
a- Polarization b- Repolarization
c- The resting period d- Threshold

B- Complete the following: (5 marks)

1- Two particular membrane channels are:
a- ---------- b- ----------
2- Three hormones that control the kidney are:
a- ---------- b- ---------- c- ----------
3- Urine is formed as a result of three processes which are:
a- ---------- b- ---------- c- ----------
4- Three factors affecting the enzyme activity are:
a- ---------- b- ---------- c- ----------
5- Two types of lipids are: a- ---------- b- ----------
6- Two types of the neurons are: a- ---------- b- ----------

Faculty of science.
Zoology department.

Nutrition (Z, 125) Biochemistry students Jan.2009 Time: 2hrs

1st PART

(I): Choose the correct answer..... 10 Marks

1. Vegetable proteins:

a): Often lack one or more essential amino acids.	b): Generally have lower score for biological value.
c): Are always complete high quality proteins.	d): Both a & b.

2. An example of phospholipids important in food is :

a):Linoleic	b):Legumin	c): Lecithin	d):Phytosterol

3. This participates in the synthesis of hemoglobin

a):Calcium.	b): Copper	c): Iron	d): Iodine.

4. Which of the following is not a function of minerals in the body?

a): acting as coenzymes.	b): adding mechanical strength to bones and teeth.
c): acting as a regulator of osmotic pressure.	d): acting as a source of energy.

5. All of these foods contain cholesterol except.

a): Butter	b): Cheese.
c): Eggs.	d): Coconut oil.

6. Essential amino acids include:

a):Alanine	b):Tyrosine	c):Proline	d): Methionine.

7. Which of the following is not circulating energy substrate?

a):Amino acids	b):Fatty acids	c):Glycerol	d) Polysaccharides.

8. All of these carbohydrates come from plants except:

a): Fructose.	b): Cellulose.
c): Lactose.	d): Sucrose.

9. A saturated fatty acids contains:

a): only one double bond between carbon atom.	b): Some double bonds between carbon atoms.
c): No double bonds between carbon atoms.	d): No double bonds between hydrogen atoms.

10. Which mineral is involved in blood clotting, muscle activity and nerve function.

a): Calcium.	b): chloride.
c):Iodine.	d): iron.

- **Draw the following answer table in your notebook.**

1	2	3	4	5	6	7	8	9	10	Q
										A

(II) a: Complete the following spaces..... 10 Marks

1. A triglyceride molecule consists of .....attached to a .....
2. A healthful diet must be.....
:.....,.....,.....

3. Foods are classified in to three functional groups:
   a).....
   b).....
   c).....

4. Table sugar is a disaccharide called.....and is composed of .....and .....

5. Two amino acids are jointed to each other by .....linkage known as .....

6.The most common monosaccharide in the diet are .....and.....

7. The study of how your body uses the food that you eat known as.....

8. A nutrient is defined as.....in food that helps maintain the body health.

9.We require food to provide:.....
.....,.....
.....

10. .....causing weight loss or nutrient deficiency diseases.

(II) b: Write on the following items:

(a): Classification of carbohydrates..... 2.5 Marks.

(b): Biological importance of lipids..... 2.5 Marks.

(c): Scientific names, sources and deficiency symptoms of:
Vitamin D..... 2.5 Marks.

(d): Essential and non-essential amino acids. ..... 2.5 Marks.

2nd PART.

1st Question, What do you know about: 18 Marks.

1. What is meant by enzyme? Classify them by two different ways?
2. Mention two different glands in two different organs in the digestive system.
3. Functions of Hcl.
4. Hormones controlling digestive juice secretions.
5. Absorption of fats.
6. Phase II of catabolism.

2nd Question, Complete the following: 12 Marks.

1. Serous cells are present mainly in----------which is a type of ----------lie medial to ----------.
2. Bile acts as----------agent, while ----------acts as lubricant.
3. ----------is an enzyme secreted with the intestinal juice and is important for activation of ----------.
4. Procarboxy peptidase converted to ..... by ----------.
5. Protein is absorbed in the form of ----------.
6. Glucose stored in ----------or ---------- in the form of ----------.
7. Absorption is done by----------when the concentration of absorbed substance is higher in lumen than that in adjacent portal vein and by ----------when they are absorbed against its concentration gradient.
8. Catabolism release----------.

لاحظ أن: الأسئلة(ثلاث صفحات) جميعها مطلوبة- أكتب الجمل كاملة وضع خط تحت الكلمات المضافة.