كيمياء - ل ١١ ث الكيمياء التحليلية

Mansoura University
Faculty of Science
Chemistry Department
Subject: Analytical Chemistry
Course: **Titrimetry (Volumetry)**
Course code:Chem(211)

Summer Semester
2 nd level(Chemistry)
Date:Aug. 2013
Time allowed:2 hours
Full Mark:60 Marks

Answer the Following Questions

1) Discuss Five methods used for expressing the concentration of a solution.

2) Number of moles of 5.8 g NaCl = ..., when dissolved in 500 ml, the solution has molarity of .....(At.wt Na=23 Cl=35.5)

3) Calculate the volume of conc. nitric acid, *having sp. gravity 1.42 and 69% w/w percentage concentration,* required to prepare 1.00L of 0.20 M HNO3. What is the volume of the prepared acid needed to react quantitatively with 0.0106g of Na_2CO_3 (H= 1.00, N=14.00, O= 16.00, Na=23.00, C=12.00)

4) Write equivalent weight with respect to molecular weight for the following compounds

(i) Na_2CO_3 using ph.ph as indicator , eq.wt=M.wt/.....

(ii)H_3PO_4 using M.O as indicator, eq.wt=M.wt/.....

(iii)$Cr_2(SO_4)_3$ eq.wt=M.wt/.....

5) Calculate the pH of 50ml of 0.1M CH_3COOH on addition of the following volumes of 0.05M NaOH:

a) 0 ml b) 50ml c) 100ml d) 120ml

Knowing that (Ka $_{CH3COOH}$= $1.8x10^{-5}$, pKa= 4.76)

6) Indicate in details the types of EDTA titrations and its application in analysis of mixtures

7) Define the following:

(i) Standard solution (ii) Oxidation- reduction reaction

(iii) Self indicator. iv) Solubility product

8- In titration of Fe^{2+} in acidic medium with 0.0206M $K_2Cr_2O_7$, volume of $K_2Cr_2O_7$ necessary was 40.2ml according to the following equation:

$$6Fe^{2+} + Cr_2O_7 + 14H^+ \rightarrow 6Fe^{3+} + 2Cr^{3+} + 7H_2O$$

Calculate the weight of iron(in mg)

9- Suppose 0.7144 gm of KHP was used to standardize $Mg(OH)_2$ solution, as in the following reaction:

$$Mg(OH)_2 + 2KHC_8H_4O_4 \rightarrow Mg(KC_8H_4O_4)_2 + 2H_2O$$

If 31.18ml of $Mg(OH)_2$ was needed, what is the normality of Mg(OH)2?

10- Prove that pH range for neutralization indicators is given by pH= pKa ± 1

11-Discuss the different methods for detecting the equivalent point in precipitation titrations.

12- Define the following terms: F test, confidence limit, accuracy and precision.

13- Explain why metal ion titrated with EDTA need to be buffered at definite pH

14 - 0.5 gm of $CaCO_3$ is dissolved in HCl and titrated with EDTA solution .If 50 ml of EDTA is needed at equivalent point. Find the molarity of EDTA (Ca=40, C=12, O =16)

15-

i-Define: metallic indicators, buffer solution, titration error, equivalence and end points.

ii-Why buffer solutions resist the change in the pH when small amount of strong acid or strong base is added to it?

(Fe=56, K=39, O=16, C=12,Ca=40, H= 1.)

Good luck

Prof. Dr Mohamed El Defrawy
prof.Dr. Magdi E. Khalifa

ع كيمياء - رياضيات بحتة ٢/١

الفرقة: الثانية المادة : رياضيات بحته – ر ٢٠١ الدرجة الكلية : ٨٠ درجة	كلية العلوم – قسم الرياضيات	امتحان الفصل الصيفى الزمن: ساعتان التاريخ : ١٨/٨/ ٢٠١٣

الشعب: ك +ك حيوي+ميكروبيولوجى+ك ونبات+ك وحيوان +جيولوجيا+علوم بيئة

أجب عن الأسئلة الآتية: كل سؤال ٢٠ درجة

[1] أ) ناقش اتصال الدالة الآتية عند النقطة (0,0)

$$f(x,y)=\begin{cases}\dfrac{3x^2y}{7x^2+y^2} & , \quad (x,y)\neq(0,0)\\ 0 & , \quad (x,y)=(0,0)\end{cases}$$

ب) اذا كانت $u=\tan^{-1}(\dfrac{x^3+y^3}{x-y})$ فاثبت أن $xu_x+yu_y=\sin 2u$.

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[2] أوجد الحل العام للمعادلات التفاضلية

a) $(x+y-1)dx-(3x+3y+1)dy=0$

b) $(x^2+xy+3y^2)dx=(x^2+2xy)dy$

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[3] أ) استخدم قاعدة السلسلة لحساب $\dfrac{\partial z}{\partial u}$ اذا كانت $z=x\ln y \ , \ x=3u+2v \ , \ y=uv$

ب) أوجد الحل الخاص للمعادلة $y'+\dfrac{1}{x}y=\dfrac{1}{x^2} \ , \ y(1)=1$.

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[4] أ) أوجد قيمة التكامل $\iint_R (x^2+y^2)dxdy$ حيث R هى المنطقة المحصورة بين الدائرتين

$x^2+y^2=4 \ , \ x^2+y^2=16$.

ب) احسب التكامل الخطى $\int_c xy\,dx+x^2dy$ حيث c هى القطعة المستقيمة من النقطة (2,1) الى النقطة (4,5).

مع أطيب التمنيات بالتوفيق

أسرة التدريس

Mansoura University **Faculty of Science** **Chemistry Department** **Subject: Quantum chemistry** **Course: Chem. 244**	كلية العلوم جامعة المنصورة	**Summer Course** **Second year Major** **Chemistry Students** **Time Allowed:2 hours** **Full Mark: 80 Marks** **Date: August, 2013**

Answer the following question:

Question one:

A) When a photon colloid with a matter, the expected effect is highly dependent on the photon energy, explain (three cases). (6 mark)

B: Explain (10 mark)

I. The A□ operator is Hermation.

II. The A□ operator is linear.

III. The two function ψ_1, ψ_2 is degenerate

C: Determine the Heisenberg uncertainty in momentum of an electron in a system, if the uncertainty in velocity is 10^{-5}. (5mark)

Question two:

A: Calculate the first three energy value of: (12 mark)

I. An electron move in one dimensional box of 2 A^{o} diameter.

II. An 10 gm particle moving in a box of 10cm, Where m (of electron) = 9.1×10^{-31} kg , h= 6.625×10^{-34} J.s, Comment on the quantum character of the results obtained.

B: Explain graphically how emitted radiation from a heated body is dependent on its temperature. (5 mark)

C: Calculate the lowest energy level benzene. (4mark)

Question three :

A) From Einstein experiment, a bulb emits light of wave length300nm. this light strikes a metal which has a work function of 2.13 ev. Calculate

1) The energy of the emitted photon. (6 mark)

2) The kinetic energy of the emitted photon. Where $h=6.625\times10^{-34}$, mass= 9.1×10^{-31} kg, $C=3\times10^{8}$. (6 mark)

B: Explain briefly the following: (9 mark)

a) Two operator do commute with each other.

b) The function which describe a quantum mechanical system should be well behaved.

c) The function in mechanical quantum system is Orthogonal.

Question four:

A) write short notes on : (6 mark)

1. Bohr theory.
2. Zeeman effect.
3. Stark effect.

B) : Explain the relation between the kinetic energy of the emitted photoelectrons and the frequency of the incident radiation in Einstein's experiment. (6mark)

C: Explain the Heisenberg uncertainty principal from quantum mechanics postulate point of view. (5 mark)

صيف فيزياء ف ٢٢١ (كيميا، [illegible]، مجموعة البيولوجي)

Mansoura University
Faculty of Science
Physics Department

Summer Exam.
Date: Aug. 2013
Time Allowed: 2 hours
Full Mark: 80 Marks

Subject: Physics Course: 221 ف Physical Optics

Answer the following questions:

1] A) Demonstrate an explanatory diagram of the optical arrangement of Young's experiment of interference. Drive the theory of interference for this experiment.

[18 Marks]

B) When one of the beams of Mach-Zehnder interferometer passes through a wide tunnel of length 20 meters, 200 fringes cross the field of view. Calculate the change in refractive index if the wavelength of light is equal to 5890 A°.

[9Marks]

2] A) Explain with the necessary theory the interference in thin films due to reflected light.

[16 Marks]

B) Explain how you can obtain plan polarized light by reflection.

[11 Marks]

3] A) Discuss Fraunhofer diffraction pattern when using a rectangular slit. Drive and expression for the intensity distribution of observed diffraction pattern.

[20 Marks]

B) Calculate the angular spectrum separation of two D lines of Sodium of wavelengths 5890 A° and 5896 A° in the second older spectrum produced by diffraction grating. The light being incident normally on the grating which have 6000 lines / Cm.

[6 Marks]

Good Luck

Examiner: Prof. Dr. Taha Sokkar

كيمياء - ٤ ص

Mansoura University **Faculty of Science** **Chemistry Department** **Subject : Chemistry** **Course(s):**No.(245) Physical Chemistry of liquids and solutions	كلية العلوم جامعة المنصورة	**Summer Term** **Second year Students** **Special Chemistry-level 2** **Date : Summer 2013** **Time Allowed : 2 hours** **Full Marks : 60 Marks**

Answer the following questions :

1.a) Explain the partial molar volumes and their methods of determination. (10 marks)

b) At 30°C, the osmotic pressure of 100 ml for unknown protein solution containing 2.84 gram of that protein was found to be 0.03 atms.Calculate the molecular weight of the protein. (10 marks)

2. a) Write shortly on the different colligative properties of solutions and their modified laws with Van't Hoff factor. (10 marks)

b) In a cell containing solution of silver nitrate, a certain amount of current was passed for 3 hours. The amount of silver deposited was found to be 45 gram . Calculate the current strength. (10 marks)

3. a) Write on the transference numbers and their methods of determination. (10 marks)

b) The resistance of 0.01 mol. solution of acetic acid in a cell (cell constant =0.805 cm^{-1}) was found to be 821 Ohm .What is the degree of ionization of this acid . Limiting equivalent conductance of acetic acid equal to 388×10^{-4} $Ohm^{-1} m^2$. (10 marks)

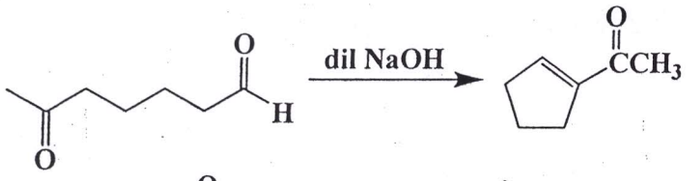
(R =0.082 L atm, F= 96500 Coulomb, molecular weight of Ag =108)

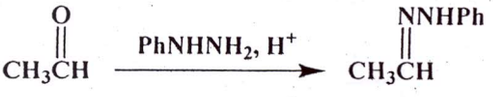
With best wishes ; Prof.Dr.Esam Gomaa

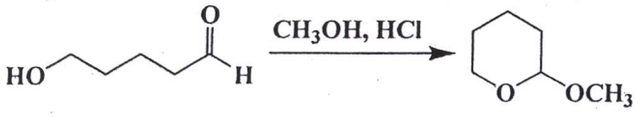
Mansoura University Faculty of Science Chemistry Department Subject: Chemistry Course(s): Chem.233 Physical Organic Chemistry II		Summer Course 2nd Level Chem. Students Date: 27 / 8 / 2013 Time Allowed: **2** Hours Full Mark: **60** Marks

Answer All Questions

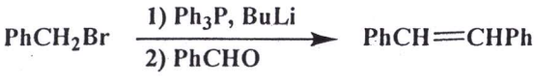
1- Propose mechanisms for the following reactions: **[20 Marks]**

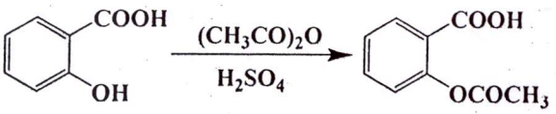
a) 

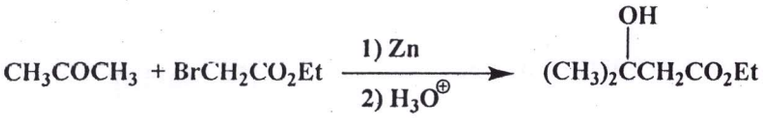
b) 

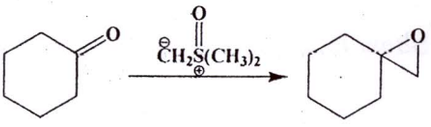
c) 

d) 

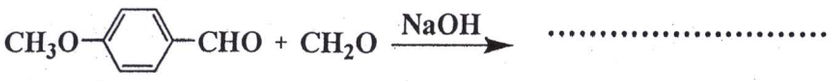
e) 

f) 

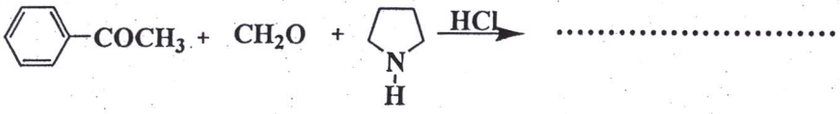
g) 

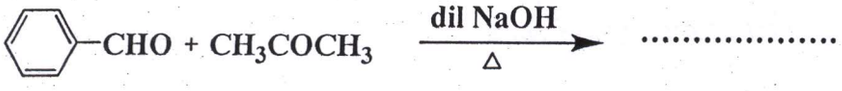
h) 

2- Complete the following equations and write the reaction mechanism to explain your answer: **[20 Marks]**

a) 

b) 

c) 

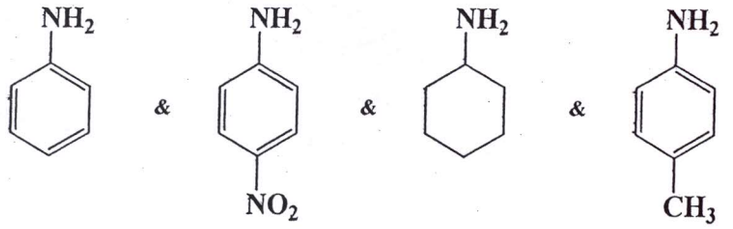
d) 

e) 

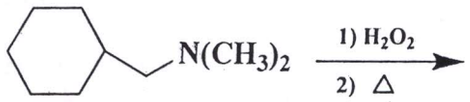
P. T. O.

3- a) Arrange the following in order of decreasing with respect to their basic strength. Explain

[4 Marks]



b) Give the product(s) expected from the following reactions: [6 Marks]

i - 

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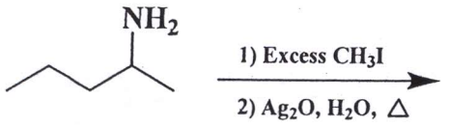
ii - 

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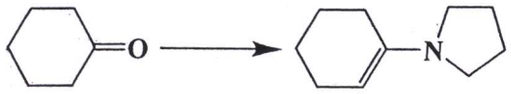
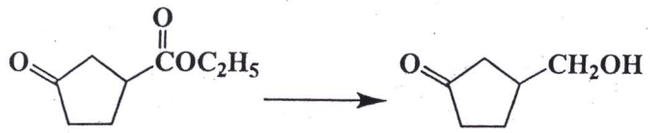
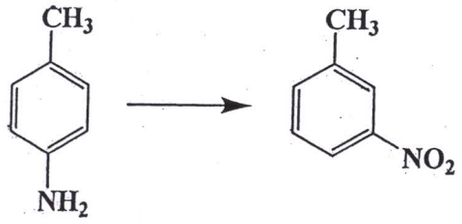
c) Show how you would accomplish the following transformation: [10 Marks]

i - 

ii - 

iii - 

Best Wishes and Good luck

A.Prof. Dr. Eman Keshk

Mansoura University Faculty of Science Chemistry Department Subject: Chemistry Course: Chem. 234 ***Organic Spectroscopy***		Summer Course Exam. 2rd Level : Chemistry program Date: 25 August. 2013 Time Allowed: 2 hrs Full Mark: **80** Marks

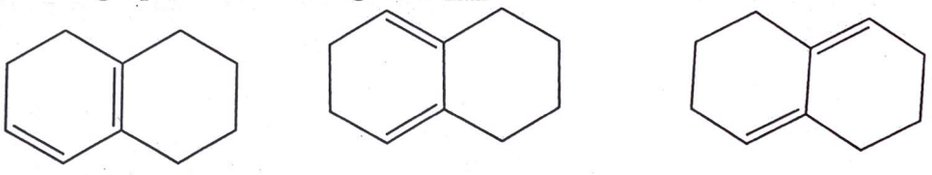
Answer All Questions;

Question 1: ***Select the correct answer.*** **(20 Marks)**

1) Which of the following molecules would have the highest frequency carbonyl stretching:

a; Cyclohexanone. b; Cyclobutanone. c; Cyclopentanone.

2) Which of the following ispmers has the highest λ_{max} value:

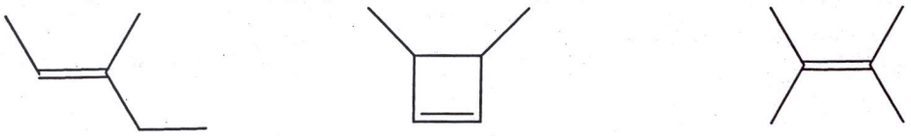


(a) **(b)** **(c)**

3) Which of the following hydrocarbons gives only one singlet signal in its ^{1}H NMR spectrum :

a; Cyclohexan-1,2-dione b; Cyclohexan-1,3-dione c; Cyclohexan-1,4-dione.

4) Which of the following structures displays an infrared signal at 1622 cm-1?



(a) **(b)** **(c)**

5) Which of the following gives three types of ^{1}H NMR signals:

a; *n*-Pentane. **b; Isopentane.** **c; Neopentane.**

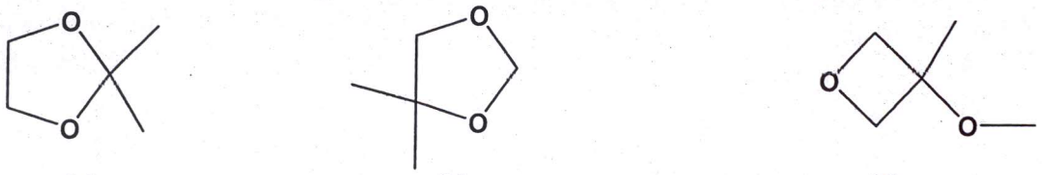
6) Which of the following compounds has the MOST deshielded protons:

a; CH_3Cl **b; CH_3I** **c; CH_3Br**

7) Absorption of what type of electromagnetic radiation results in the transition among allowed electrons migration ?

a; Radio waves. **b; Infrared.** **c; Ultraviolet.**

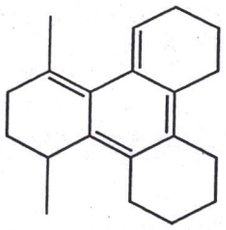
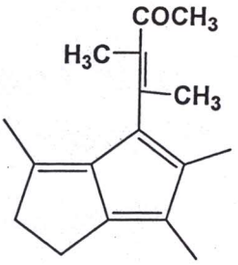
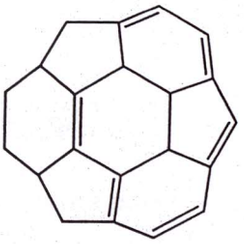
8) An unknown compound shows in its ^{1}H NMR spectrum two singlet signals at δ 1.4 and 3.9 ppm with the ratio 6:4 Which of the following is the most likely formula of this compound?



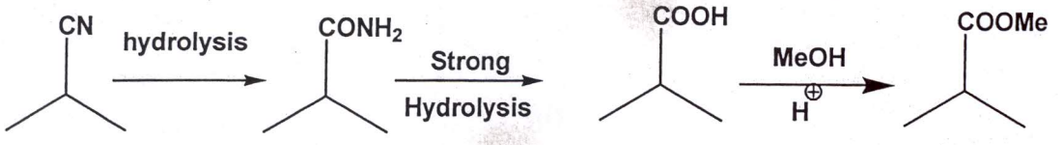
(a) **(b)** **(c)**

Question 2: (20 Marks)

I) Use the *Woodward-Fieser* rules to predict the expected λ_{max} for the following compounds:

(1)	(2)	(3)
		

II) Explain, by using the chemical and spectroscopic techniques, how you can follow up the following sketch?



Question 3: (20 Marks)

Write shortly what you know about Two Only of the following:

a; The role of Inductive effect in the change of (ν') value.

b; Disadvantages the chemical techniques in elucidation of the organic compounds.

c, Chemical shift and shielding / deshielding effect .

Question 4: (20 Marks)

a; Draw the structural formula of each of the following compounds. How many ^{1}H-NMR signals and types of splitting would you expect to see from each isomer?

a; C_3H_6O **b; $C_3H_6Br_2$**

b; What is the structure of a compound $C_{10}H_{14}O$ which has ^{1}H NMR signals at δ = 1.4 (doublet , 6H) & 4.10 (heptet, 1H) , 4.47 (singlet, 2H) and 7.2 (multiplet, 5H) .

c; An unknown compound has the molecular formula $C_{10}H_{12}$ showed in its ^{1}H NMR spectrum three signals at 1.60 (triplet, 4H), 2.85 (triplet, 4H) and 7.01 (multiplet, 4H). Deduce the structural formula of this compound.

d; What is the structure of a compound $C_6H_{10}O$ which has in its infra red spectrum the peaks at ν = 3000 , 1700, 1606 Cm^{-1} and the ^{1}H-NMR spectrum showed the signals at δ – 1.83 (singlet, 3H) & 2.27 (singlet , 6H) & 6.15 (singlet, 1H).

With My Best Wishes

Prof. Dr. El-Sayed I. El-Desoky

كيمياء حيوى - لفرقة ٢٧٩

Mansoura University **Faculty of Science** **Chemistry Department** **Subject: Chemistry** **Course(s): كيمياء الجزئيات الحيوية** **ك ح ٢٧٩**	كلية العلوم جامعة المنصورة	**Summer Exam** **Time Allowed: 2 hours** **Full Mark: 80 Marks** **Date:** 22, 8, 2013

Answer The Following Questions

1. **Give an account about :**

   a) **effect of the substrate concentration on enzymatic activity [14 Marks]**

   b) **Hydrolysis of nucleic acid [13 Marks]**

2. **Write about titration of amino acids. Show equation also. [26.5 Marks]**

3. **Give an account about krebs citric acid cycle. [26.5 Marks]**

مع تحيات

أ.د محمد عبد الحافظ الفار

Mansoura University		**Summer Term**
Faculty of Science		**Second Level**
Chemistry Department		**22/08/2013**
Nuclear and Bonding		**2 hours**
Chem 222		**60 Marks**

1. **Answer the following questions:**

   (a) Prove that $t_{1/2}$ of a radioactive element is given by 0.693/k, where k is the decay constant. **(5 Marks)**

   (b) The radioactivity of a radioactive isotope falls to 12.5% in 90 days. Calculate the $\mathbf{t_{1/2}}$ and **k** of the radioisotope. **(5 Marks)**

   (c) Calculate the B.E. of $_8O^{16}$ per nucleon (mass defect = 0.137 amu) **(5 Marks)**

2. **Answer the following questions:**

   (a) One gram of $_{79}Au^{198}$ ($t_{1/2}$ = 65 hrs) decays by β emission to produce stable Hg.
   (i) Write the nuclear reaction for the process.
   (ii) How much Hg will be present after 260 hrs? **(4 Marks)**

   (b) What is nuclear reaction and how are they classified? **(3 Marks)**

   (c) I and I^- have the same nuclear reactions. Why? **(4 Marks)**

   (d) The nuclear stability related to packing fraction and n/p ratio. Comment. **(4 Marks)**

3. **Answer the following questions:**

   (a) The energy gap (Eg) in zinc sulfide (ZnS) is 3.6 eV.
   (i) Is this material coloured?
   (ii) Do you expect this material to be a conductor at room temperature? **(4 Marks)**

   (b) Explain for both Potassium (K) and beryllium (Be) the reasons of conductivity on the basis of the band structure. **(4 Marks)**

   (c) How do you expect the conductivity to vary in a metallic conductor with increasing temperature? (Explain your answer.) **(4 Marks)**

   (d) How could you increase the electrical conductivity of a semiconductor? **(3 Marks)**

Please turn to next page

4. Answer the following questions:

(a) Compare between diamond and graphite. **(3 Marks)**

(b) Determine the packing efficiency of face centred cubic systems. **(3 Marks)**

(c) Explain the fluorite structure by two (2) different ways. **(3 Marks)**

(d) Choose the correct answer: **(6 Marks)**

(i) In the $CdCl_2$ structure, Cd occupies _____ holes

(a) All octahedral (b) half octahedral (c) all tetrahedral (d) half tetrahedral

(ii) $K_2[PtCl_6]$ has _____ structure

(a) Fluorite (b) Antifluorite (c) Rock salt (d) layered

(iii) The reason why any particular structure is formed is that it gives the most favourable

(a) lattice energy (b) radius ratio (c) Unit cell (d) Miller indices

(iv) The free electron gas theory failed to explain

(a) atomic spectrum (b) mass (c) electronic configuration (d) specific heat

(v) Miller indices showing the close-packing plane in cubic crystal

(a) (100) (b) (110) (c) (111) (d) None

(vi) Ringsilicates/cyclosilicates structures consists of the following group

(a) SiO_4^{4-} (b) $Si_2O_5^{2-}$ (c) $Si_2O_7^{6-}$ (d) SiO_3^{2-}

Very Best Wishes

Prof. Dr. Gaber Abu-El-Reash **Dr. Ahmed Lutfi**