Mansoura University **Faculty of Science** **Chemistry Department** **Subject code: Chem. 415** **Course: Electro-analytical chemistry and spectroscopic methods of analysis**		**First semester examination** **4th level students** **Program: Chemistry/Zoology and Chemistry/Botany** **Date: 12/1/2016** **Time allowed: 2 hours** **Full mark: 80 marks**

Answer the following questions: (الأسئله في صفحتين)

Section A: (Spectroscopic methods of analysis) (40 marks)

Question 1: (20 marks)

a. **Define each of the following: (10 marks)**
   1. Electromagnetic radiation.
   2. Wave length.
   3. Scattering.
   4. Auxochromes.
   5. **I.R** active substances.

b. **Draw the diagram which represents**: single beam instrument. **(5 marks)**

c. **Calculate the molar absorptivity of**: $K_2Cr_2O_7$ at 455 nm, given that 36.5 mg was dissolved in 500 mL exhibits 12% transmittance at 455 nm in a 2-cm cell. **(5 marks)**

Question 1: (20 marks)

a. **Put true (√) or false (×) and correct the wrong one: (10 marks)**
   1. According to Beer's law, **A α 1/C**.
   2. During the interaction between **EM** radiation and matter, the type of excitation independent on the wave length of the light.
   3. Wagging vibration involves change in bond length.
   4. Spectroscopic methods are not classified according to the region of the electromagnetic spectrum.
   5. The colour in **$KMnO_4$** is due to defect in crystal.

b. **Complete the following: (10 marks)**
   1. .....lamp is a source for **I.R** radiation while..... lamp is a source for **U.V** radiation.
   2. .....is an example for **I.R** detector.
   3. Electrons are promoted to higher orbitals by.....while vibrations are excited by.....and rotations are excited by .....
   4. Bathochromic shift is a shift to ..... and it also called .....
   5. Hyposo-chromic shift is a shift to.... .....and it also called .....

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Section B: (Electro-analytical chemistry) (40 marks)

Question 3: (20 marks)

a. **Complete each of the following sentences: (5 marks)**

1. In static method.....passes through the electrochemical cell like.....
2. Electrodes of the fourth kind can follow the reaction mechanism for .....
3. Coulometry requires **100%** current efficiency which means:.....
4. For **CPC** technique, two types of working electrodes are commonly used:.....or.....
5. Irreversible peak current is proportional to:.....and.....and.....

b. **Put true (√) or false (×) and correct the wrong one: (5 marks)**

1. Galvanostat is a device used to control the current in the dynamic methods.
2. Potentiometric end point of acid-base titration is determined using glass electrode.
3. Fluoride ion electrode interferes by OH^- at high pH values.
4. During coulometric titration of Fe^{2+} against cerium, Ce^{3+} is the mediator.
5. Mass transfer due to convection can be eliminated by preventing stirring process.

c. **Sketch the diagram which represents**: the cell used for polarographic measurment. **(4 marks)**

d. The purity of a sample of picric acid, $C_6H_3N_3O_7$ (**M.wt.=229 g/mole**), is determined by controlled-potential coulometry, converting the picric acid to triaminophenol, $C_6H_9N_3O$. A **0.03 g** sample of picric acid is placed in a **1000-mL** volumetric flask and diluted to the volume. A **10-mL** portion of this solution is transferred to a coulometric cell and diluted till the Pt cathode is immersed. The exhaustive electrolysis of the sample requires **1737 C** of charge. Report the purity of the picric acid. **(6 marks)**

Question 4: (20 marks)

a. **Give the scientific name for each of the following statements: (5 marks)**

1. It completes the electric circuit and its potential known and remains constant.
2. It contains a thin glass bulb at the bottom that is selective to H^+ ions.
3. It contains quantitative deposition of analyte as a solid on the cathode surface.
4. It can be removed by addition of **Triton X-100** to the polarographic cell.
5. The most widely used technique for quantitative analysis of redox reactions.

b. **Mention two advantages for each of the following : (4 marks)**

1. **ISE's.**
2. **CCC.**

c. **Comment on the following: (5 marks)**

1. The measured pH by glass electrode is higher than the actual pH in highly acidic solutions.
2. **DME** is not very useful for oxidation processes.

d. Vitamin **C**, $C_6H_8O_6$ (**M.wt.=176 g/mole**), gives an anodic wave at +0.1 V **vs SCE** that can be used for analysis. **20** mL sample of orange juice stabilized with the addition of a small amount of oxalic acid is filtered, buffered to pH **8** and diluted to **50** mL. The anodic wave has I_d value of **9.36** μA with drop factor ($m^{2/3}t^{1/6}$) value of **2.6** and the diffusion current constant ($I_d/m^{2/3}t^{1/6}C$) equal **3**. Calculate vitamin **C** concentration in **ppm** unit. **(6 marks)**

Good luck: Dr. Yasmeen Gaber and Dr. Hany Moustafa

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Final Examination in Botany
First Term: Jan. 2016

Educational Year: Fourth Level **Program (Branch): Chemistry-Botany**
Subject: Bot (417) **Course(s): Ecosystem-Ecology and pollution**
Time: 2 hrs **Date: 2 / 1 /2016** **Full mark: 60** **Question mark: 20**

Answer the following questions:

Q1: A) - Answer the following true (√) or false (X) and correct the false if present: (10 marks)

1) Garbage examples are paper, wood, cloth and rubber.
2) Carbon and sulphur compounds from secondary air pollutants.
3) Increase nutrients in water increase dissolved oxygen.
4) Primary air pollutants are those formed in air by interaction of atmospheric constituents.
5) Nitrogen and phosphorous cause water eutrophication.

B) – Discuss the following:- (10 marks)

a) – Effects of air pollution on vegetation.
b) – Impacts of biological pollution of water.

Q2: **A) – Complete the following sentences:- (10 marks)**

1) persistence organic compounds such as --------and-------- are hazards because ---------,---------- and----------.
2) In ecological balance of natural streams, plants produce --------through---- while fish produce ----------through ----------.
3) Pollution defined as ----------.
4) As regards the nature of pollutants, pollution can be divided into ---------, ----------,---------- and ----------.
5) Air pollutants may be classified as ----------and ----------or as --------- and ----------.

Examiners: Dr. Ghada A. El-Sherbeny

باقى الامتحان الصفحة التالية ⟸

Q.3 **A. Complete the following:-** (10 marks)

1- The physical factors having the greatest effect on the terrestrial ecosystem are ....., ... and.....

2- .....is an early warning that the community or ecosystem is exposed to degradation.

3- Halophytes are adapted to the environment through....., ...and.....

4- ..... is a relationship that is beneficial to both organisms in association.

5- Xerophytes are adapted to the environment through....., ...and.....

B. Answer each of the following either true (√) or false (×): (10 marks)

1. A community is the set of all populations that inhabit a certain area.
2. Any animal, which is hunted and killed by another animal for food is carnivore.
3. Natural resources can be classified into biotic and abiotic resources.
4. The leaves of some xerophytes rolled to cope with the dry habitat.
5. A food chain shows which animals eat other animals or plants.
6. Mutualism is one specie benefits, while the other is neither helped nor harmed to any great degree.
7. Stems in some extreme xerophytes are modified into leaf-like flattened and fleshy structures.
8. Decomposers are a biotic component of an ecosystem.
9. Parasitism is an interaction in which an organism extracts energy and nutrients from its host
10. Hydro-halophytes develop special type of negatively geotropic roots, called pneumatophores.

Q.2 **B- Give short note on the following:** (10 marks)

1. Adaptation of halophytes.
2. Phosphorus and carbon cycle.

Dr. Yasser El-Amier

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Final Examination in Botany
First Term: Jan. 2016

Educational Year:2015- 2016 **Program (Branch):Chem. And Bot.**
Level4

Subject:Botany **Course(s):**Mycology and phytopathology (M415)
Time: 2 hrs Date: 16 /1 /2016 **Full mark: 60** **Question mark: 20**

Answer the following questions:

Q1: Give an account on each of the following:

a- Essential considerations in plant disease management (5 marks)
b- Identification of Etiolation, Hypertrophy, Epidemiology, Varigation and Signs (5 marks)
c- Classification of plant diseases (5 marks)
d- Objectives of remote sensing in plant pathology (5 marks)

Q2 : Using illustrative diagrams describe each of the following:

a- Essential components of an epiphytotic (disease triangle) (6 marks)
b- Methods of penetration and invasion by fungi (4 marks)
c- Histological defense structures (6 marks)
d- Cellular defense structures (4 marks)

Q3 :

a- **Compare and contrast between each of the following:**
   1- Soil inhabitants and soil invaders (5 marks)
   2- Polycyclic and monocyclic diseases (5 marks)
b- **Write an account on each of the following:**
   1- Koch's postulates (4 marks)
   2- Soil as a mean of autonomous dispersal (6 marks)

Examiners :

Prof. Gamal Abdel-fattah Dr. Hoda Soliman

Mansoura University Faculty of Science Chemistry Department Subject: Chemistry Course(s): Surface Chemistry and Molecular Spectroscopy Code: Chem. 445		First term 4th year level Chemistry-Zoology & Chemistry-Botany Students Date: 23 January 2015 Time allowed: 3 hours Full mark: 60 marks

Answer the following questions:

Section A: Molecular Spectroscopy

Q1: Complete the following: **[12 Marks]**

1. The energy of light is directly proportional to .....
2. Atomic absorption is ....., while atomic emission is .....
3. The wave lengths of lines in the hydrogen emission spectrum is given by.....
4. The total energy of molecule can have is equal .....
5. The intensities of spectra line in rotational spectrum are directly proportional to .....
6. The molecules are infra-red active they must have....., while the molecules are Raman active they must have .....
7. Chromophore is ..... and the auxochrome is .....
8. The possible electronic transition for organic compounds are.....
9. The number of vibration for linear molecules are.....and non-linear molecules are.....
10. The vibrational spectra are accompanied by .....while the electronic spectra by .....
11. When molecule absorbs infra-red radiation the molecule is.....and when molecule absorbs microwave radiation the molecule is.....
12. The molecule contains a double bond has force constant .....than the molecule contains a single bond

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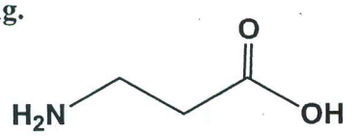
Q2: Explain the following: **[10 Marks]**

1. The difference between IR and Raman spectra.
2. Rayleigh, Stokes and anti-Stokes scattering.
3. The modes of vibration of CO_2 and H_2O
4. Rigid rotator
5. The electronic transitions for β-alanine:



Q3: Calculate the following: **[8 Marks]**

1. Calculate the energy per mole associated with ultra-violet region of electromagnetic spectrum assuming that the wave length is $5x10^{-6}$ cm.

2. Calculate the bond length for $C^{12}O^{16}$ molecule knowing that moment of inertia is 6.2 x 10^{-49} kg m^2.

Section B

Answer **five** questions **only** of the following,

[6 marks for each question= 30 marks]

1) **Define** the following terms with aid of diagrams:
   i. Interface ii. Adhesion forces iii. Critical temperature
   iv. Wetting agents v. contact angle vi. Capillarity

2) **Determine** the spreading coefficient of n-hexadecane (γ_{O1A}=30.0 ; γ_{O1W}= 52.1), n-octane (γ_{O2A} = 21.8 γ_{O2W}=50.8), and n-octanol (γ_{O3A} =27.5; γ_{O3W}=8.5) on water (γ_{WA} =72.8) at 20°C. ***(Comment,,,,)***

3) **Describe** the differences between physical adsorption and chemical adsorption.

4) **Deduce** the set equations of Langmiur model for describing the solid/gas adsorption.

5) **Deduce and discuss** the Kelvin Equation.

6) In the Du Nouy tensiometer, if the diameter of the ring is 1.0 cm and the force needed to pull the ring up (with the liquid attached to the outer and inner periphery of the ring) is 6.77 mN, **what** is the surface tension of the liquid?

7) **Calculate** the surface excess concentration for a 1 M aqueous solution of NH_4NO_3. The rate of change the surface tension with concentration equal unity. (R = 8.314 J/mol.K.)

8) **Discuss** the effect of temperature on surface tension of different liquids.

Best Wishes;

Prof. Essam Arafa, **Prof. Salem Samra,**

Dr. Hamdy Farag, **Dr. Kamal Shalabi**

Department of Botany

Faculty of Science

Mansoura University

Exam of Enzymology and Metabolites

4th level

General Botany Time: 2h

Answer the following questions:

Question 1

A-What is the difference between isomerases and ligases?.

B-Write the following enzymatic equations, the name of the enzyme involved and the group name of each enzyme:

$C_4 + H_2O$ .....$NH_3 + C_4$

$C_5 + H_2O$ .....$NH_3 + C_5$

C-How could you synthesize each of the following compounds using enzymatic reactions?

i- Pyruvate by three different enzymatic reactions.

ii- C_2 compound from C_4 compound.

iii-C_1 compound from C_2 compound.

Question 2

A-What is meant by amidase?.

B- Enzymatically how can you carry out the following conversions?

i- Glyceraldehyde 3-phosphate to dihydroxy acetone phosphate? and classify the enzyme involved in the reaction.

ii- Glyceric acid 3-phosphate to glyceric acid 2-phosphate.

iii- Glutamine to glutamate.

v-Mention only the medical or economic importance of each of the following:

Asparaginase – Phytase – Glutaminase - Urease

Question 3

Illustrate with diagram the differences between glycolate and glyoxylate cycle. What is the aim in each case?. Mention the most significance values of each one.

Question 4

A-Mention the main differences between C_3 and C_4 plants.

B-What is meant by CAM plants?. Show how can CO_2-fixation in these plant species take place?.

C-The complete oxidation of fatty acids might follow 2 mechanisms, what are these?. Which one of these mechanisms produces high energy yield?. Why?.

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Prof. Hamed M El-Shora *Prof. Samy* Abo-Kassem