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	TANTA UNIVERSITY FACULTY OF SCIENCE DEPARTMENT OF CHEMISTRY		
	EXAMINATION FOR JUNIOR (SECOND YEAR) STUDENTS OF . SPECIAL BIOCHEMISTRY		
	COURSE TITLE:	CHEMISTRY OF CARBOHYDRATES AND LIPIDS	COURSE CODE: BC2202
DATE:	15-6-2015	TERM: SECOND	TOTAL ASSESSMENT MARKS: 50
			TIME ALLOWED: 1 HOUR

1) Give short note for each of the following : (12 marks)

- Ceramide.
- Functions of prostaglandin.
- Waxes.
- Saponification of triacylglycerols.

2) Draw the structure of the following (15 marks)

- Phosphatidyl choline
- prostaglandin
- Fatty acid contain (C18:1<sup>Δ9</sup>)
- Cholesterol
- Rhizochaline

3) Complete the sentences (7 marks)

- Micelles of fatty acids in water are organized such that the ..... faces the solvent and the ..... are directed toward the interior.
- Cardiolipin is found in .....
- Palmitoylated protein is one type of ..... And the type of its linkage is .....
- When 3 fatty acids are bonded to a glycerol backbone through ester bonds a .....is formed
- Liquid oil can be changed into solid fats by .....

4) Give an account of the following (16 marks)

- Rancidity.
- Proteolipids.
- Terpenes.
- Biological functions of Triacylglycerols

With my best wishes  
Dr. Mai El-Keiy

EXAMINERS	PROF.DR. AHMED SAFAAN DR. MAI ELKEIY
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II-Carbohydrates Section:

Answer the following questions:

1-A-Explain each of the following:-

(16 marks)

- i- Application of HIO<sub>4</sub> oxidation to Trehalose followed by bromine water oxidation and hydrolysis of the corresponding dialdehydes formed in products.
- ii- Conversion of methylglucoside(  $\alpha$  or  $\beta$ ) to tetramethyl glucose.
- iii-The osazone formation provides us an important tool for comparing configurations at asymmetric centers below C<sub>2</sub> in aldoses and ketoses.
- iv-Enzymatic( Diastase)hydrolysis of amylose and amylopectine

2-A-Give the structural formulas for the following compounds:

(4 marks)

- i-Glucosidoerythrose
- ii-Amino- $\alpha$ -D-glucopyranose
- iii- methyl- $\alpha$ -D-fructopyranoside
- iv- Gentianose

B-Show by equations:-

(15 marks)

- i- The cellulases include the large number of endo- and exo-glucanases which hydrolyze  $\beta$  -1,4-glucosidic bonds of the cellulose chains
- ii- Alpha-galactosidase is commercially used as digestive enzyme for stachyose.
- iii- Biosynthesis of vitamin C

3-Discuss each of the following :-

(15 marks)

- i-. A specific oxidation that would convert D-galactose to D-galacturonic acid
- ii-Elucidation of the lactose structure
- iii-Synthesis of Salicin involves the reaction between O-acetyl - $\alpha$  glucosyl bromide and Salicyl alcohol.

PROF.DR. AHMED SAAFAN



TANTA UNIVERSITY  
FACULTY OF SCIENCE  
DEPARTMENT OF CHEMISTRY

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- C. Palmitoylated protein is one type of ..... And the type of its linkage is .....
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With my best wishes  
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EXAMINERS	PROF.DR. AHMED SAFAAN
	DR. MAI ELKEIY



## II-Carbohydrates Section:

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PROF.DR. AHMED SAAFAN





Tanta University  
Faculty of Science  
Department of Chemistry

Final Examination for Second and Third Level Students of Chemistry/ Geology,  
Zoology, Microbiology, Botany, Entomology. Biochemistry)

Chemical Kinetics Chemistry

Course code: CH 2240

June 13<sup>th</sup>, 2015 Term: Second Total Assessment Marks: 100 Time Allowed: 2h

**Answer all the following questions :** ( 20 marks for each)

- 1- a ) Discuss the factors affecting the reaction rate?
- b) An elementary reaction  $2A + C \rightarrow D$ , is second order in A and first order in C and the rate of this reaction is  $2.5 \times 10^{-1}$  M/S .when the concentration of A, C and D are all 1.0 M. What is the rate constant of this reaction?
- 2- a ) Define the rate equation of chemical reaction and discuss how can you determine it ?
- b) The following data were obtained in the decomposition of  $N_2O_5$  in  $CCl_4$  at 40 °C

t (sec)	600	1200	1800	2400	3000	$\omega$
O <sub>2</sub> (ml)	6.30	11.40	15.53	18.90	21.70	34.75

Find out the order of this reaction and its half life time?

- 3- a ) Enumerate the methods for determination the order of chemical reaction and discuss the differential method?
- b) The half-life for radioactive disintegration of radium is 1590 Yr . calculate the decay constant .In how many years will three-quarter of the radium have undergone decay? (The decay is first order)

( انظر خلفه )

- 4- a ) Deduce the integrated rate equation of the opposing first-order reaction



- b) The half-life of thermal denaturation of hemoglobin first order process has been to be 3460 Sec at 60 c° and at 65 c°. Calculate the activation energy ( $\Delta E$ ).

- 5- a ) Write short notes about characteristics and classifications of catalysts and discuss the mechanism of chemical catalysis according to Arrhenius concept ( Equilibrium treatment ).


- b) The reaction mechanism,  $A + B \xrightleftharpoons[k_{-1}]{k_1} C \xrightarrow{k_2} P$  if  $k_{-1} \gg k_2$ . Find out the rate law and the order of this reaction.

GOOD LUCK

Prof. Dr M. Y. EL SHEKH

Prof. Dr Hosny EL-Daly

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 <div>TANTA UNIVERSITY FACULTY OF SCIENCE DEPARTMENT OF PHYSICS</div>			
EXAMINATION FOR SOPHOMORES (2 <sup>ND</sup> LEVEL) STUDENTS OF CHRMISTRY/BIOCHEMISTRY & BIOCHEMISTRY			
COURSE TITLE:		BIOPHYSICS	COURSE CODE:PH2292
DATE:23	30 MAY 2015	TERM: SECOND	TOTAL ASSESSMENT MARKS: 50
		TIME ALLOWED: 2 HOURS	

ANSWER THE FOLLWING QUESTIONS:

1- Write on:

(12 mark)

- X-ray effects on living tissues,
- Hydrostatics,
- Sound transitions in biomaterials.

2- Explain:

(12 mark)

- Transitions of molecules in the nerve systems,
- Bioelectrical Potentials,
- The vision theory.

3- Discuss:

(12 mark)

- The electromagnetic forces,
- The effect of magnetic fields on human cells,
- The Hearing theory.

4- Explain the applications of x- ray in medicine.


(14 mark)

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EXAMINERS:	Prof.Dr. G. FARAG	&	Prof. Dr. M, El Khosht
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 TANTA UNIVERSITY FACULTY OF SCIENCE DEPARTMENT OF CHEMISTRY				
EXAMINATION FOR LEVEL TWO OF STUDENTS OF CHEMISTRY/BIOCHEMISTRY; BIOCHEMISTRY				
COURSE TITLE:	PRINCIPLE OF BIOCHEMISTRY II			COURSE CODE: BC2204
DATE: 3-6-2015	TERM: SECOND	TOTAL ASSESSMENT MARKS: 150		TIME ALLOWED: 2 HOUR

**Answer all the following questions**

**Section (A)**

- I- Illustrate diagram and/ or biochemical equation to be clarify each of the following: (20 marks)
- 1- The exchange of  $\text{CO}_2$  with  $\text{O}_2$  in tissue to red blood cells. (8 marks)
  - 2- Four principle reaction involved in renal regulation of acid base balance and the formation of ammonia in the kidney (12 marks)
- II- What happened from each of the following and explain your answer (20 marks)
- 1- Patient suffers from dehydration and drink pure water
  - 2- Albumin in plasma is lower than normal
  - 3- Person has got hot bath with lack of oxygen
  - 4- Patient suffer with diabetes mellitus with ketosis
- III- 1- Compare between interstitial and trans-cellular fluid; mention the 3 types of serous fluid. (5 marks)
- 2-What is the condition of substance injected into the body to be measure total and extracellular fluids? How can you measure the volume of intracellular fluid? (5 marks)
- IV- 1- Find the molarity and osmolarity of 0.9 g % of NaCl; if you know the atomic mass of Na= 23 and Cl=35.5 (7 marks)
- 2-Find the total volume of extracellular fluid and its percentage to body weight for person weight 70 Kg injected i.v. with 100 mg inulin that dissolved in 10 ml. After 5 hours, the 400 ml of urine was collected and urine inulin level in urine was 10 mg % and plasma inulin level was 0.375 mg % (8 marks)
- 3-The specific volume of ammonium sulfate is 0.565 ml/g. The solubility of ammonium sulfate at  $0^\circ\text{C}$  is 706 g/1000g water.(10 marks)
- a) Calculate the concentration (g%) and molarity of ammonium sulfate in saturated solution at  $0^\circ\text{C}$ .
  - b) The amount of solid ammonium sulfate that must be added to 100 ml of 40% saturated to bring 80% saturated.

See the next page

## Section (B)

I- 1- Describe by chemical equations all steps in the synthesis of: (20 marks)

a- Proline

b- Tryptophan (starting from Chorismate)

c- Arginine

d- Cysteine

2. Clarify by chemical equation Edman degradation reaction and it's used? (5 marks)

II- 1- An unknown tetrapeptide is found to contain one equivalent each of Arg, Cys, Gly, and Leu. Edman degradation releases Gly. Trypsin gives no apparent reaction. Partial hydrolysis in acid gives several dipeptides, including CysArg and LeuCys. Identify the structure of the tetrapeptide. (Use the standard abbreviations). (7 marks)

2- If you treat the following peptide with chymotrypsin, which peptide would you expect to generate?

Lys-Gly-Phe-Thr-Tyr-Pro-Asn-Trp-Ser-Tyr-Phe (6 marks)

3- You are given a mixture that contains glutamic acid ( $pI = 3.2$ ), arginine ( $pI = 10.8$ ), and valine ( $pI = 6.0$ ), and you subject the mixture to electrophoresis at pH 7.1. Arrange amino acids migrate to anode or cathode (6 marks)

4. Clarify the advantage of the two-dimensional electrophoresis? (6 marks)

III- 1- Mention and illustrate diagrammatically the secondary and tertiary structure of protein with examples (13 marks)

2- Mention the name and chemical structure of each of the following amino acids containing: (7 marks)

a- Guanido group

b- Imidazol ring

c- Indole group

d- reactive aliphatic hydroxyl

e- Aromatic ring

3- Write the structure of lysine and glutamate as it would be expected at its isoelectric point. (5 marks)

Best wishes

Prof. Ehab M. M. Ali

Dr. Thoria Abdel Aziz

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(CH2214)

June 2105.

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Total marks: 150

A vertical pencil and a handwritten number 2.

[18 Points]

- [12 Points]

- A) A Lewis acid is commonly used as a catalyst.  
B) The initial step is probably the formation of a carbanion.  
C) A Lewis base is employed to induce carbocation formation.  
D) The carbon chain is lengthened through the elimination of 1 mole of water.

[5 Points]

[12 Points]

- [5 points]

- $$2,4\text{-Dinitrochlorobenzene} + \text{NaOH} \rightarrow 2,4\text{-dinitrophenol}.$$

A)  $\text{Cl}^-$       B)  $\text{Br}^-$       C)  $\text{I}^-$       D)  $\text{F}^-$       [5 points]



9 - Which of the following statements correctly describe(s)  $S_N1$  reactions of alkyl halide (RX)? [5 points]

- I) Rate =  $k$  [base]                      II) Rate =  $k$  [base][RX]  
III) Rate =  $k$  [RX]                      IV) The reactions occur in two steps.  
V) The reactions occur in one step.  
VI) Rearrangements sometimes occur.  
A) II and VI                      B) I only                      C) I and III  
D) I and IV                      E) III, IV and VI.

10- The reaction of diethylmalonate with sodium ethoxide produces ethanol and a [4 points].  
i- free radical                      ii- carbocation                      iii- molecular species  
iv- carbanion                      v- carboxylate ion.

11 - Discuss  $S_N1$  mechanism (give example) . [5 points]

12 - Arrange the following compounds according to their reactivity towards nucleophilic addition reactions to carbonyl group: [5 points]  
Acetone, Formaldehyde, Acetaldehyde.

13 - Discuss the mechanism of nucleophilic addition reactions to carbonyl compounds. [5 points].

14- Arrange the following compounds in the order of reactivity towards  $S_N2$  reactions (explain your answer): [5 points]  
(A)  $\beta$ -Phenylisopropyl bromide                      (B) Benzyl bromide  
(C)  $\alpha$ -Phenylethyl bromide.

15- Which statement is correct for an  $S_N1$  reaction at a chiral carbon atom? [5 points]

- A) The product will be optically active, but have opposite configuration.  
B) The reaction will involve racemation.  
C) A carbanion is formed as intermediate.  
D) The rate of reaction is a function of the concentration of the nucleophile.  
E) The attacking group will be a strong electrophile.


16- The addition of  $Br_2$  to trans-2-butene giving meso-2,3-dibromobutane can be explained by a mechanism involving: [5 points]

- A) A free radical.                      B) A carbocation.  
C) A cyclic bromonium ion.                      D) A carbanion.  
E) Simultaneous attack by bromine atoms.

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- 17- Discuss the mechanism of Pinacol–Pinacolone rearrangement reaction. [5 points]
- 18- Which of the following statements correctly describe(s) E2 reactions of alkyl halide (RX)? [5 points ]
- I) Rate =  $k$  [base]                      II) Rate =  $k$  [base][RX]  
III) Rate =  $k$  [RX]                      IV) The reactions occur in two steps.  
V) The reactions occur in one step.
- A) I and V                      B) II and IV                      C) II and V
- 19- The addition reaction of HBr to 1-butene in presence of peroxide can be explained by a mechanism involving: [5 points ]
- A) a carbanion.                      B) a carbocation.  
C) a cyclic bromonium ion.                      D) free radicals.
- 20- Which two reaction types have the same initial step? [5 points]
- A)  $S_N1$  and E2 reactions                      B) E1 and  $S_N1$  reactions  
C)  $S_N2$  and E1 reactions                      D) none of the above.
- 21- Circle the more likely mechanism for the reaction: [5 points]  
Chlorobenzene +  $KNH_2 \rightarrow$  aniline.
- A) Aromatic electrophilic substitution.  
B) Aliphatic Nucleophilic substitution.  
C) Benzyne intermediate mechanism.  
D) Nucleophilic aromatic bimolecular displacement mechanism.
- 22- Inversion of configuration is associated with which of the following? [5 points]
- A) E1 reaction                      B) free-radical halogenation  
C)  $S_N1$  reaction                      D)  $S_N2$  reaction                      E) none of the above.
- 23- Reaction of 2-Methyl-1-chloropropane with alcoholic potassium hydroxide to 2-methylpropene occurs through what mechanism? [5 points].
- A)  $S_N1$                       B) E1                      C) E2                      D)  $S_N2$                       E) A and C.
- 24- Arrange the following compounds in the order of reactivity towards  $S_N1$  displacement. [5 points]  
 $CH_3CH_2CCl(CH_3)_2$  ,  $CH_3CH_2CH_2CH_2Cl$  ,  $CH_3CH_2CHClCH_3$   
(A)                      (B)                      (C)
- 25- Discuss the Free-energy profile for a reaction with an intermediate. [5 points].

فريق التدريس

	<p style="text-align: center;">TANTA UNIVERSITY FACULTY OF SCIENCE DEPARTMENT OF CHEMISTRY</p>			
	<p style="text-align: center;">EXAMINATION FOR JUNIOR (SECOND YEAR) STUDENTS OF PHYSICAL BIOCHEMISTRY</p>			
	<p>COURSE TITLE:</p>	<p>CHEMISTRY OF CARBOHYDRATES AND LIPIDS</p>	<p>COURSE CODE: BC2202</p>	
<p>DATE:</p>	<p>15-6- 2015</p>	<p>TERM: SECOND</p>	<p>TOTAL ASSESSMENT MARKS: 50</p>	<p>TIME ALLOWED: 1 HOUR</p>

1) Compare between each of the following (12 marks)

- A. Epimers and Enantiomers
- B. Glycolysis and gluconeogenesis
- C. Pyran and furan rings
- D. Amylose and Amylopectin

2) Give an account of the following (16 marks)

- A. The role of carnitine in the  $\beta$ - oxidation of fatty acid
- B. classification of Carbohydrates
- C. Phospholipid bilayer
- D. Transport of glucose into cells

3) Draw the structure of the following (15 marks)

- A. Acetone
- B. Sucrose
- C. Fatty acid contain (C18:1 <sup>$\Delta^9$</sup> )
- D. glucose
- E. Phosphatidyl serine

4) Put (✓) or (X) & correct the false ones: (7 marks)

- A. 3 carbons are removed from fatty acyl coA in one turn of  $\beta$ -oxidation.
- B. In maltose, the glucose molecules are connected by an alpha 1, 6 glycosidic bonds.
- C. A fatty acid with 14 carbon atoms will undergo 6 cycles of beta oxidation
- D. The sugar is called alpha if the OH group of anomeric carbon is to the left (upward in the ring structure).

With my best wishes  
Dr. Mai El-Keiy

EXAMINERS	PROF.DR. AHMED SAFAAN
	DR. YEHIA HAFEZ
	DR. MAI ELKEIY





TANTA UNIVERSITY  
FACULTY OF SCIENCE  
DEPARTMENT OF CHEMISTRY

EXAMINATION FOR JUNIOR (SECOND YEAR) STUDENTS OF PHYSICAL BIOCHEMISTRY

COURSE TITLE:	CHEMISTRY OF CARBOHYDRATES AND LIPIDS	COURSE CODE: BC2202
DATE:	15-6-2015	TERM: SECOND
	TOTAL ASSESSMENT MARKS: 50	TIME ALLOWED: 1 HOUR

**Sec. (I) Proteins and nucleotides and vitamins**

**50 marks**


**Answer the following Questions:-**

- 1) - Explain Gabriel method for the synthesis of Phenyl alanine.
- 2) - Write the types of interactions that stabilize the 3<sup>o</sup> structure of proteins.  
Give examples of fibrous and globular proteins.
- 3) - Explain how the ammonia excretion takes place.
- 4) - Give examples on the following enzymes:  
a- Transaminase.                      b- Carboxylase.                      c- Mutase.
- 5) - Write the DNA and RNA nucleotides, show how are jointed together.
- 6) - Give examples of three water soluble vitamins detecting the corresponding coenzymes and enzymes.

**Good Luck**  
**Dr.yehia Hafez**

EXAMINERS	PROF.DR. AHMED SAFAAN
	DR. YEHIA HAFEZ
	DR. MAI ELKEIY

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	TANTA UNIVERSITY FACULTY OF SCIENCE DEPARTMENT OF CHEMISTRY			
	FINAL EXAM FOR LEVEL2 STUDENTS (DOUBLE MAJOR)			
	COURSE TITLE:	KINETIC THEORY OF GASES		COURSE CODE: CH2242
DATE	JUNE10, 2015	TERM: SECOND	TOTAL ASSESSMENT MARKS: 50	TIME ALLOWED: 2H

**Answer All Questions (50 marks)**

**1- Put true or false sign and correct the false answer? (10 marks)**

1. Heavier gas molecules move faster than lighter molecules.
2. The gas viscosity increases as the pressure increases.
3. Collision cross section is the average distance a molecule travels between collisions.
4. A diatomic molecule has 5 degrees of freedom.
5. The mean free path decreases as the gas density increases.

**2- Complete the following sentence: (20 marks)**

1. Effusion of gases is defined as .....
2. All gases at a given temperature have the same .....
3. According to the equipartition of energy principle the average energy for each vibrational degree of freedom is.....
4. Increasing the number of gas molecules will ..... the mean free path.
5. For triatomic molecule the average total energy per mole is.....
6. .... is the number of variables required to describe the motion of a particle completely.
7. When the two gas molecules are headed in the same direction the consequent collision is called.....

**Turn over the paper**

8. The viscosity of gases increases as temperature increases. This is because .....
9. The r.m.s. velocity for hydrogen at 25°C will be ..... m/s.
10. The molecular collisions are assumed to be elastic this means.....

**(4)- Write the mathematical equations (define its parameters) describes the following: (14 marks)**

1. Mean free path
2. The collision frequency if each sphere is collides with the other.
3. Heat capacity at constant pressure for a gas.
4. Poiseuille's equation
5. The dependency of the barometric pressure on the altitude.
6. The volume excluded per mole of gas.
7. The relation between the thermal conductivity coefficient of a gas and the viscosity of a gas.

**(5)- Answer the following? (6 marks)**


1. If equal amounts of helium and hydrogen are placed in a porous container and allowed to escape, which gas will escape faster and how much faster?
2. Use the van der Waals equation to calculate the pressure of a sample of 5 moles of oxygen gas in a 10 L vessel at 10°C where  $a(\text{O}_2) = 1.36 \text{ L}^2 \text{ atm/mol}^2$  and  $b(\text{O}_2) = 0.032 \text{ L/mol}$ .

**Best Wishes ...**

**Dr. Eman Fahmy Aboelfetoh**



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	<p style="text-align: center;">TANTA UNIVERSITY FACULTY OF SCIENCE DEPARTMENT OF CHEMISTRY</p>			
	<p style="text-align: center;">EXAMINATION FOR SOPHOMORES (SECOND YEAR) STUDENTS OF BIOLOGY (SPECIAL BIOCHEM., CHEM./BIOCHEMISTRY, CHEM./ZOOLOGY AND CHEM./ENTOMOLOGY)</p>			
1969	COURSE TITLE:	INSTRUMENTAL ANALYSIS (1)		COURSE CODE: CH2244
DATE:	MAY 30, 2015	TERM: SECOND	TOTAL ASSESSMENT MARKS: 100	TIME ALLOWED: 2 HOURS

**Question (I):**

(25 mark)

**A. Answer the following:**

- 1- What is a photomultiplier tube? Describe what it does and how it works.
- 2- Most of phosphorescence cannot be recorded in solution at room temperature, why?

**B. Choose the correct answer for the following:**

- 1) Which of the following is not active in IR absorption spectroscopy?
  - a)  $\text{Cl}_2$
  - b)  $\text{CHCl}_3$
  - c)  $\text{CH}_4$
  - d)  $\text{C}_6\text{H}_6$
- 2) Which is the preferred continuum source in visible region?
  - a) Tungsten filament lamp
  - b) Hollow cathode lamp
  - c) deuterium lamp
  - d) none of above
- 3) A photon whose wavelength is 200 nm is:
  - a) a visible photon
  - b) an ultraviolet photon
  - c) an infrared photon
  - d) a microwave photon
- 4) The excellent exciting light source used in the atomic absorption spectroscopy is:
  - a) low pressure lamp
  - b) hollow cathode lamp
  - c) Xenon lamp
  - d) tungsten-halogen lamp
- 5) Fluorescence occurs within:
  - a) 10 s
  - b) 10 ms
  - c) 10  $\mu\text{s}$
  - d) 10 ns

**Question (II):**

(25 mark)

**Answer the following:**

- 1- List the following in order of increasing energy and wavelength: x-rays, infrared light, visible light, radio waves, and ultraviolet light.
- 2- What are an absorption filter and a monochromator?
- 3- Explain the energy transitions caused by UV-VIS light absorption.
- 4- Describe two light sources used for UV-VIS spectrophotometry.

**Question (III):**

**(25 marks)**

**A. Discuss briefly on each of the following:**

- 1- Hock's law and draw three examples of IR absorption modes.
- 2- Two applications of UV-VIS spectrophotometry?
- 3- Steps of atomization in the flame of atomic absorption spectroscopy.
- 4- Variation of fluorescence intensity with concentration.

**Question (IV):**

**(25 marks)**

**Draw the following:**

- b) Block diagram showing all the components of a basic spectrophotometer.
- c) Energy transitions involved in fluorescence and phosphorescence.

**B. Answer the following problem:**

What is the absorbance given that the molar absorptivity is  $2.30 \times 10^4 \text{ L.mol}^{-1}.\text{cm}^{-1}$ , the pathlength is 0.05 cm, and the concentration is 0.0000453 M?

*Good Luck*

Examiners	Prof. Dr. Mohamad Mohamad Ayad Dr. Nagy Labieb Kamal
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