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THE OPEN UNIVERSITY OF SRI LANKA
B.Sc DEGREE PROGRAMME/STAND ALONE COURSES 2006/2007
LEVEL 5 – FINAL EXAMINATION

CHU 3139 – BIOCHEMISTRY 1

Date : 02.06.2007

Time: 10.00 am- 12.30 pm

Instructions to candidates.

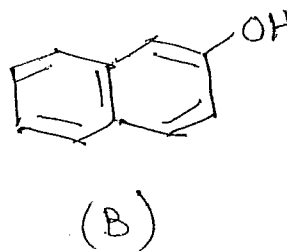
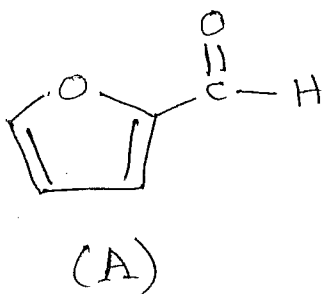
This question paper has three pages and six questions.

Answer the first question and any three of the other questions. A total of four questions must be answered.

If more than four questions answered, only the first question and the first three of the other questions will be marked.

1. (a) i. Write down the chemical equation for the formation of a triglyceride starting with glycerol and **three different** fatty acids. (10 marks)

ii. In Molisch test, when concentrated H_2SO_4 is added to a pentose, a cyclic compound, (A) is formed. A reacts with β -naphthol (B), to form a coloured compound. Write down the mechanism for the formation of the coloured compound.



(30 marks)

(b) Answer the following questions with respect to amino acid analyzer.

- What is the resin available in amino acid analyzer?
- How are amino acids eluted from the column?
- Which amino acids elute last?
- What is the method of detection of amino acids?
- How are the eluting amino acids identified?
- How is the quantity of a particular amino acid determined?

(60 marks)

2. (a) i. What is meant by primary, secondary, tertiary and quaternary structure of a protein.

(20 marks)

ii. What are the forces/bonds that maintain each of the structures in (i). Give a detailed explanation?

(45 marks)

iii. What do you mean by denaturation of proteins?

(10 marks)

iv. What alterations may occur when a protein is denatured?

(10 marks)

v. What substances/conditions could denature a protein?

(15 marks)

3. (a) Write down five properties of a biological membrane.

(25 marks)

(b) i. Write down main features of the DNA double helix. List five of them.

(25 marks)

ii. Write down functions of m-RNA and t-RNA.

(30 marks)

(c) Draw structures of a saturated fatty acid and an unsaturated fatty acid. Explain why do saturated fatty acids remain as liquids, but saturated fatty acids solidify at low temperature.

(20 marks)

4.(a) i. List all water soluble vitamins.

(10 marks)

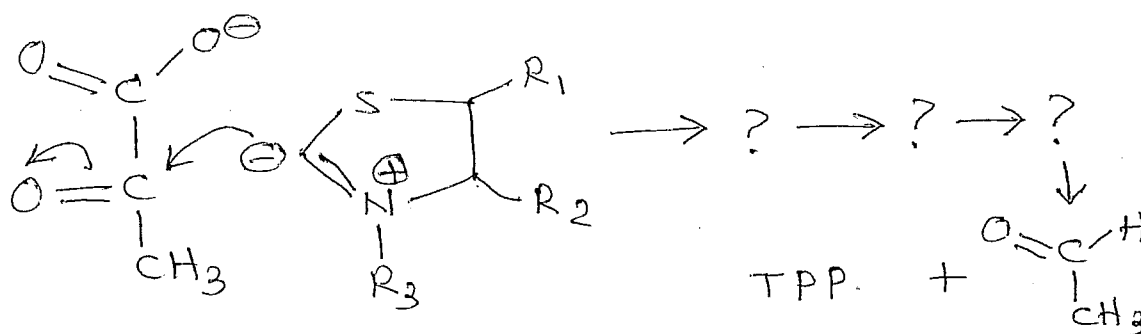
ii. Describe tests for vitamin E & K.

(20 marks)

iii. Explain the role of biotin as a carboxyl carrier using a detailed diagram.(30 marks)

(b) i. Explain what is meant by a cofactor? (15 marks)

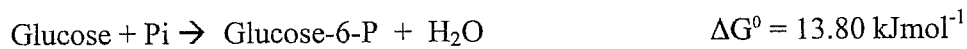
ii. Decarboxylation of pyruvate by thiamine pyrophosphate is as follows.



Complete above mechanism. Draw all structures in your answer script and draw arrows clearly to show the electron transfer.

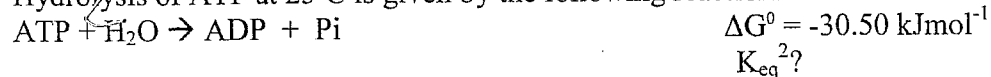
(25 marks)

5.(a) The phosphorylation of glucose is give by the following reaction.



$$K_{\text{eq}}^1 \text{ at } 25^{\circ}\text{C is } 3.9 \times 10^{-3} \text{ M}^{-1}$$

Hydrolysis of ATP at 25°C is given by the following reaction.



$$K_{\text{eq}}^2?$$

- i. Calculate the equilibrium constant for the phosphorylation of glucose coupled with ATP hydrolysis? $R = 8.31 \text{ JK}^{-1}\text{mol}^{-1}$ (40 marks)
 - ii. Calculate the equilibrium constant (K_{eq}^2) for the hydrolysis of ATP at 25°C? (20 marks)
- (b) i. What is meant by substrate level phosphorylation? (15 marks)
- ii. How does photophosphorylation differ from oxidative phosphorylation? (25 marks)
6. (a) i. What is the function of citric acid cycle? (10 marks)
- ii. What are the important steps involved in citric acid cycle. (30 marks)
- (b) i. What do you understand by the term transamination? (10 marks)
- ii. What are the three forms of nitrogen removal? Explain. (20 marks)
- (c) i. What are the coenzymes involved in the conversion of pyruvate to ethyl alcohol? (10 marks)
- ii. Write down relevant equations for the above conversion. (20 marks)