



THE OPEN UNIVERSITY OF SRI LANKA
B.Sc DEGREE PROGRAMME/STAND ALONE COURSES 20011/2012
LEVEL 5-FINAL EXAMINATION

CHU 3139-BIOCHEMISTRY

Date: 14.01.2012

Time: 1.30-3.30pm

Instructions to candidates

This paper has three pages and six questions.

Answer the first question and 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) Isolated plant fraction was divided into four parts, A, B, C and D.
- A purple ring was formed when in A when Molisch test was performed.
 - A faint silver mirror was observed in B when Tollen's reagent was added.
 - C was hydrolyzed with dilute H_2SO_4 .
 - The acid hydrolyzate (iii) and D was subjected to paper chromatography. R_{glc} values for (iii) and D were 1.0 and 0.5, respectively.

What conclusions can you draw about the compounds present in the plant fraction?

What further tests would you carry out to confirm your proposed compounds? Explain in detail.

(50 marks)

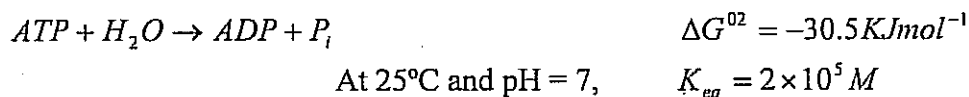
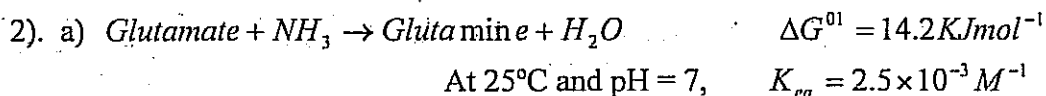
- b) i. How is the genetic information in DNA convert into functional proteins?

Explain.

ii. "Isolation of RNA is very similar to DNA isolation but have small differences". Justify this statement.

iii. Why is agarose gel used to separate DNA, not polyacrylamide gel?

(50 marks)



- i. Comment on the equilibrium constant for the conversion of glutamate to glutamine when coupling with ATP hydrolysis. Show your calculations clearly.
- ii. Show whether above conversion is energetically feasible or not.

(50 marks)

- b) i. What do you mean by substrate level phosphorylation? Explain using examples found in the citric acid cycle.
- ii. Explain how oxidative phosphorylation is similar to photophosphorylation?
- iii. "Oxidation of NADH produces 3 ATP molecules in the respiratory chain while FADH_2 produces only 2". Why this is so?

(50 marks)

- 3). a) i. What are the properties of the biological membrane?
- ii. "The type of protein present in the membrane depends on the function it performs".
- iii. Cell membranes act as barriers to many molecules. How do substances move across the membrane? Explain.

(50 marks)

- b) Explain the dynamic functions of proteins?

(20 marks)

- c) Discuss the principles and compare the techniques of gel filtration and affinity chromatography.

(30 marks)

- 4) a) i. What are the major roles of lipids in human biochemistry? Explain.
- ii. What is the common isolation method for lipids?
- iii. What are the reasons for selecting above method?
- iv. There are some factors that can complicate above isolation method. What are they? Explain.

(50 marks)

- b) i. What are lipoproteins?
- ii. What is the function of lipoproteins?
- iii. How many types of lipoproteins found in the blood? What are they?
- iv. Which one of these can be found in high concentrations in a patient having high blood cholesterol?

(30 marks)

- c) c) i. What vitamins have the ability to function as antioxidants?
- ii. What is the difference between coenzyme and a cofactor?
- iii. What are the functions of coenzymes?

(20 marks)

- 5) a) i. What is glycolysis?
ii. What is the net energy production of glycolysis?
iii. Glycolysis can be controlled by regulating certain enzymes. What are they?
iv. What is the fate of glycolysis when the concentration of ATP is high in the body?
Explain

(30 marks)

- b) i. What do you mean by pentose phosphate pathway?
ii. In what tissues this pentose phosphate pathway of glucose metabolism is predominant?
iii. Why is this pathway preferred to glycolysis?

(30 marks)

- c) Explain how pyruvate is metabolized under aerobic and anaerobic conditions. Write down all necessary enzymes and coenzymes.

(40 marks)

- 6) a) i. What is the function of citric acid cycle?
ii. Acetyl CoA comes from different pathways to oxidize in the citric acid cycle. What are they?
iii. Describe the fate of acetyl CoA when the citric acid cycle cannot oxidize it.
iv. What are the intermediates of citric acid cycle and what are they need for?

(40 marks)

- b) Triglycerides are esters of glycerol and fatty acids.
i. What is the fate of fatty acids in the body?
ii. How does glycerol provide energy? Explain in detail.

(30 marks)

- c) How does fructose produce energy? Explain different pathways using necessary enzymes.

(30 marks)