



**UNIVERSITY OF RUHUNA – FACULTY OF ALLIED HEALTH SCIENCES**

**DEPARTMENT OF PHARMACY**

**FIRST BPHARM PART I EXAMINATION – FEBRUARY 2022**

**PH 1123 BIOCHEMISTRY I – SEQ PAPER**

**TIME: TWO HOURS**

**INSTRUCTIONS**

- There are **four** questions in part **A**, **B** and **C** in this SEQ paper.
- Answer all questions.
- No paper should be removed from the examination hall.
- Do not use any correction fluid.
- Use illustrations where necessary.

**PART A**

1.

1.1

1.1.1 Identify the following reactions as being endergonic or exergonic.

**(10 marks)**



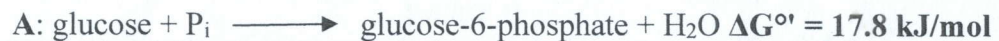
1.1.2 Show that coupling of these two reactions together permits the thermodynamically favorable conversion of **A** to **E**.

**(10 marks)**

1.2

1.2.1 Which of the following reaction is(are) spontaneous?

**(15 marks)**



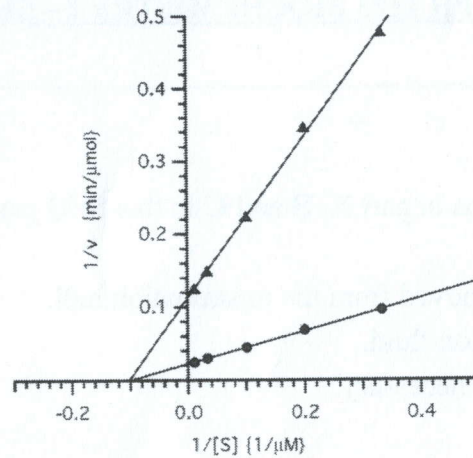
$\Delta G^{0'} = 20.3 \text{ kJ/mol}$



1.2.2 Which of these reactions can be coupled so that the overall reaction is favorable? What is the net change in free energy in such coupled reactions?

**(25 marks)**

1.3 Given below is the Lineweaver-Burk plot for an enzyme catalyzed reaction that was conducted with 800 pmol of enzyme in the presence ( $\blacktriangle$ ) and absence ( $\bullet$ ) of a 100  $\mu\text{M}$  concentration of an inhibitor.



- 1.3.1 Calculate  $V_{\text{max}}$  and  $K_{\text{M}}$  values for the inhibited and uninhibited reactions. (Show your calculations including units.) **(20 marks)**
- 1.3.2 What type of inhibition is displayed by this inhibitor? Give reasons for your answer. **(05 marks)**
- 1.3.3 What is the turnover number of the enzyme in the absence of the inhibitor? **(10 marks)**
- 1.3.4 Where does this inhibitor most likely bind on the enzyme? Explain. **(05 marks)**

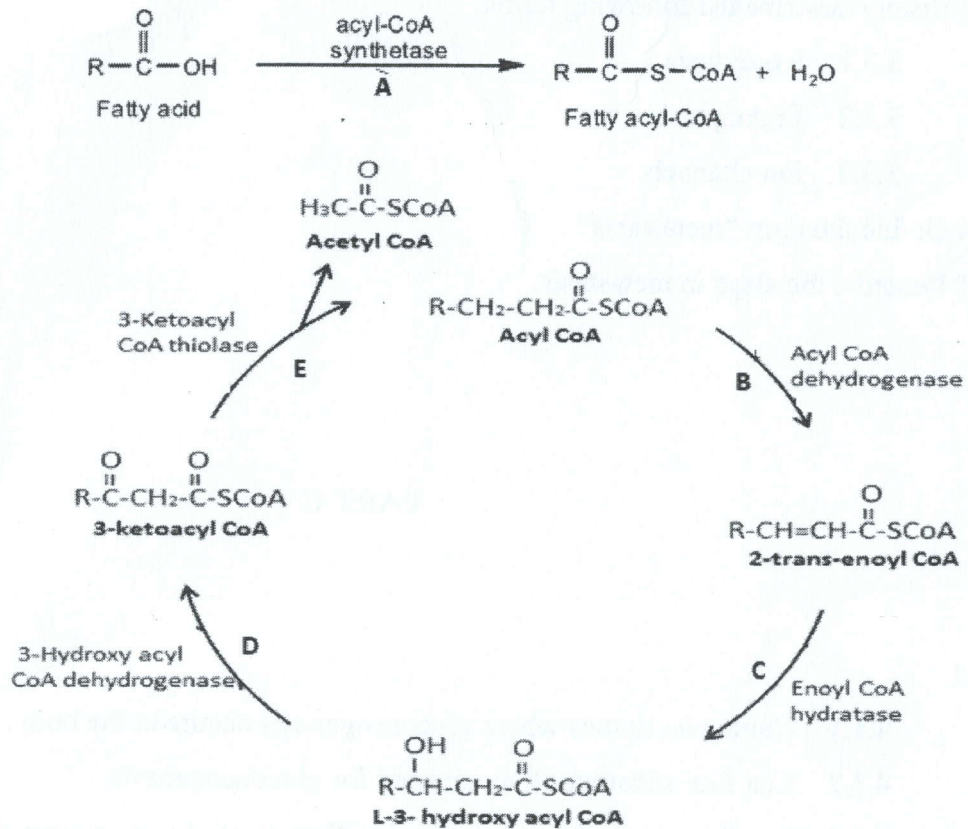
2.

2.1

- 2.1.1 What are the products of fatty acid (even chain/odd chain) oxidation in our body? **(10 marks)**
- 2.1.2 The more seafood you eat, the more C17 carbon fatty acids you are likely to have in your diet, as much as 5%. Therefore, seafood eaters can get a little bit of extra glucose from the fatty acids in the fish they eat. Explain this. **(10 marks)**



2.2 Identify the cofactors and/or coenzymes (A-E) required for the enzymatic reactions given below. (15 marks)



2.3 Predict which would provide a greater amount of energy (ATP); a saturated fatty acid with 18 carbons (stearic acid) or an 18 carbon monounsaturated fatty acid (oleic acid). Give reasons for your answer. (15 marks)

### PART B

2.4 "Vitamin D is a fat-soluble vitamin which is rich in fish liver oil".

2.4.1 Name two provitamins of this vitamin with their active form. (10 marks)

2.4.2 State three conditions that could occur due to the deficiency of this vitamin. (10 marks)

2.5 What are the main five digestive juices that help to break down food into smaller pieces? (10 marks)

2.6 Describe the digestion process that occurs in mouth, stomach and small intestine. (20 marks)

3.

- 3.1 What is facilitated diffusion? (10 marks)
- 3.2 List four factors affecting the net diffusion. (10 marks)
- 3.3 Briefly describe the following terms. (45 marks)
- 3.3.1 Exocytosis
  - 3.3.2 Endocytosis
  - 3.3.3 Ion channels
- 3.4 Define the term "metastasis". (10 marks)
- 3.5 Describe the steps in metastasis. (25 marks)

### PART C

4.

4.1

- 4.1.1 Name two tissues where gluconeogenesis occurs in the body. (10 marks)
- 4.1.2 List four substrates that are used for gluconeogenesis. (20 marks)
- 4.1.3 Briefly explain the metabolic significance of gluconeogenesis. (20 marks)

4.2 Explain the biochemical basis for the following.

- 4.2.1 Pyruvate kinase deficiency results in hemolytic anemia. (25 marks)
- 4.2.2 Pentose phosphate pathway is important for the protection of cells. (25 marks)

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