RAJARATA UNIVERSITY OF SRI LANKA
FACULTY OF APPLIED SCIENCES

B.Sc. (Special) Degree in Chemistry
Third Year - Semester II Examination – October / November 2017

CHE 3202-II – ADVANCED BIOCHEMISTRY

Answer any FOUR questions **Time: TWO hours**

1. The enzymatic reaction converting succinate to fumarate is inhibited by malonate.

   a) What type of inhibition is this? **(10 marks)**

   b) Draw a relevant, properly labeled, Lineweaver- Burk plot for above inhibition. **(20 marks)**

   c) Explain the following terms. **(7.5 marks x 4)**

      i) Cofactors
      ii) Holoenzyme
      iii) Apoenzyme
      iv) Prosthetic group

   d) Explain what is meant by uncompetitive inhibition. Use relevant equations and properly labeled graphs to support your answer. **(40 marks)**

2.

a) Explain why lactate is formed during vigorous exercise. **(20 marks)**

b) Write down the reaction for the formation of lactate from pyruvate. **(20 marks)**

c) What are the alternative fates of pyruvate? **(30 marks)**

d) What is the overall result of the TCA cycle in terms of ATP and CO_2 production per glucose molecule and indicate the products in the relevant steps in the TCA cycle. **(30 marks)**

3.

a) Write down the sequence of the β oxidation pathway giving names of enzymes and co-enzymes. **(40 marks)**

b) Calculate energy yield when palmitic acid ($C_{18:0}$) is completely oxidized. **(20 marks)**

c) Write down three metabolic circumstances that amino acids can undergo oxidative degradation in animals. **(10 marks)**

d) Outline the amino group catabolism in the vertebrate liver. **(30 marks)**

4.

a) Define gluconeogenesis. **(10 marks)**

b) What are the precursors of gluconeogenesis in animals? **(10 marks)**

c) When is gluconeogenesis active? **(20 marks)**

d) Explain why the gluconeogenesis is not simply the reverse of the glycolysis. **(30 marks)**

e) Name two secondary pathways of glucose oxidation. **(10 marks)**

f) State 3 features associated with the products of pentose phosphate pathway. **(20 marks)**

5.

a) Explain the basis of <u>any two</u> of the following protein purification techniques. **(15 marks x 2)**

i) Gel filtration Chromatography
ii) Affinity Chromatography
iii) Ion exchange Chromatography
iv) Electrophoresis
v) Solvent and salt precipitation
vi) Thin layer Chromatography
vii) Column Chromatography
viii) Size exclusion Chromatography

b) Define the following transport systems across the cell membrane using a diagram. **(30 marks)**

i) Uniport
ii) Symport
iii) Antiport

c) Discuss the active cotransport of Na^+ and K^+ in animal cell. **(40 marks)**