

**RAJARATA UNIVERSITY OF SRI LANKA  
FACULTY OF APPLIED SCIENCES**

**B.Sc. Honours in Chemistry  
Third Year – Semester II Examination – July 2020**

**CHE 3202 – ADVANCED BIOCHEMISTRY**

Time: Two (02) hours

---

Answer all questions.

---

1.

- a) Explain how would you experimentally determine Michaelis constant,  $K_m$  for enzymes using Michaelis-Menton kinetics.  
Note: Derivation of Michaelis-Menton equation from first principles is expected. (35 marks)
- b) State the characteristics of  $K_m$  mentioned in a). (30 marks)
- c) Describe the effect on maximum velocity,  $V_{max}$ , and  $K_m$  on the Lineweaver-Burk plot for competitive, uncompetitive and noncompetitive inhibitors with the aid of a graph. (35 marks)

2.

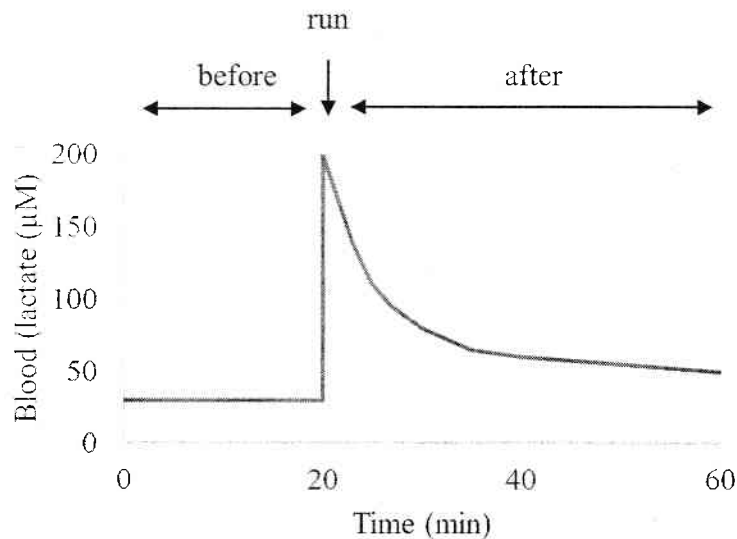
- a) Three irreversible steps in glycolysis are bypassed by reactions catalyzed by gluconeogenic enzymes. State three reactions involve in both glycolysis and gluconeogenesis using a same diagram. Indicate relevant enzymes. (30 marks)
- b) Fatty acids undergo oxidative removal of successive 2 carbon units in the form of acetyl-CoA starting from the carboxyl end of the fatty acid chain in  $\beta$ -oxidation pathway.
  - i. Elaborate above statement using 18- carbon Stearic acid giving appropriate reactions and relevant enzymes. (40 marks)
  - ii. Calculate energy yield when Stearic acid is completely oxidized. (30 marks)

3.

- a) Glucose 6-phosphate deficient people can develop some serious health problems after eating fava beans. Illustrate your answer with your knowledge of pentose phosphate pathway. Mechanisms and structures are expected. (50 marks)
- b) Define the following transport systems across the cell membrane using a diagram.
- Uniport
  - Symport
  - Antiport
- (15 marks)
- c) Postulate a mechanism for  $\text{Na}^+$  and  $\text{K}^+$  cotransport in animal cells against their electrochemical gradient. Clearly indicate the two conformations involve in your diagram. (35 marks)

4.

- a) Briefly discuss three alternate fates of pyruvate. (45 marks)
- b) The concentration of lactate in blood plasma before, during, and after a 400 m sprint are shown in the graph.



- What causes the rapid rise in lactate concentration? Explain using suitable chemical reactions. (35 marks)
- What causes the decline in lactate concentration after completion of the sprint. (20 marks)

- END -