

**UNIVERSITY OF FORT HARE**

**BCH313**

**SPECIAL EXAMINATIONS**

**NOVEMBER 2018**

---

**Time: 3 HOURS**

**Subject: Advanced Metabolism**

**Marks: 100**

**This paper consists of 3 pages including cover page**

**Internal Examiner**

**Mr NT Mazomba**

**Professor G Bradley**

**External Examiner**

**Dr B Wilhelmi**

**Instructions**

**Answer all the questions**

**Question 1 (20 Marks)**

- With the knowledge that you have about glycogen synthesis, draw a detailed representation showing the synthesis of amylopectin. (6)
- Explain how gluconeogenesis is regulated by fructose-2,6-bisphosphate in the absence of glucose in the blood. Include a diagram in your answer. (7)
- An experiment was carried out to track carbons that are incorporated in glucose in the process of gluconeogenesis.  $^{14}\text{C}$  labelled lactate and  $\text{HCO}_3^-$  were used as the precursors of glucose. Explain in full the fate of these labelled carbons from each of these precursors in the process of gluconeogenesis. Include a diagram(s) in your answer. (7)

**Question 2 (20 Marks)**

- What is the source of glycerol and fatty acids in the synthesis of 'new' triacylglycerol in adipocytes? Describe in detail the synthesis of triacylglycerol in these cells. Add a diagram outlining the process. (7)
- A cholesterol sample is prepared using acetyl-CoA labeled with  $^{14}\text{C}$  at the carboxyl group carbon, as precursor. Approximately what percentage of the carbon atoms of cholesterol are labeled. Show on the outline of the cholesterol synthesis pathway how you arrived at your estimation. (7)
- Explain in full the involvement of citrate in the synthesis of fatty acids. (6)

**Question 3 (20 Marks)**

- Using two examples from different classes of amino acids, explain why other amino acids do not follow rules that are used in the classification of amino acids. (6)
- Describe in detail the overall effect high levels of glutamine have on the activity of glutamine synthetase. Include a diagram in your answer. (7)
- Describe in full the unusual phenomenon exhibited by the enzyme that catalyzes the last step in the synthesis of tryptophan. Include diagrams in your answer. (7)

**Question 4 (20 Marks)**

- Fully describe what is meant by cross regulation as applied to purine nucleotides synthesis. Add a diagram in your answer. (7)
- Describe in detail how dTMP is produced? (5)
- The first step in the synthesis of purine is the formation of amine, which is a **committed step**, and the enzyme is under **feedback inhibition** by AMP and GMP. Describe in detail which reaction is referred to here, and what is meant by this statement. (8)

**Question 5 (20 Marks)**

Explain what the phrase 'integration of metabolism' means under the following topics; Central themes of metabolism, Major metabolic pathways, Junction points, Organ specialization (Heart muscle) and Hormonal regulation of fuel metabolism.

---

[Total Marks = 100]

END OF EXAMINATIONS