

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF DEGREE
OF BACHELOR OF BIOCHEMISTRY

BIOC 404: METABOLIC REGULATION AND INTERGRATION

STREAMS: BIOC

TIME: 2 HOURS

DAY/DATE: MONDAY 08/4/2019

2.30 P.M. – 4.30 P.M.

INSTRUCTIONS

- (i) Answer Question ONE and any TWO questions
- (ii) Do not write on the question paper

QUESTION ONE (30 MARKS)

- (a) Describe the role of the following enzymes in metabolic regulation and integration.
 - (i) Carbomyl phosphate synthetase I (1 Mark)
 - (ii) Hexokinase iv (1 Mark)
 - (iii) Fatty acid synthase complex (1 Mark)
- (b) Describe regulation of de novo pyrimidine nucleotide biosynthesis in the liver. (6 Marks)
- (c) Describe metabolic changes that occur during starvation highlighting possible dangers. (9 marks)
- (d) Fructose-2, 6-biphosphate is not an intermediate of either glycolysis or gluconeogenesis yet it is most important regulator of the two. Explain. (7 marks)
- (e) Explain how gene transcription is regulated in eukaryotes. (5 marks)

QUESTION TWO (20 MARKS)

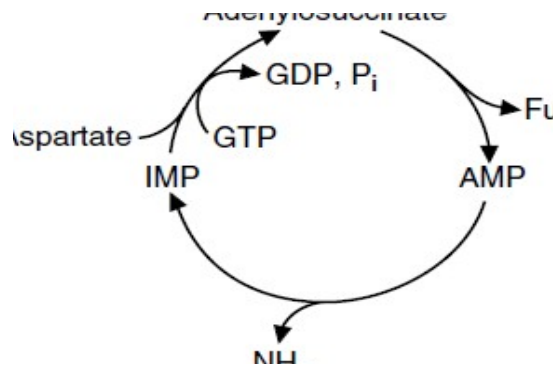
- (a) Using structural and chemical formulae discuss the urea cycle, highlighting its role in amino acid metabolism. (10 marks)
- (b) Using clear illustrations, describe the composition and regulation of individual components of Pyruvate dehydrogenase complex. (10 marks)

QUESTION THREE (20 MARKS)

- (a) The body maintains a relatively large free amino acid pool in the blood, even during fasting.
- (i) Give reasons for this observation. (3 marks)
 - (ii) Describe the mechanisms which maintains free amino acid pool in the blood. (7 marks)
- (b) Discuss the JAK-STAT mechanism of **leptin** signal transduction, highlighting how leptin resistance can be reversed. (10 marks)

QUESTION FOUR (20 MARKS)

- (a) Why are metabolic processes regulated? (3 marks)
- (b) Use the illustrative pathway below to answer questions i to iii.



- (i) Give the name of the pathway? (2 marks)
 - (ii) What is the physiological significance of this pathway? (5 marks)
 - (iii) IMP is one of the intermediates in above pathway, explain biosynthetic regulation of IMP and its implication in highly proliferative cells. (10 marks)
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