CHUKA  **UNIVERSITY**

UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE IN BIOCHEMISTRY

BIOC 415: PLANT BIOCHEMISTRY

STREAMS: BSC (BIOC) **TIME: 2 HOURS**

DAY/DATE: MONDAY 03/12/2018 **8.30 AM – 10.30 AM**

INSTRUCTIONS:

- **Answer Question One and any Two Questions**
- **Do not write on the question paper**

QUESTION ONE (30 MARKS)

(a) Lipoxygenase are involved in the synthesis of oxylipins, which are defense and signal compounds. Explain this statement giving specific examples. [8 marks]

(b) Give three organelles where de novo synthesis of fatty acids takes place in plants. [3 marks]

(c) Describe the activity and regulation of ribulose bisphosphate carboxylase/oxygenase (RubisCO). [8 marks]

(d) Using schematic diagram, discuss C4 metabolism of the PEP carboxykinase. [7 marks]

(e) Explain the biological role of plant secondary metabolites. [4 marks]

QUESTION TWO (20 MARKS)

Nitrate and sulfate assimilation is essential for the synthesis of nitrogenous biomolecules in plants.

(a) Explain how leguminous plants balance the nitrate assimilation and nitrogen fixation according to the cellar demands and environmental conditions. [4 marks]

(b) Describe microbial nitrogen fixation. [4 marks]

(c) Explain biological role of cysteine in plant growth. [4 marks]

(d) Discuss biosynthesis of methionine from cysteine by plant cells. [8 marks]

QUESTION THREE (20 MARKS)

(a) Using an illustrated diagram, describe structure of the chloroplast. [6 marks]

(b) Describe the structure and metabolic functions of plant mitochondria. [6 marks]

(c) Discuss in details non-cyclic photophosphorylation showing the water splitting activity as described by KoK, 1970. [8 marks]

QUESTION FOUR (20 MARKS)

(a) Light controls plant development from germination to the formation of flowers in many different ways. Describe roles of the following photoreceptors in plant physiology.

(i) Phytochromes
(ii) Phytotropins
(iii) Cryptochromes. [9 marks]

(b) Explain why the salvage of phosphoglycolate is costly in barley crops but insignificant among sorghum growing under the same environmental conditions. [11 marks]
