

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF DEGREE OF MASTERS OF SCIENCE IN AGRONOMY AND MASTERS OF SCIENCE IN HORTICULTURE

BIOC 850: ADVANCES IN PLANT BIOCHEMISTRY

STREAMS: MSC (AGRO), MSC (HORT)

TIME: 3 HOURS

DAY/DATE: MONDAY 03/12/2018

2.30 PM – 5.30 PM

INSTRUCTIONS:

- Answer any five Questions
- Do not write on the question paper

QUESTION ONE (20 MARKS)

- (a) Auxins (indole-acetic acid) are phytohormones that positively influence cell enlargement, bud formation, apical dominance, root initiation, formation and ripening of fruits.
- (i) Using structural formulae, discuss biosynthesis of auxin in plants. [8 marks]
- (ii) Explain the rationale for using synthetic 2,4-dichlorophenoxyacetic acid as a herbicide. [4 marks]
- (b) Describe the role of the following photoreceptors in plant physiology.
- (i) Phytochromes [4 marks]
- (ii) Phytotropins [4 marks]

QUESTION TWO (20 MARKS)

Recent years have witnessed spectacular developments in plant biotechnology, involving transfer of foreign genes with desired traits to boost food security globally. Explain the application of the following in improving agriculture production and food nutrition.

- (a) Plant engineering for improving postharvest traits. [4 marks]

- (b) Plant engineering for disease resistance [8 marks]
- (c) Plant engineering for herbicide resistance [8 marks]

QUESTION THREE (20 MARKS)

- (a) Describe the regulation of ribulose biphosphate carboxylase/oxygenase (RubisCO). [9 marks]
- (b) Explain why the salvage of phosphoglycolate is costly in barley crops but insignificant among millet growing under the same environmental conditions. [11 marks]

QUESTION FOUR (20 MARKS)

- (a) Describe microbial nitrogen fixation. [5 marks]
- (b) Using schematic diagram describe sulfate metabolism in leaves. [5 marks]
- (c) Discuss biosynthesis of essential amino acid, isoleucine in plant cells. [8 marks]
- (d) Explain biological role of proline amino acid in plant growth. [2 marks]

QUESTION FIVE (20 MARKS)

- (a) Describe flavonoids subclasses and their health benefits. [12 marks]
- (b) Give the plant source and pharmacological use of the following plant alkaloids:
- (i) Sanguinarine [2 marks]
 - (ii) Vinblastine [2 marks]
 - (iii) Ajmaline [2 marks]
 - (iv) Quinine [2 marks]

QUESTION SIX (20 MARKS)

- (a) Discuss in details three stages of CO₂ assimilation in photosynthetic organisms, highlighting role of magnesium ions in RubisCO mechanisms. [10 marks]
- (b) Discuss the role of abscisic acid (ABA) in regulation of environmental stress (salt, water and temperature) in plants. [10 marks]
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