



MACHAKOS UNIVERSITY

University Examinations for 2021/2022 Academic Year

SCHOOL OF AGRICULTURE, ENVIRONMENT AND HEALTH SCIENCES

DEPARTMENT OF AGRICULTURAL SCIENCES

FOURTH YEAR FIRST SEMISTER EXAMINATION FOR

BACHELOR OF SCIENCE IN AGRICULTURAL EDUCATION AND EXTENSION

BACHELOR OF SCIENCE IN AGRIBUSINESS MANAGEMENT AND TRADE

BACHELOR OF EDUCATION (SPECIAL NEEDS EDUCATION)

BACHELOR OF EDUCATION (SCIENCE)

AGR 412: POSTHARVEST TECHNOLOGY

DATE: 30/8/2022

TIME: 8.30-10.30 AM

INSTRUCTIONS: Answer question ONE and any other TWO questions

QUESTION ONE (COMPULSORY - 30 MARKS)

- a) Explain five requirements of a maturity index (5 marks)
- b) Explain five practical applications of maturity indices in postharvest technology practices (5 marks)
- c) With the aid of a well-labelled diagram explain the five phases of climacteric manifestation during initiation, growth and development of a climacteric fruit (6 marks)
- d) Assume that 10 ml of orange juice with a total soluble solids content of 14 °Brix requires 5.6 ml of 0.1N NaOH to reach end point. Given that the conversion factor of the predominant organic acid in orange juice is 0.0064, answer the following questions:
 - i. Name the predominant organic acid in orange juice (1 mark)
 - ii. Prove that the sugar: acid ratio in the orange juice is 38.9 (4 marks)
- e) Quality is an important aspect in the marketing of agricultural commodities:
 - i. Explain the three major quality attributes associated with fleshy fruit ripening (6 marks)
 - ii. Explain four reasons of establishing quality standards in the marketing of harvested agricultural commodities (4 marks)

QUESTION TWO (20 MARKS)

- a) Assume that a random sample of 72g of maize grains is used to determine the moisture content and is dried to a constant weight of 63g:
- Calculate the moisture content of the maize grains on a wet weight basis. (3 marks)
 - Calculate the moisture content of the maize grains on a dry weight basis. (3 marks)
- b) Determination of total soluble solids (TSS) and total titratable acidity (TTA) is important in the assessment of maturity and quality of horticultural commodities:
- With the aid of a well labelled graphical representation explain the quality impacts of the changes in TSS and TTA that occur during fruit ripening (3 marks)
 - Explain two reasons of measuring both TTS and TTA in fruits (2 marks)
 - Describe the two methods used in the determination of TTA (4 marks)
- c) Explain five factors that influence the adoption of controlled atmosphere and modified atmosphere storage systems (5 marks)

QUESTION THREE (20 MARKS)

- a) Explain five effects of respiration in harvested agricultural commodities (5 marks)
- b) Explain five reasons of measuring the rate of respiration in harvested agricultural commodities (5 marks)
- c) With the aid of relevant graphical illustrations for i) and ii) below:
- Describe three effects of exogenous ethylene treatment on the respiratory metabolism of climacteric fruits. (4 marks)
 - Describe three effects of exogenous ethylene treatment on the respiratory metabolism of non-climacteric fruits. (4 marks)
 - Explain one effect each of exogenous ethylene treatment on the regulation of its own biosynthesis in climacteric and non-climacteric fruits. (2 marks)

QUESTION FOUR (20 MARKS)

- a) Discuss six factors that lead to postharvest loss of horticultural commodities in Kenya (12 marks)
- b) Explain the principle behind browning of horticultural commodities upon wounding and subsequent darkening of the skin (4 marks)
- c) Explain four objectives of the Kenya Bureau of Standards KS 1758-2:2016 Code of Practice/Standard (4 marks)

QUESTION FIVE (20 MARKS)

- a) Differentiate between controlled atmosphere and modified atmosphere storage systems (2 marks)
- b) With the aid of a well labelled graphical illustration for each, describe the two methods used to create modified atmosphere conditions (6 marks)
- c) Explain seven positive effects of film packaging other than creation of modified atmosphere conditions (7 marks)
- d) A consignment of 1750 tonnes of wheat was dried from an initial moisture content of 26% down to 13%. Calculate the final weight of the dried wheat (5 marks)