



MACHAKOS UNIVERSITY

University Examinations for 2019/2020 Academic Year

SCHOOL OF AGRICULTURAL SCIENCES

DEPARTMENT OF AGRICULTURAL EDUCATION AND EXTENSION

THIRD YEAR SECOND SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE IN AGRIBUSINESS MANAGEMENT AND TRADE

AGR 412: POSTHARVEST TECHNOLOGY

DATE: 12/11/2020

TIME: 2.00-4.00 PM

INSTRUCTIONS:

Answer Question ONE and ANY other Two Questions

QUESTION ONE (COMPULSORY) (30 MARKS)

- a) Explain the importance of postharvest technology practices and procedures in agribusiness enterprises (6 marks)
- b) Explain each of the following in relation to postharvest technology management in agribusiness enterprises:
 - i. The postharvest behaviour of the **TWO** classes of fleshy fruits (4 marks)
 - ii. The qualitative changes that take place during fleshy fruit ripening, clearly indicating the hypotheses that have been put forward to explain each of the changes (6 marks)
- c) Assume that you have been employed as the Stores Manager in a Fresh Produce Exporting Company and the Stores Supervisor reports to you that a careless worker had stored half ripe banana fruits in a cold store at 5°C for one week and upon transfer to room temperature at 25°C he noticed that the fruits have pits and browning of the skin which have eventually turned black.
 - i. Explain the phenomenon and nature of the damage that the fruits would have undergone and secondary responses of the fruit as a result of the mistake (4 marks)
 - ii. Explain the principle behind the pitting and browning of the banana fruit skin (3 marks)
 - iii. Outline any other **FOUR** symptoms associated with the phenomenon in (i) above that translate into postharvest losses (4 marks)

- d) The National Cereals and Produce Board has employed you as in-charge of the maize store and a colleague brings you the following data of the conditions in the store:

Specific humidity = 0.014 kg/kg and

Wet bulb temperature = 26°C

Using the Psychrometric Chart provided assist your colleague to determine the:

- i. Dry bulb temperature (1 mark)
- ii. Relative humidity (1 mark)
- iii. Water vapour pressure (1 mark)

QUESTION TWO (20 MARKS)

- a) Quality of harvested agricultural commodities has an important bearing to agribusiness management and trade:

- i. Explain the term quality with respect to harvested agricultural commodities (2 marks)
- ii. Explain the importance of establishing quality standards (7 marks)

- b) Global-Gap is important in international standard for international agribusiness trade especially for harvested fresh produce exports:

- i. Explain the term 'Global-GAP' (2 marks)
- ii. Explain **ANY SIX** principles of Global-Gap (6 marks)
- iii. Outline the benefits accrued from Global-GAP certification in the context of agribusiness industry (3 marks)

QUESTION THREE (20 MARKS)

- a) Respiratory metabolism is one of the key biochemical processes that take place during the postharvest handling of perishable agricultural commodities.

- i) Explain the effects of respiration on harvested agricultural commodities (4 marks)
- ii) Explain the importance of measuring the rate of respiration in harvested agricultural commodities (4 marks)

- b) With the aid of relevant graphs explain the effects of exogenous ethylene treatment on the respiratory metabolism of climacteric and non-climacteric fruits and on the regulation of its own biosynthesis (9 marks)

- c) From respiratory metabolism and commodity quality perspectives explain the impact of overcoating/overwaxing of oranges with food grade waxes as a postharvest treatment in the citrus industry (3 marks)

QUESTION FOUR (20 MARKS)

- a) A standard procedure in the postharvest storage of horticultural commodities requires that they be held in atmosphere/environment that have attained equilibrium relative humidity. Assume that vegetables with a water content of 97% are brought into a store with whose relative humidity is 89%.
- i) Define the term equilibrium relative humidity (1 mark)
 - ii) Calculate the vapour pressure deficit in the storage room (2 mark)
 - iii) Calculate the percentage amount of water that the vegetables have to lose in order attain the equilibrium relative humidity (2 marks)
- b) From an agribusiness view point, explain the factors that influence the adoption of controlled atmosphere or modified atmosphere as alternative methods for storage of harvested horticultural commodities (5 marks)
- c) Discuss the expected package requirements for packaging of harvested fresh agricultural produce (10 marks)

QUESTION FIVE (20 MARKS)

- a) Discuss the possible contribution of postharvest technology handling procedures and practices of agricultural commodities towards meeting the Kenya Big Four Agenda (9 marks)
- b) Postharvest loss of agricultural commodities, especially of perishable commodities poses a big challenge for the Fresh Produce Agribusiness Enterprises in Kenya.
- i. Define the term postharvest loss (2 marks)
 - ii. With reference to tomato as a model fruit, outline:
 - I. the symptoms that translate to postharvest loss (3 marks)
 - II. the causes of the symptoms that translate to postharvest loss (3 marks)
 - III. the measures taken to alleviate the postharvest loss problems (3 marks)

