

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 <u>FOUR</u> 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 <u>ANY SIX</u> 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)

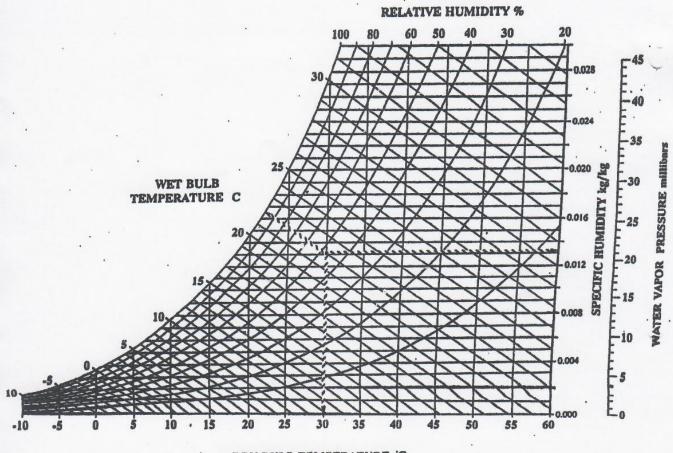
- a) A standard procedure in the postharvest storage of horticultural commodities requires that they be held in atmosphere/environment that have attained equilibrium relative humidity. Assume that vegetables with a water content of 97% are brought into a store with whose relative humidity is 89%.
 - 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)



DRY BULB TEMPERATURE 'C