UNAM
UNIVERSITY OF NAMIBIA

FACULTY	AGRICULTURE, ENGINEERING AND NATURAL SCIENCES		
SCHOOL	AGRICULTURE AND FISHERIES SCIENCES		
DEPARTMENT	FOOD SCIENCE AND SYSTEMS		
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DURATION	3 HOURS	**MARKS**	100

SECOND OPPORTUNITY EXAMINATION

Examiner: Dr. P. Hiwilepo – van Hal

Internal Moderator: Mr. S. Emvula

External Moderator: Prof. V. A. Jideani

This question paper consists of **three (3)** pages excluding this front page.

Instructions

- **Answer all six (6) questions**

QUESTION 1

Choose the most appropriate answer from the list given **[10]**

I. Chilling injuries arise from the exposure of the products to a temperature

a) Above the normal physiological range
b) Below the normal physiological range
c) Under poor ventilation condition
d) In CA storage

II. The volatile toxic substances accumulate in the tissue when fruit are stored in an environment of

a) Above the normal physiological range
b) Below the normal physiological range
c) Under poor ventilation condition
d) In CA storage

III. Fresh fruits and vegetables such as apples, oranges and carrots, keep best at temperatures

a) Below freezing
b) Above freezing
c) At freezing
d) 2 °C

IV. "Internal discolouration" is a common symptom of chilling injury in

a) Apple
b) Pineapple
c) Citrus
d) Banana

V. For storing different kinds of fruits together, it is essential that their temperature requirement

a) Should be the same
b) Should not be the same
c) May be different
d) None of the above

VI. The quality problem for sliced apple and potato is

a) Enzymatic browning
b) Lypolytic rancidity
c) Hydrolytic rancidity
d) Putrefaction

VII. Which compound is abundant in citrus fruits and has antioxidant properties.

a) Carotenoid
b) Ascorbic acid
c) Tocopherol
d) Flavonoid

VIII. Lycopene is present in

a) Citrus
b) Tomato
c) Mango
d) Cucumber

IX. The enzyme which is responsible for browning of fruits and vegetables is

a) Lipo-oxidase
b) Polyphenol-oxidase
c) Amylase
d) Protease

X. What is the purpose of packaging in postharvest handling?

a) To make the produce look more appealing
b) To provide protection from mechanical damage, moisture loss, and contamination
c) To increase respiration rates
d) To enhance the color of fruits

Question 2
Indicate whether the following statements are **True or False**: **[10]**

a) Postharvest losses are primarily caused by physical damage during harvest.

b) Ripening involves biochemical processes such as the conversion of starch into sugars.

c) Ethylene is a gas that accelerates the ripening process in many fruits.

d) Postharvest treatments, such as washing and drying, can help extend the shelf life of produce.

e) Respiration rates in fruits and vegetables generally decrease as temperature increases.
f) At lower temperature sugar-starch balance is heavily inclined toward the accumulation of starch in Fruits and vegetables.

g) Low relative humidity enhances rooting of carrots.

h) Chilling injury occur below the freezing point of the of the product tissues.

i) The chemical composition of product tissue depends on the substrates being metabolized.

j) Respiration is measured by the rate of O_2 evolved as CO_2 is consumed.

QUESTION 3

Explain how careless handling and temperature abuse cause significant losses on the following:

a) Bananas [5]
b) Tomatoes [5]
c) Mangoes [5]
d) Potatoes [5]

QUESTION 4

Describe the following terminologies and provide relevant examples for each:

a) Vacuum Packaging [5]

b) Controlled Atmosphere Storage (CAS) [5]

c) Modified Atmosphere Packaging (MAP) [5]

d) Hypobaric Storage [5]

QUESTION 5

a) With the aid of a sketch, show how ethylene gas production relates to respiratory peaks for climacteric and non-climacteric fruits. [10]

b) By using a food pipeline diagram, describe the post-harvest handling system for Maize. Indicate the possible causes of quantitative, qualitative and economic losses along this pipeline. [10]

QUESTION 6

a) Discuss three (3) biochemical changes occurring during the ripening of beans. [9]

b) Imagine you are an Officer at Namibian Agronomic Board (NAB) and have been a sked to deliver a presentation on **'Reducing Postharvest Losses in Grains '** to a group of small-scale farmers. What key advice would you provide to help them minimize losses and improve their overall produce quality? [11]

END OF THE EXAMINATION