NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

FACULTY OF HEALTH, NATURAL RESOURCES AND APPLIED SCIENCES
SCHOOL OF AGRICULTURE AND NATURAL RESOURCES SCIENCES
DEPARTMENT OF AGRICULTURAL SCIENCES AND AGRIBUSINESS

QUALIFICATIONS: BACHELOR OF SCIENCE IN HORTICULTURE	
QUALIFICATIONS CODE: 07BHOR	**LEVEL: 7**
COURSE CODE: PPT720S	**COURSE NAME:** POSTHARVEST PHYSIOLOGY AND TECHNOLOGY
DATE: JANUARY 2025	**PAPER:** 2
DURATION: 3 HOURS	**MARKS:** 100

SECOND OPPORTUNITY/SUPPLEMENTARY EXAMINATION QUESTION PAPER	
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MODERATOR:	PROF. VICTOR NTULI

INSTRUCTIONS

1. Answer all the questions.
2. Write neatly and clearly.
3. Mark all answers clearly with their respective question numbers.
4. All written work MUST be done in blue or black ink.
5. No books, notes and other additional aids are allowed.

PERMISSIBLE MATERIALS

1. Calculator
2. Examination paper
3. Examination script

THIS QUESTION PAPER CONSISTS OF 4 PAGES
(Excluding This Front Page)

Section A: Multiple choice questions [15 marks]

Evaluate the statements below and select the most appropriate answer or phrase from the given possibilities. Fill in the appropriate letter next to the number of the correct statement/phrase on your ANSWER SHEET.

1. The art of preventing spoilage on the field before harvest is known as_____
   a) Pre-harvest Factor.
   b) Storage.
   c) Preservation.
   d) Protection.
2. Which of the following pre-harvest factors affect the quality of fruits and vegetables?
   a) Genetic/Variety.
   b) Water/Irrigation/Rainfall.
   c) Humidity.
   d) All of the above.
3. The absorption of red light (625-700 nm) through phytochrome is essential for_____
   a) carbohydrates synthesis.
   b) Vitamin synthesis.
   c) Total soluble solids.
   d) Enzyme synthesis.
4. Which of the following chemicals is commonly used as a growth retardant to improve the quality and longevity of flower crops?
   a) Benzyladenine.
   b) Indole-3-acetic acid.
   c) Gibberellic acid.
   d) Daminozide.
5. For how many days are potato tubers typically held at 7°C – 10°C and 90% relative humidity during the curing process?
   a) 2—4 days.
   b) 5—7 days.
   c) 10—12 days.
   d) 15—20 days.
6. Which of the following is known to improve the quality and longevity of flower crops after harvesting?
   a) Ethylene.
   b) Auxins.
   c) Gibberellins.
   d) All of the above.
7. What is the primary purpose of the curing process in post-harvest handling of potatoes, onions, and garlic?

a) To increase moisture content.

b) To enhance storage life and quality.

c) To decrease skin thickness.

d) To lower storage temperature.

8. Degreening of fruits is typically carried out in special treatment rooms. What are the key environmental conditions that are controlled in these rooms?
   a) Light and oxygen levels.
   b) Air pressure and ventilation.
   c) Temperature and humidity.
   d) Carbon dioxide and oxygen levels.
9. Which of the following is an indicator of physiological maturity in tomatoes?
   a) The fruit changes color from light green to green.
   b) The fruit changes color from green to red or yellow.
   c) The fruit remains green.
   d) The fruit grows in size and remains green.
10. Which instrument is commonly used to measure the firmness of fruits and vegetables during harvest maturity testing?
    a) Thermometer.
    b) Penetrometer.
    c) Hygrometer.
    d) Refractometer.
11. Which vitamin is abundant in citrus fruits, strawberries, and bell peppers?
    a) Vitamin D.
    b) Vitamin K.
    c) Vitamin E.
    d) Vitamin C.
12. Which of the following standards is specifically designed to ensure a safe food supply chain?
    a) ISO 9001.
    b) ISO 22000.
    c) ISO 14001.
    d) ISO 45001.
13. Which of the following is an organic acid found in tomatoes and citrus fruits?
    a) Malic acid.
    b) Oxalic acid.
    c) Citric acid.
    d) Lactic acid.
14. What characterizes commodities with a low respiration rate?
    a) High metabolic activity and longer shelf life.

b) Low metabolic activity and longer shelf life.
c) High sensitivity to storage conditions.
d) Rapid spoilage.

15. Which type of anthocyanin is responsible for the red and purple colors in cherries and plums?
    a) Delphinidin.
    b) Malvidin.
    c) Cyanidin.
    d) Pelargonidin.

Section B: True/False questions **[15 marks]**

Evaluate the statements below and indicate whether the statement is true or false. Write the word 'True' or 'False' next to the corresponding number on your ANSWER SHEET.

1. Indole-3-acetic acid is a plant hormone that has been reported to enhance the quality and shelf life of flower crops.
2. Corn is considered physiologically mature when the kernels are soft, and the husks are still green.
3. Benzyladenine is a chemical that acts as a growth regulator of flowers.
4. The typical concentration of ethylene applied in the degreening process of fruits is 20 ppm.
5. Nitrogen is typically used in the degreening process to induce the decomposition of chlorophyll in fruits.
6. Physiological maturity in fruits and vegetables occurs when they have fully ripened and are ready for consumption.
7. Pectinases, cellulases, and hemicellulases are enzymes that contribute to the softening of fruits and vegetables.
8. Vitamin C is a fat-soluble vitamin.
9. Aroma is a reliable indicator of harvest maturity in the ripening of melons.
10. Vitamin A is found in carrots and sweet potatoes as Beta-carotene.
11. Oxalic acid is primarily found in tomatoes.
12. Nuts, grains, and dried fruits are examples of commodities with a low respiration rate.
13. Chalcone synthase and anthocyanidin synthase are enzymes involved in anthocyanin synthesis.
14. The softening of fruits is generally considered undesirable for consumption.
15. Pectinases, cellulases, and hemicellulases are enzymes that contribute to the softening of fruits and vegetables.

Section C: short/long questions [70 marks]

Please answer ALL the questions in this section.

Short questions [35 marks]

1. What is the function of exocarp? [2]
2. Describe the structure of the plant cell Wall. [3]
3. Explain the three main layers of a coconut fruit. In your answer, include the layers that are removed before they are sold and mention any alternative uses for the removed layers. Use a labelled diagram to support your answer. [9]
4. Explain the process of carotenoid synthesis during fruit ripening. [12]
5. Describe the static grading method. In your answer, include how it works, and mention one advantage and one disadvantage [5]
6. Describe the Codex Alimentarius. In your answer, include its purpose, the organizations involved, and its importance for food safety and trade. [4]

Long questions [35 marks]

1. As a post-harvest specialist, you are invited to consult a company facing huge losses owing to microbial degradation of their fruits and vegetables during storage and transportation. Based on the scenario provided, answer the following:

   a) Citing examples of common spoilage microorganisms, describe the microbiological spoilage of fruits and vegetables after harvest. [23]

   b) List and explain the strategies you would recommend to prevent microbial spoilage of fruits and vegetables after harvest. [12]

END OF QUESTION PAPER