

University of Ruhuna- Faculty of Technology
Bachelor of Biosystems Technology Honours Degree
Level IV (Semester II) End Semester Examination, December 2025
Academic year 2023/2024

Course Unit: BSTE 4232 Natural product Development Technology (Written)
Duration: 1 & 1/2 hours

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Instructions to candidates:

Answer only **Three (3)** questions.

Each question should be started with a new page.

If you answer more than three questions, only the **first three** will be marked.

1. The increasing global use of herbal medicines and the expansion of the herbal product market have raised significant concerns about the safety and quality of both medicinal plant materials and finished herbal products.
 - a. List FIVE (05) major categories of contaminants and residues that can be found in herbal medicines.

(20 marks)
 - b. Describe the role of Good Agricultural and Collection Practices (GACP) as the first line of defense against contaminants in herbal medicines..

(30 marks)
 - c. A company wishes to export a herbal tea to international markets. Outline a comprehensive quality assurance plan to ensure the product complies with international standards for contaminants and residues. Your plan should cover steps from raw material selection to finished product testing.

(50 marks)

(Total-100 marks)

2. Nail lacquers or nail paints may be defined as viscous or semi-liquid preparations that are intended for the decoration of the nails of the fingers and toes.
 - a. List five (05) characteristic properties of nail lacquer.

(20 marks)
 - b. Briefly discuss the main ingredients used in nail lacquer formulation.

(40 marks)
 - c. Briefly explain the evaluation tests required before introducing a nail lacquer to the market.

(40 marks)

(Total-100 marks)

3. The success of an extraction process depends not only on the method but also on a careful consideration of the solvent and the physical characteristics of the plant material.

a. When selecting a solvent for extraction, several factors must be evaluated. List FIVE (05) such factors and briefly explain the importance of each.

(30 marks)

b. Super critical fluid extraction (SFE) is hailed for its "green" credentials. Elaborate on THREE (03) specific environmental and safety benefits of using SFE over traditional solvent-based extraction methods in the natural products industry.

(30 marks)

c. A company wants to use Super critical fluid extraction (SFE) to produce a high-value, thermally sensitive astaxanthin (carotenoid) extract from microalgae.

i. Justify why SFE is an excellent selection for this application.

(10 marks)

ii. Discuss the critical process parameters you would optimize to maximize yield and prevent degradation.

(30 marks)

(Total-100 marks)

4. Establishing a tablet production line requires a deep understanding of both the formulation and the operational principles of the machinery involved.

a. Discuss three (03) defects of the tablets that possible in manufacturing process.

(30 marks)

b. Describe the principle of the "Piston Tamp" or "Slugging" method used in Dry Granulation

(30 marks)

c. You are tasked with manufacturing a high-dose, poorly flowing herbal powder *Moringa oleifera* leaves into a tablet.

i. Justify the selection of a granulation method (Dry or Wet) over Direct Compression for this specific formulation.

(10 marks)

ii. Design a brief flow chart for your Selected manufacturing process, from raw material reception to the final compressed tablet.

(30 marks)

(Total-100 marks)

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