



UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER II
SESSION 2022/2023**

- COURSE NAME : NATURAL PRODUCT CHEMISTRY
- COURSE CODE : BWK 20803
- PROGRAMME CODE : BWK
- EXAMINATION DATE : JULY/AUGUST 2023
- DURATION : 3 HOURS
- INSTRUCTIONS :
1. ANSWER ALL QUESTIONS
 2. THIS FINAL EXAMINATION IS CONDUCTED VIA
 - Open book
 - Closed book
 3. STUDENTS ARE **PROHIBITED** TO CONSULT THEIR OWN MATERIAL OR ANY EXTERNAL RESOURCES DURING THE EXAMINATION CONDUCTED VIA CLOSED BOOK

THIS QUESTION PAPER CONSISTS OF **FOUR (4)** PAGES

TERBUKA

Q1 Primary and secondary metabolites form the biological system of plants.

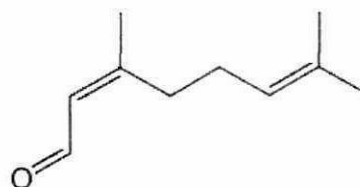
- (a) Distinguish between primary and secondary metabolites. (4 marks)
- (b) Categorise the secondary plant metabolites according to the metabolic pathways, intermediate compounds and secondary metabolites compounds formed. (10 marks)

Q2 Terpenoids, alkaloids, nitrogen-containing compounds, organosulfur, and phenolic compounds are bioactive compounds found in plants.

- (a) Identify the building block for the following compound structure in **Figure Q2(a)**.



(i)



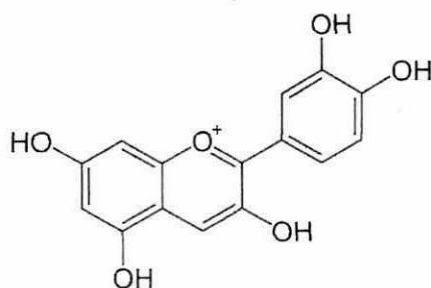
(ii)

Figure Q2(a)

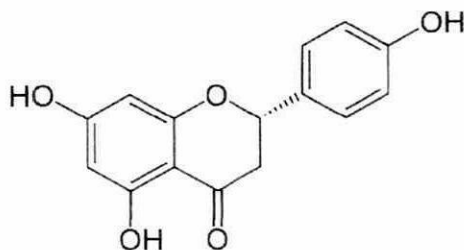
(4 marks)

- (b) Categorise the following flavonoid compounds in **Figure Q2(b)** with a brief explanation of each.

(i)



(ii)



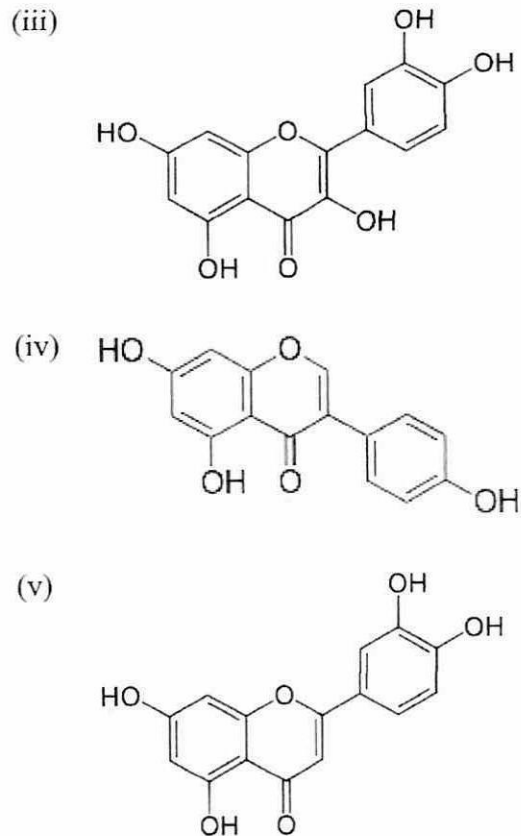


Figure Q2(b)

(10 marks)

- Q3** Phytonutrients also called to as phytochemicals compounds contain health-promoting properties including antioxidant, anti-inflammatory, and liver-health-promoting activities.
- (a) The primary source of sulphur for human beings is the sulphur-containing amino acids (SAAs). Methionine and cysteine are the two SAAs that make up various proteins.
- (i) Explain the importance of SAAs. (2 marks)
- (ii) Compare methionine and cysteine. (6 marks)
- (b) Terpenes and terpenoids are the primary constituents of the essential oils of many types of plants and flowers.
- (i) With the aid of illustration, distinguish between sesquiterpenes and sesterterpene. (4 marks)

- (ii) With the aid of specific terpenoid compounds, describe **THREE (3)** major functions of terpenoids in living organisms consisting of defence, function, and communication, respectively.

(6 marks)

Q4 Extraction techniques are influenced by solubility in conjunction with other solutes, various compounds in the plant matrix, and the solvent employed to solubilise the active ingredients.

- (a) Differentiate the factors that influence the extraction efficiency of compounds between **TWO (2)** novel extraction techniques in **Figure Q4(a)**.

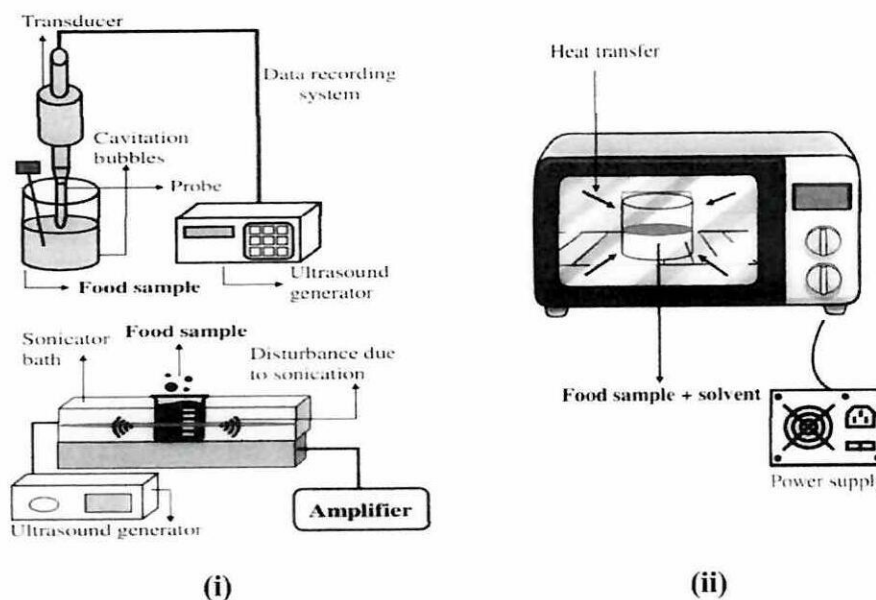


Figure Q4(a)

(10 marks)

- (b) Show the general setup of thin-layer chromatography and column chromatography. The setup should include the labelling of each component.

(10 marks)

- (c) *Rheum emodi* is a flowering plant in the Polygonaceae family. This plant contains anthraquinone, a phenolic substance. Prepare the experimental method for anthraquinone extraction from *R. emodi* using the Soxhlet extraction technique. The experimental method should include a list of the materials, chemicals, and equipment used, as well as a description of the Soxhlet extractor, sample preparation, and extraction method process.

(14 marks)

- END OF QUESTIONS -