



UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2022/2023

- COURSE NAME : PHYTOCHEMISTRY
- COURSE CODE : BWJ 32103
- PROGRAMME CODE : BWW
- 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

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- Q1** Phytochemistry is the scientific study of phytochemicals, which are chemical compounds that occur naturally in plants. These compounds can include a wide range of molecules and have been classified into a few categories.
- (a) Name **FIVE (5)** different classes of phytochemicals.
(5 marks)
- (b) Give **ONE (1)** example of a phytochemical from each class named in **Q1 (a)** and draw the structure.
(10 marks)
- (c) Identify (mark) and name at least **FIVE (5)** different building blocks to form any chosen structure/s of phytochemical/s in **Q1(b)**.
(10 marks)
- Q2** Phytochemists study phytochemicals to understand their structure, biosynthesis, and biological activity. They are interested in the ways in which these compounds might be used for medicinal or other purposes.
- (a) Draw the structure of Citral, Piperine and Quercetin.
(6 marks)
- (b) Tabulate the qualitative analysis (name of the test, reagents that should be used and positive results that will be observed) that should be conducted to test the presence of each phytochemical in **Q2(a)**.
(10 marks)
- (c) Discuss briefly **THREE (3)** health effects of each phytochemical in **Q2(a)**.
(9 marks)
- Q3** Chromatography techniques are commonly used by phytochemists to separate, isolate and determine phytochemicals. The basic technique of chromatography is a thin layer and column chromatography. The amorphous fraction of plant X is believed to consist of two types of phytochemicals as shown in **Figure Q3.1**. Phytochemical **A** is yellow in colour while phytochemical **B** is purple in colour. Discuss the procedure that should be conducted to isolate and confirm each phytochemical in **Figure Q3.1** by using chromatographic techniques.

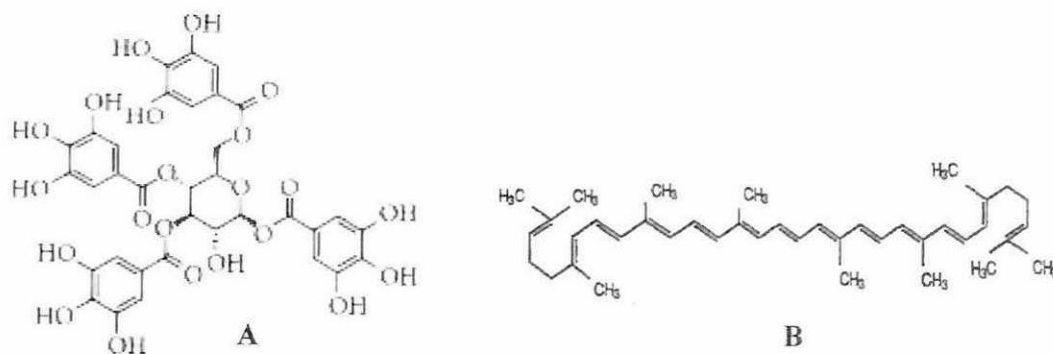


Figure Q3.1

(25 marks)

Q4 Infrared (IR) and nuclear magnetic resonance (NMR) spectroscopies involve the interaction of molecules with electromagnetic energy and are usually used by phytochemists to determine the structure of phytochemicals.

(a) **Figure Q4.1** shows the infrared spectra of compound $C_7H_{13}O$, which give the fruity aromatic jasmine qualities in the essential oil of jasmine flower.

(i) Determine the functional groups of the peak A, B, C, D and E observed in the spectra.

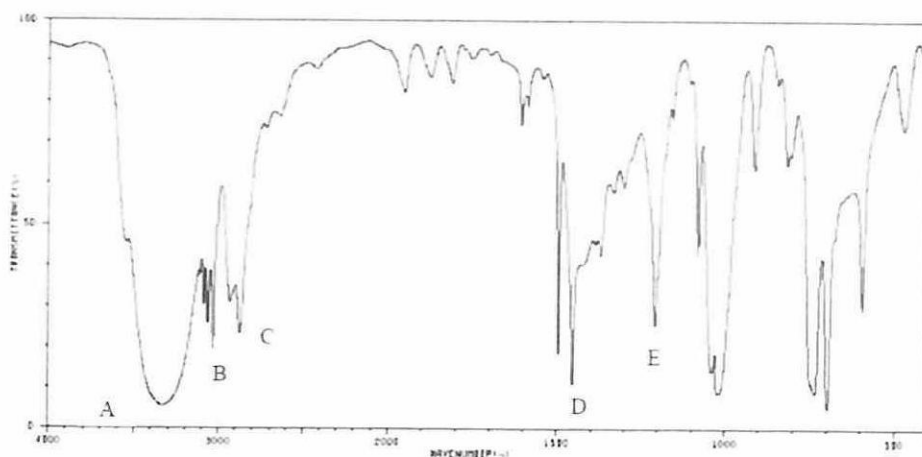


Figure Q4.1

(5 marks)

(ii) Draw the structure of the compound.

(2 marks)

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- (b) The compound in **Figure Q4.2** has been run in ^1H NMR spectroscopy.
- (i) Draw the predicted ^1H NMR spectrum for the compound in **Figure Q4.2**. Explain your answer.

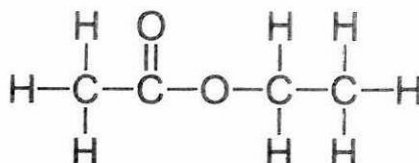


Figure Q4.2

- (12 marks)
- (ii) Match/label each group of ^1H in the structure with the peak in the spectrum.
- (3 marks)
- (iii) Name the splitting patterns for each peak.
- (3 marks)

- END OF QUESTIONS -