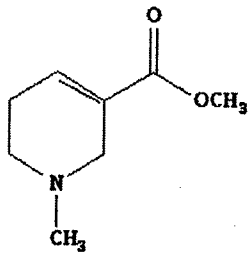
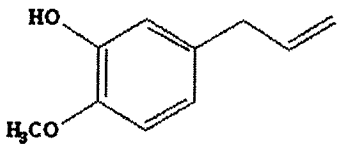
Uva Wellassa University of Sri Lanka
Faculty of Science and Technology
Department of Science and Technology
300 Level First Semester Examination – Sep/Oct 2015
SCT 325-2 Natural Product Chemistry

Number of questions: Three (**03**) questions.
Answer **all** questions.
Time allocation: Two (02) hours.
Mark allocation: 100 marks.

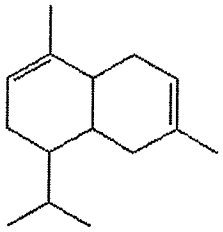
01. i. Betel quid chewing is an ancient practice in the Indian subcontinent and many parts of Asia, and is still prevalent today. In Sri Lanka betel quid comprises mainly betel leaf (*Piper betel*), areca nut (*Areca catechu*), tobacco (*Nicotiana tabacum*) and slaked lime. Following compounds are some of the natural products found in ingredients of betel quid.



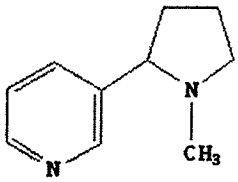
Arecoline



Chavibetol



β - Cadinene



Nicotine

a. Identify the above natural products as flavonoid, alkaloid, terpenoid, steroid, fatty acid and phenylpropanoids.
b. Write the name of the biosynthetic pathway of the above natural products and the starter units used for biosynthesis.

(12 marks)

ii. Kava (*Piper methysticum*) is a large-leaved shrub indigenous to the South Pacific Islands. The roots of the plant prepare a sedative and anaesthetic drink. Yangonin is one of the main natural products found in Kava pant use as a treatment of anxiety, insomnia, and pain.

Suggest a reasonable biosynthetic pathway to yangonin. **Draw and name** the 3 most important intermediates of the biosynthetic pathway.

(08 marks)

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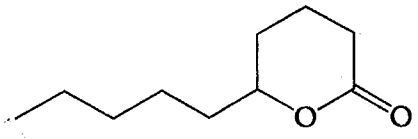
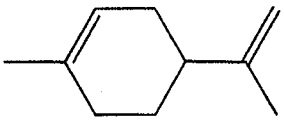
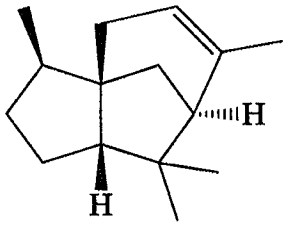
iii. CH_3-^{14}COONa was used in biosynthetic studies. Mark with an **asterisk (*)** the sites that might be ^{14}C labelled in the following natural Products.

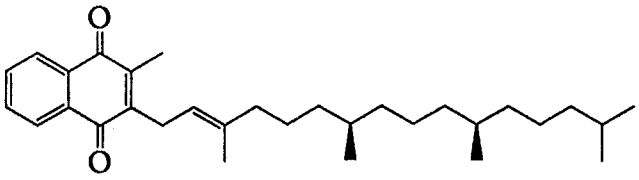
a. 

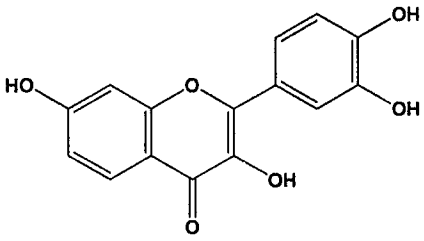
b. 

(10 marks)

iv. Indicate the biosynthetic structural units [acetate (C_1), Isoprene (C_5), shikimate (C_7)] that form the carbon skeleton of the following compounds. Some of these may derive from more than one pathway.

a. 

b. 

c. 

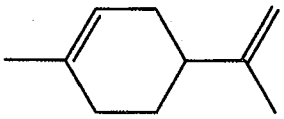
(15 marks)

02. i. Show how geranyl pyrophosphate (GPP) and farnesyl pyrophosphate (FPP) are produced from the isopentenyl pyrophosphate(IPP).

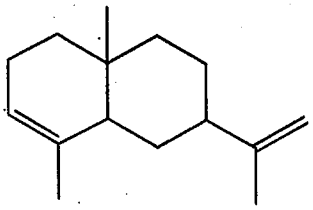
(10 marks)

ii. Suggest mechanisms for the formation of the following compounds from GPP or FPP:

a. Limonene



b. α-Celinene

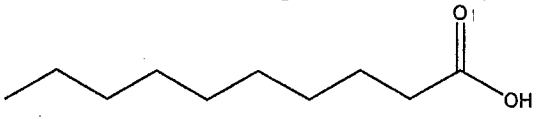


(10 marks)

iii. Outline the mechanism of formation of Lanosterol from farnesyl pyrophosphate (FPP).

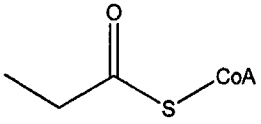
(10 marks)

03. i. **Suggest** a biosynthetic pathway for the following saturated fatty acid:



(05 marks)

ii. **Draw** the structure of the polyketide you would expect to obtain from propionyl coenzyme A and three molecules of malonyl coenzyme A.



Propionyl CoA

(03 marks)

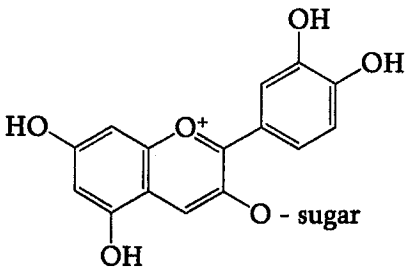
iii. **Draw** fatty acids given bellow.

a. 18:1 (9c)

b. 20:4 (5c, 8c, 11c, 14c)

(02 marks)

iv. Cyanidin is a plant polyphenol found in the skin of red coloured fruits and vegetables. It shows a colour change at various pH values. At acidic pH<3 Cyanidin is in red colour, at pH7-8 and 11.5, it turns to violet and blue respectively. **Suggest** structures of cyanidine at pH 7 and 11.



pH<3 - Red colour
Cyanidine

(05 marks)

v. Write a **short** account on Tea Polyphenols.

(05 Marks)

vi. **Briefly explain** how you isolate Alkaloids from a plant material.

(05 marks)

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