Uva Wellassa University, Sri Lanka
B.Tech. Degree Programme - 2006/07
End Semester Examination- Semester 1
December -2008

BIO-325 Natural Product Chemistry

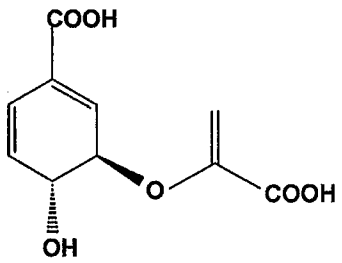
Answer four (04) questions only Time: Two (02) hours

1) (i) What are secondary metabolites? Discuss four importance of secondary metabolites giving an example in each case. (10 marks)

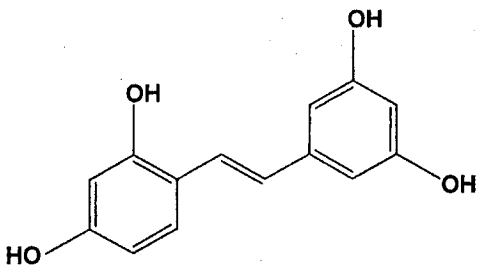
(ii) What are the major biosynthetic pathways present in plants? List the major precursor of each pathway. (6 marks)

(iii) What are the methods available for the extraction of secondary metabolites? (3 marks)

(iv) Identify the following phenolic compounds/ or structural types. (6 marks)



(a)



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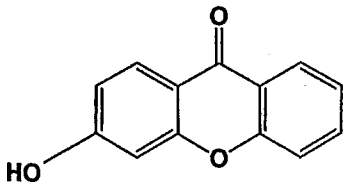

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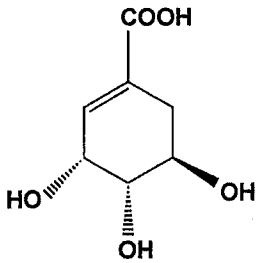

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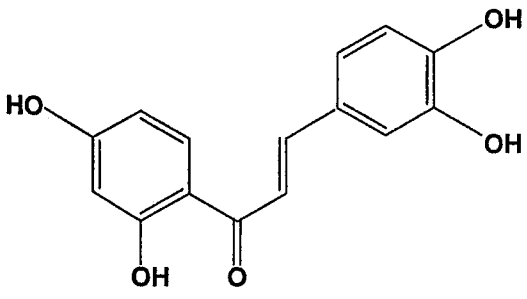

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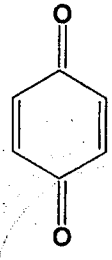


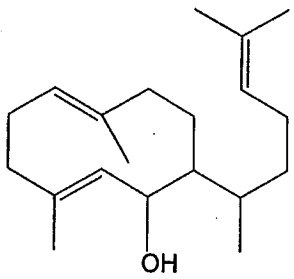
(f)

2) (i) List the uses of terpenoids giving examples in each case. (6 marks)

(ii) Arrange following compounds to give a scheme that describe the biosynthesis of cholesterol.

squaline, acetyl CoA, dimethylallyl diphosphate (DMADP), farnesyl pyrophosphate (FAPP), squaline oxide, lanosterol, protosteryl cation, cholesterol (4 marks)

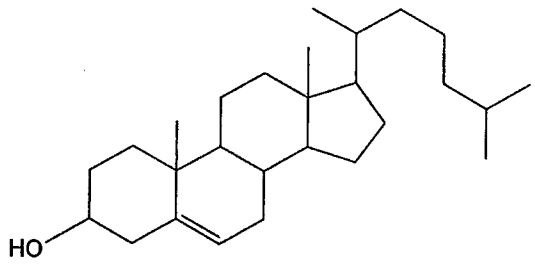
(iii) Identify the isoprene units in Dilophol.



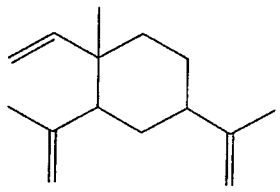
Dilophol (6 marks)

(iv) How does the extraction and isolation of a monoterpene defer from that of a saponin ? (4 marks)

(v) Identify the following skeletons a-e and classify compounds b-e as monoterpenoids, sesquiterpenoids, diterpenoids, sesterterpenoids and triterpenoids. (5 marks)



(a)



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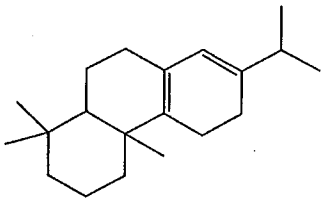

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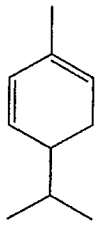

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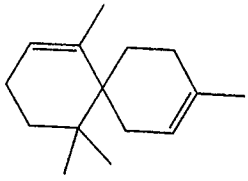
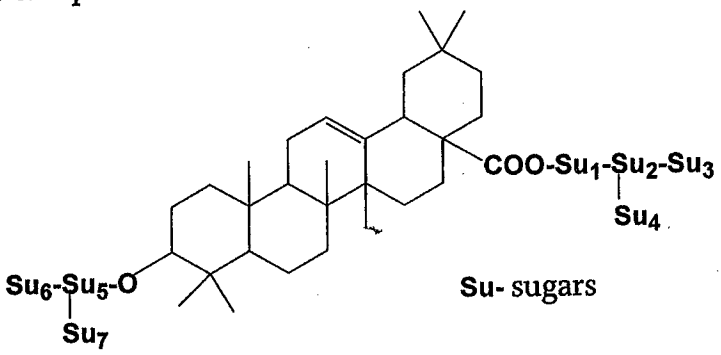


(e)

3) (i) What are saponins? Give two possible biological properties of saponins.
(4 marks)

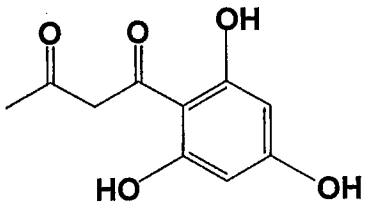
(ii) What are the preliminary tests available to identify the plant materials/ extracts rich in saponins ? (4 marks)

(iii) Write down the acid hydrolysis (4N HCl/ reflux) and base hydrolysis (KOH/ reflux) products of saponin A.



Saponin A (10 marks)

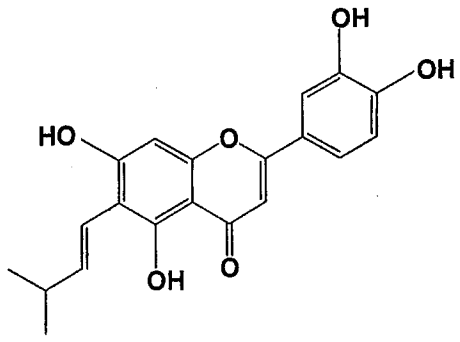
(iv) The following natural product was isolated from a culture source that had been fed with radioactive sodium acetate, $CH_3{}^*CO_2{}^-Na^+$. Name the biosynthetic pathway of this compound and indicate the positions of radioactive carbon/s present using * mark. (7 marks)



(4) (i) What are the roles of plant phenolic compounds ? (6 marks)

(ii) a. What are the major biosynthetic pathways involved in the flavonoid biosynthesis?

b. Name the three biosynthetic pathways associated with biosynthesis of following natural product. Show the positions of the molecule derived from each pathway.



(8 marks)

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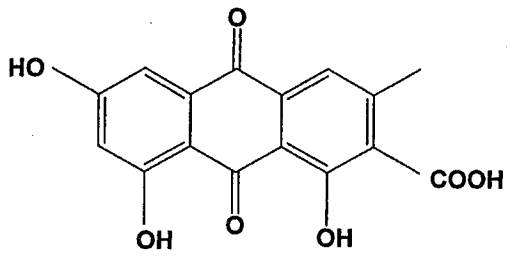
(iii) For each of the following phenolic compound indicate a biological activity or a medicinal use, or an industrial use or a function in nature.

a. ubiquinone b. usnic acid c. resveratrol d. gallic acid

(6 marks)

(iv) Identify the polyketide chain leading to the biosynthesis of Endocrocin.



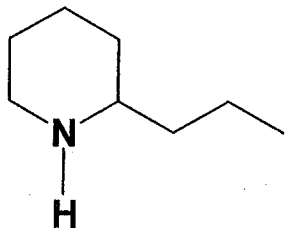
Endocrocin (5 marks)

(5) (i) What are alkaloids? Write down three classes of alkaloids with one example for each type. (5 marks)

(ii) How does the chemistry of alkaloids differ from terpenoids? (3 marks)

(iii) Draw a schematic diagram for the extraction of alkaloids from a plant material. (6 marks)

(iv) Give the structure of the product, when coniine subjected to exhaustive methylation with excess CH_3I and with AgOH followed by heating. (5 marks)



Coniine

(v) Giving examples, list three medicinal uses of alkaloids (6 marks)