THE OPEN UNIVERSITY OF SRI LANKA

B.Sc. DEGREE PROGRAMME / STAND ALONE COURSE 2012/2013

LEVEL 5-FINAL EXAMINATION

CHU 3130/CHE 5130-INTRODUCTION TO NATURAL PRODUCTS CHEMISTRY

Time: 2 HOURS

Wednesday 05th June 2013 9.30a.m.- 11.30a.m.

Answer any FOUR questions only.

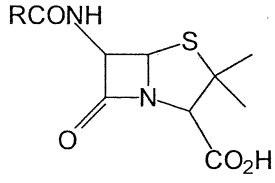
If you have answered more than four questions, only the first four answers will be marked.

1. (a) Fill the table given below with the spray reagents that can be used to detect the following secondary metabolites by tlc and state the colour observed in each case.

Class of compounds	Spray reagent	Colour observed
Alkaloids		
Amino acids		
Coumarins		

(24 marks)

(b) Write the mechanism of resistance applied by microorganisms to β-lactam antibiotics. Give two approaches to over come this problem.



β-lactam antibiotic (40 marks)

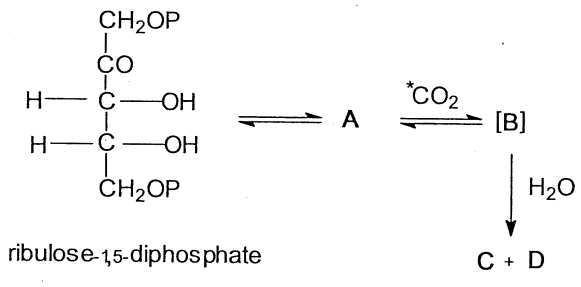
(c) Explain what is meant by following terms.
(i) Allosteric effect
(ii) Competitive inhibitor

(20 marks)

(d) Explain why biological screening tests are important.

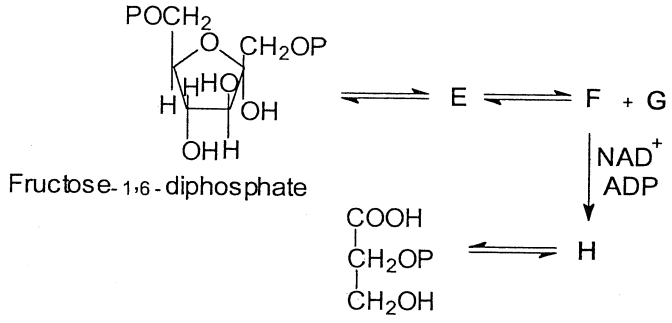
(16 marks)

2.(a) Propose the structures of the products A, B, C and D when ribulose-1,5-diphosphate under goes the following reaction sequence during photosynthesis. Indicate the position of the labeled carbon atoms if any of the following pathway leading to the biosynthesis of carbohydrate by *.



(40 marks)

(b) Identify the missing compounds E, F, G and H in the following reaction scheme met in the glycolysis pathway.

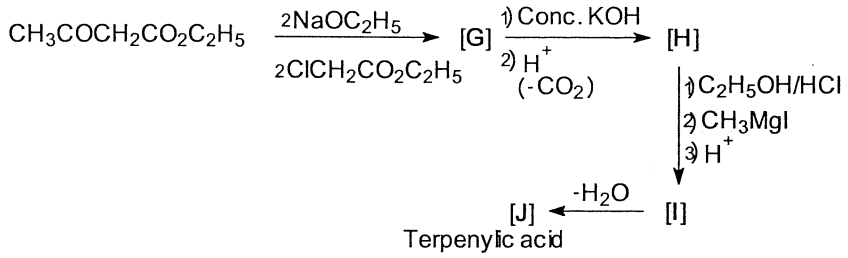


(30 marks)

(c)(i) What are the major products of citric acid cycle?
(ii) Describe briefly the role of natural products in plant-plant interactions.

(30 marks)

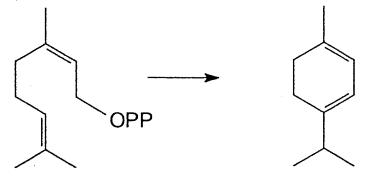
3. (a) $CH_3COCH_2CO_2C_2H_5$ underwent the following reaction sequence in the synthesis of terpenylic acid **J**.



Propose structures for **G**, **H**, **I** and **J** of this reaction.

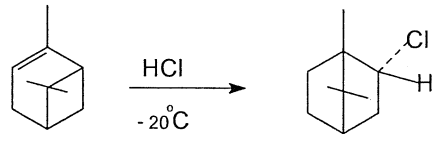
(40 marks)

(b) Indicate the mechanism involved in the biosynthetic scheme given below.



(20 marks)

(c) Outline the mechanism of following conversion.

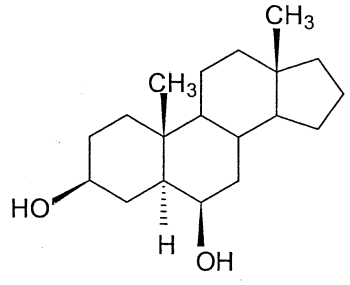


(20 marks)

(d) Give five examples to show that terpenoids are biologically important.

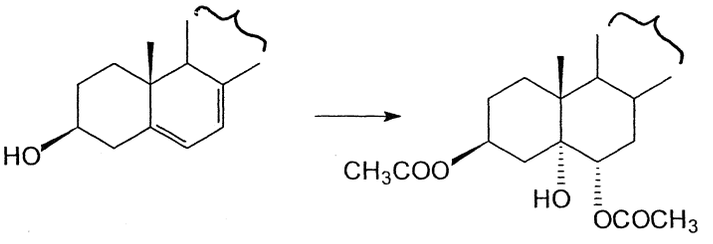
(20 marks)

4. (a) Explain why 5α-androstane-3β,6β-diol undergoes esterification reaction with ethylchloroformate ($ClCOOC_2H_5$) to form 3β-monocathylate. On the other hand the corresponding 5α-androstan-3β,6α-diol forms 3β,6α-dicathylate under the same condition. Explain your answer using chemical structures.



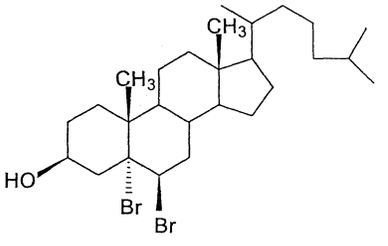
5α-androstan-3β,6β-diol (40 marks)

(b) Show how you would effect the following conversion.



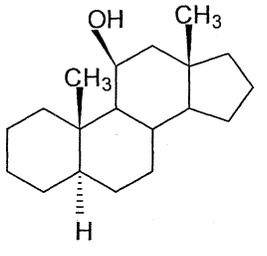
(30 marks)

(c) Explain why 5α,6β-dibromo cholesterol is debrominated to the cholesterol by sodium iodide (NaI) in acetone faster than 5α,6α-dibromo cholesterol.



5α,6β-dibromo cholesterol (30 marks)

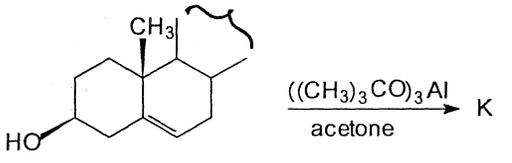
5. (a) Explain why 5α-androstan-11β-ol is oxidized to the ketone by CrO_3-aqueous acetic acid hundred times faster than 5α-androstan-11α-ol.



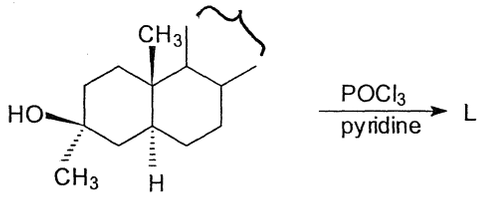
5α-androstan-11β-ol (30 marks)

(b) Give the structures of the products of the following reactions.

(i)

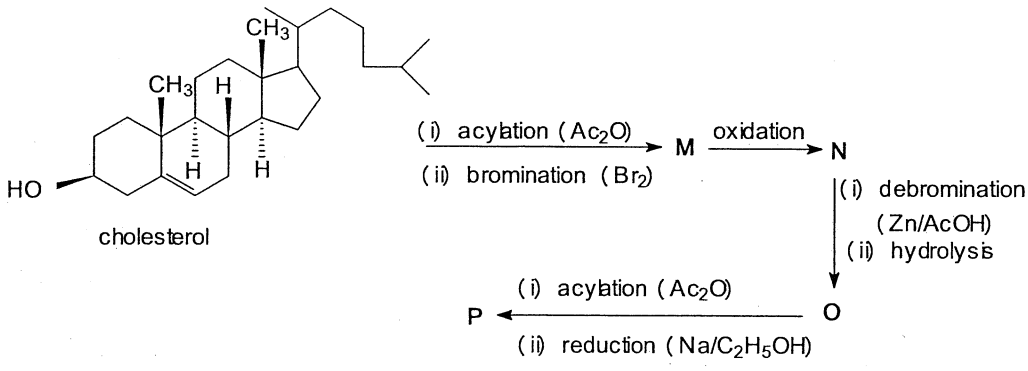


(ii)



(30 marks)

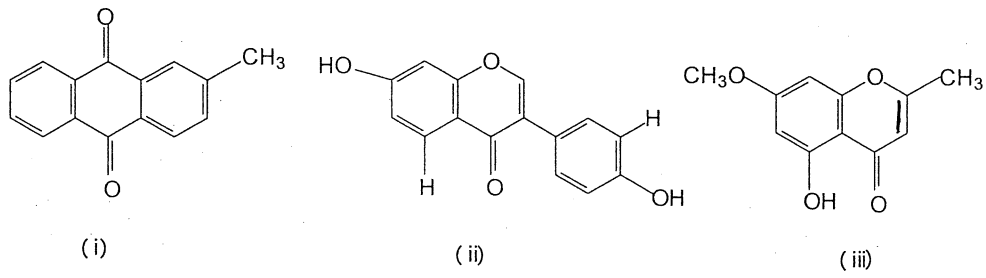
(c) Cholesterol underwent the following reaction sequence.



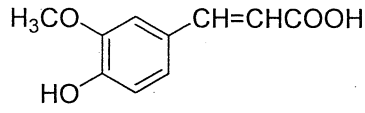
Propose structures for **M**, **N**, **O** and **P** of this reaction.

(40 marks)

6.(a) Clearly state the basic skeleton giving the appropriate carbon number and the class of the following compounds. (See example worked below).



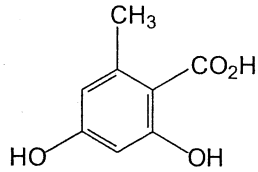
Example



Basic skeleton : C_6-C_3
Class : hydroxycinnamic acid

(30 marks)

(b) (i) Draw the structure of the polyketide (**Q**) involved in the biosynthesis of Orcellinic acid.

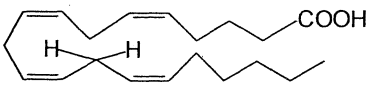


Orcellinic acid

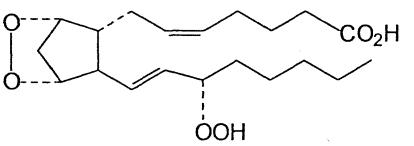
(ii) Indicate the mechanism by which orcellinic acid is formed from **Q**.

(30 marks)

(c) Indicate the mechanism of the reactions involved in the biosynthesis of the prostaglandin PGG_2 from arachidonic acid, stating the name of the enzyme involved in the reaction.



arachidonic acid



PGG_2

(40 marks)