THE OPEN UNIVERSITY OF SRI LANKA

B Sc Degree Progamme/ Stand Alone course-2011/2012

Level 5-Continuous Assessment Test I (No Book Test)

CHU 3130/CHE 5130 – INTRODUCTION TO NATURAL PRODUCTS CHEMISTRY

Time : 1 1/2 Hours

Date : Monday 05th September 2011 **Time : 4.00 pm – 5.30 pm**

ANSWER ALL QUESTIONS IN THE SPACE PROVIDED.

Registration Number

Question No.	Marks
1	
2	
3	
4	
5	
Total	

(1) (a) Secondary metabolites are formed using the following pathways. Complete the table given below by filling the class of natural products formed from each pathways and the precursor to the pathway.

Pathway	Class of Natural Products	Precursor
Mevalonic acid		
Polyketide		
Shikimic acid		

(15 marks)

(b) Fill the table given below with the spray reagents that can be used to detect the following secondary metabolites by tlc and indicate the colour.

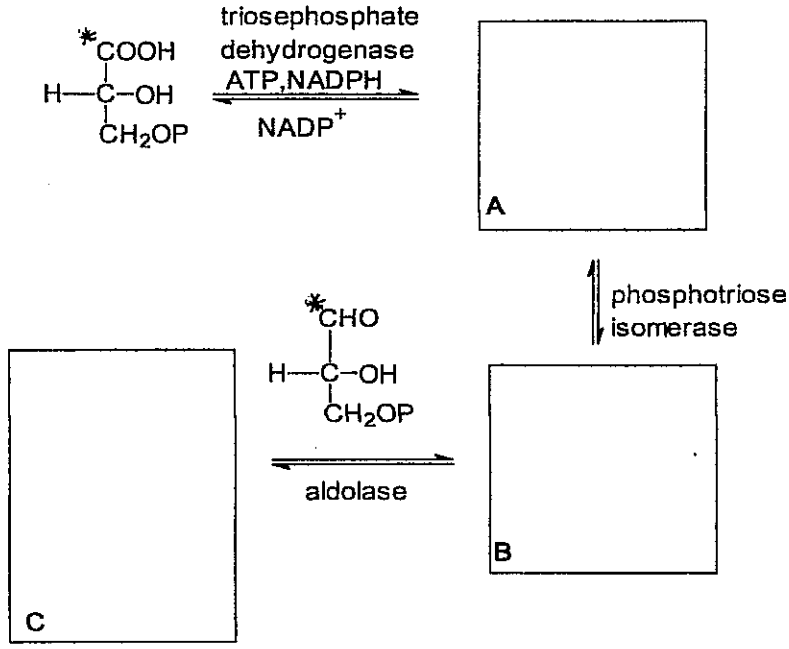
Class of Compounds	Spray Reagent	Colour
Flavonoids		
Alkaloids		
Amino acids		

(12 marks)

(2) (a) Draw a schematic diagram to show how CO_2 is reduced by sunlight.

(07 marks)

(b) Propose the structures of the products A, B, and C when 3-phosphoglyceric acid under went the following reaction sequence in the photosynthesis. Indicate the position of the labeled carbon atom(s) in the A, B and C formed by *.



(18 marks)

(3) (a) Name the co-enzymes involved in the following reactions.

(i)Carboxylation- .....

(ii)Dehydrogenation- .....

(06 marks)

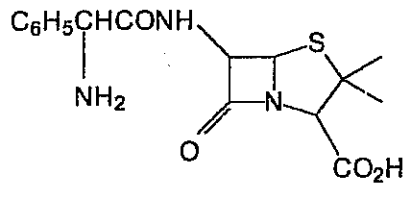
(b) Describe briefly the role of natural products in plant-microorganism interactions.

(08 marks)

(4) (a) *β-lactamase* causes resistance to ampicillin by bacteria. Name the product formed when *β-lactamase* acts on ampicillin.

(04 marks)

(b) Indicate the mechanism of the reaction involved when *β-lactamase* acts on ampicillin. Give the structure of the product formed.



ampicillin

(20 marks)

(5) a) Explain the term allosteric effect.

b) Explain the difference between a prosthetic group and a co-substrate.

(10 marks)

INTRODUCTION TO NATURAL PRODUCT CHEMISTRY- CHU3130

Continous Assesement test 1 -2011/2012 (Answer guide)

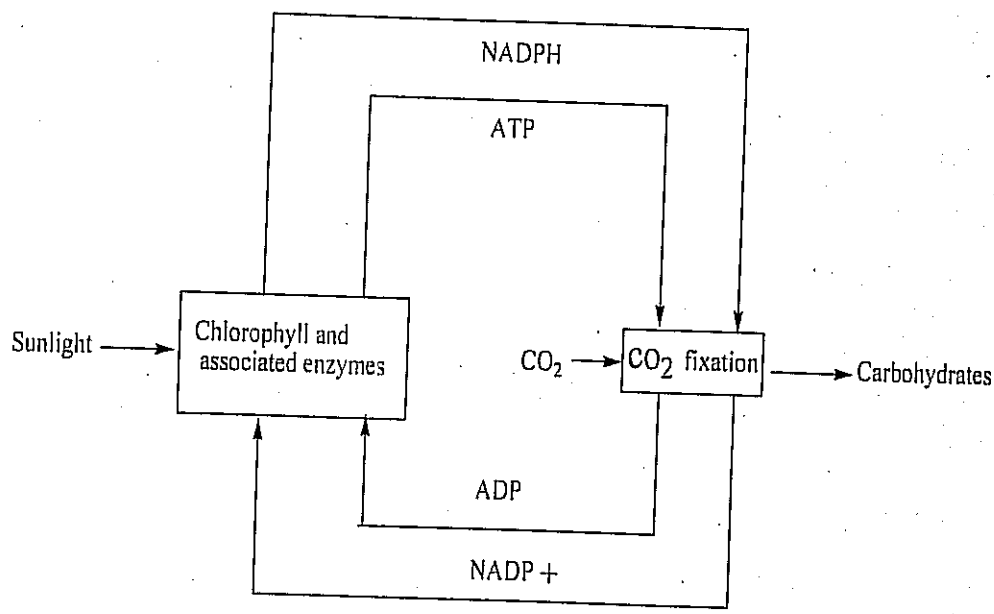
1) (a)

Pathway	Class of Natural Products	Precursor
Mevalonic acid	Trpenoids/Steroids	Mevalonic acid/acetic acid
Polyketide	Fatty acids/eicosanoids,phenols	Acetic acid
Shikimic acid	Amino acids/phenolic compounds and pigments	Shikimic acid

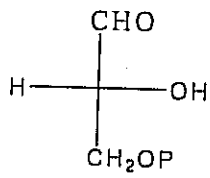
(b)

Class of Compounds	Spray Reagent	Colour
Flavonoids	Natural product polyethylene gycol	Yellow/green/orange
Alkaloids	Dragendorff reagent	Orange-brown
Amino acids	Ninhydrin	purple

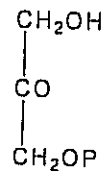
2) (a)



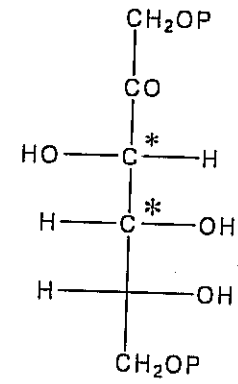
(b)



A



B



C

3) (a)

i. Carboxylation- Biotin

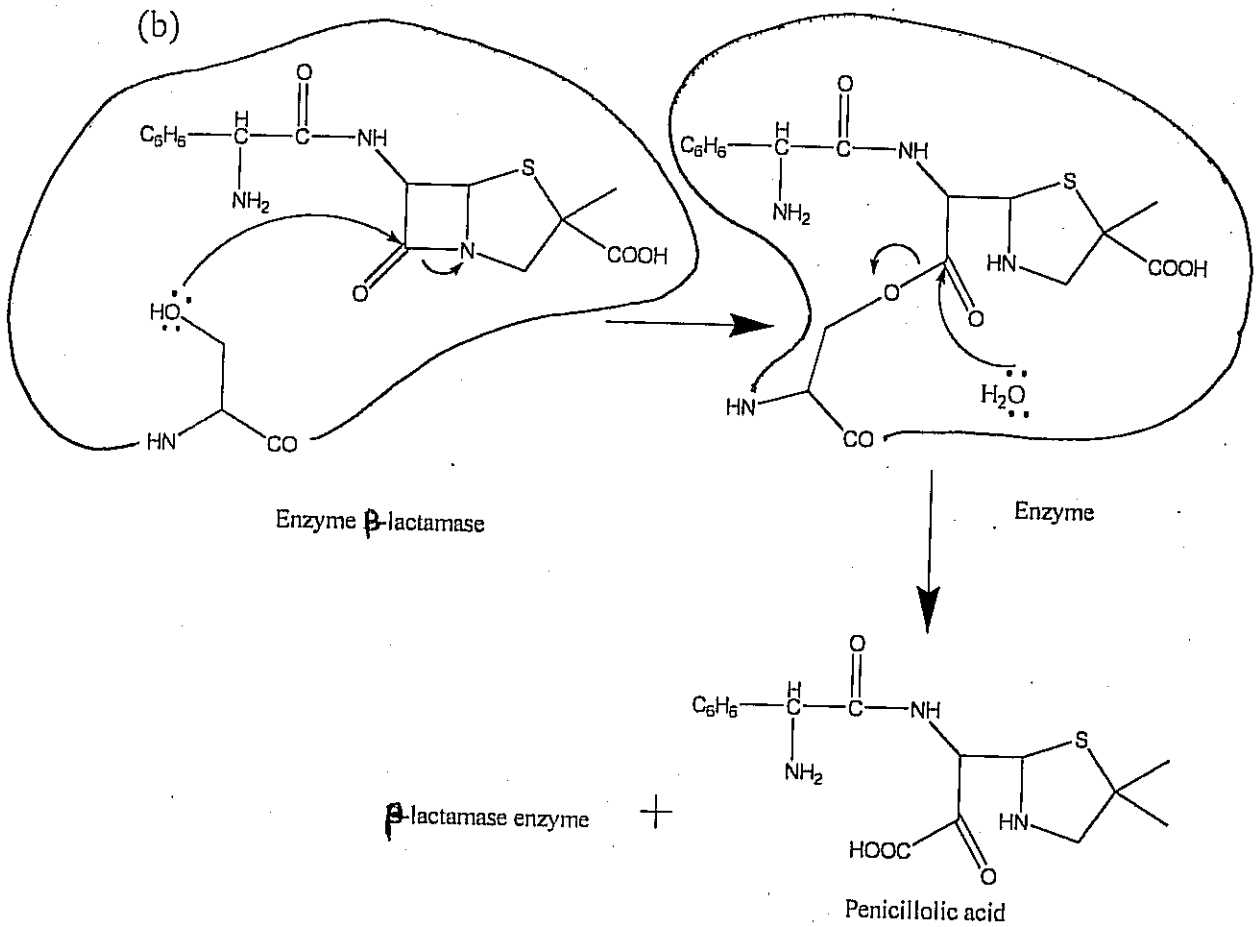
ii. Dehydrogenation- NAD+, NADP+

(b)Microorganisms attack plants and produce toxic natural products, which causes disease symptoms, mutations and finally destruction of the host plant. The host plant also counteracts in two ways. They produce natural products known as pre-inflectional allomones and post-inflectional allomones. Pre-infectional allomones are N products present in the plant before the microbial attack as plant defence mechanism.Post-infectional allomones are N products synthesized after the microbial attack as induced defense mechanism. Apart from these situations there are occasions where plant fungus symbiosis is advantageous to both organisms as in mycorrhiza formation.

4) (a) Penicilloic acid

Ampicilloic acid

(b)



5) (a) The allosteric effect is the tendency of a large molecule, such as a protein, upon binding a small molecule in one location, to change shape in such a manner that other locations are also affected.

(b) Prosthetic groups are more or less permanently bound to the enzyme and play a catalytic role in the reaction mechanism, providing functionality that the enzymes own side chains cannot provide. Co-substrates also play a role in the reaction, but are used up in the course of it, so that they must be replaced each time the reaction occurs. In this they behave like just another substrate.