THE OPEN UNIVERSITY OF SRI LANKA

B Sc Degree Progamme/ Stand Alone course-2008/2009

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

CHU 3131/CHE 5131 – Chemistry of Amino Acids, Sugars and Related Compounds

Time : 1 1/2 Hours

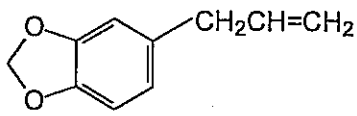
Date : Monday 9th March 2009 **Time : 4.00 pm – 5.30 pm**

ANSWER ALL QUESTIONS IN THE SPACE PROVIDED.

Registration Number

Question No.	Marks
1	
2	
3	
4	
5	
Total	

(1) Phenolic Compounds are derived from different biosynthetic pathways. Name the possible biosynthetic pathway for each of the following types.



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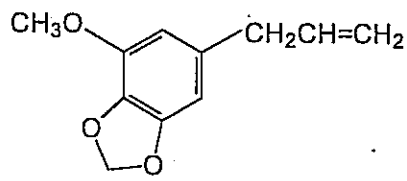

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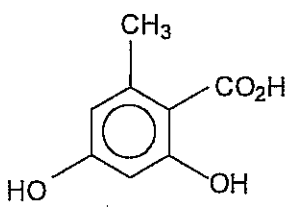

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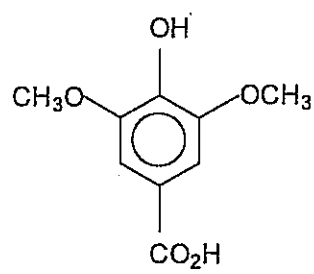

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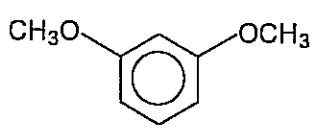
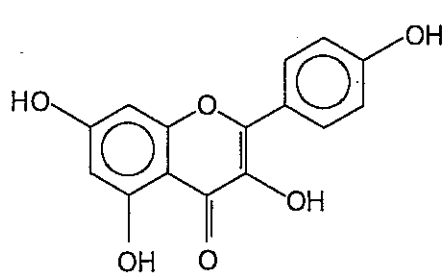


..... (20 marks)

(2) Kaemferol (**A**) is a flavonoid. Ethanolic solution of (**A**) shows a UV absorption band in the region 250-270 nm.



Kaemferol (**A**)

(i) Explain the shift observed in the UV spectrum of Kaemferol (**A**), when $AlCl_3$ is added.

(ii) What change would you expect in the UV spectrum of (**A**) when alco. NaOAc is added. Explain briefly.

(iii) Explain why the OH group at C-5 of (**A**) is less acidic than that at C-7.

(20 marks)

(3) (i) List five biological activities of tannins.

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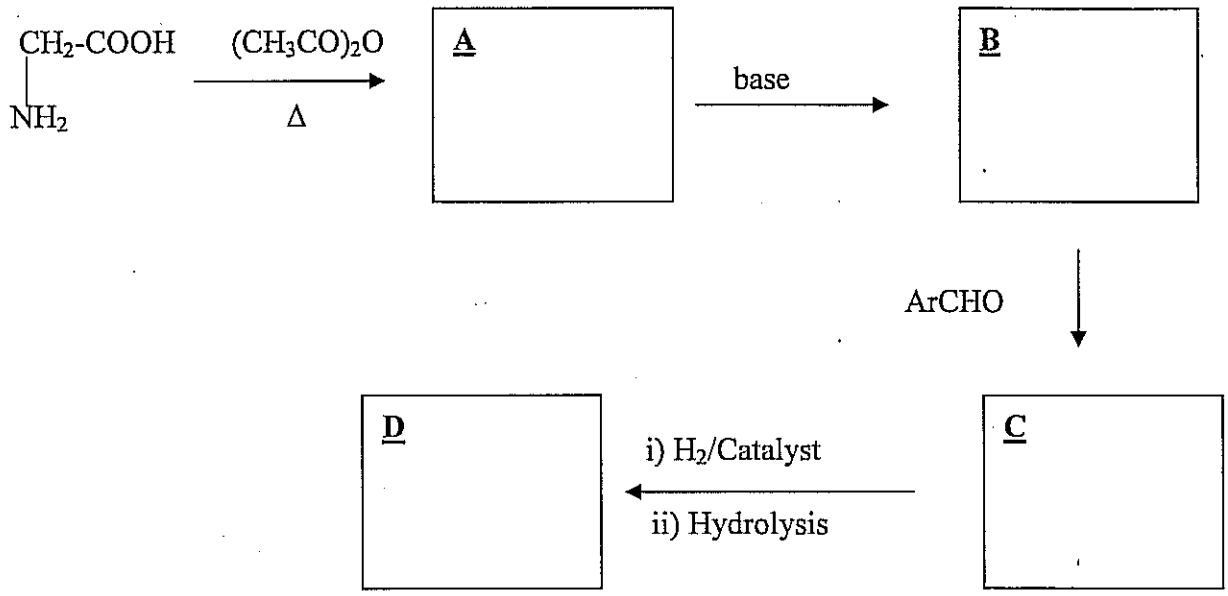
(ii) Give an example to show that coumarins are biologically active.

(16 marks)

(4) (i) Glycine underwent the following reaction sequence. Propose structures for **A**, **B**, **C** and **D**.



(ii) Predict the products of the following reactions.

a) $NH_2CHR\text{-}COOH + PhCH_2OH \xrightarrow{HCl \text{ or } pTsOH}$ ☐

b) $NH_2CHR\text{-}COOH + Ph_2CN_2 \longrightarrow$ ☐

(24 marks)

(5) Write the structural formula for the tripeptide val.ala.gly.

$NH_2CHCOOH$	$NH_2CHCOOH$	NH_2CH_2COOH
CH_3	$CH(CH_3)_2$	
Alanine	Valine	Glycine

☐

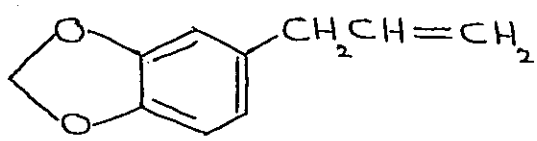
(ii) 2,4-Dinitroflurobenzene is used for N-terminal analysis of peptides. Write down the structures of the products when the tripeptide val.ala.gly is treated with 2,4-dinitroflurobenzene followed by hydrolysis.

(20 marks)

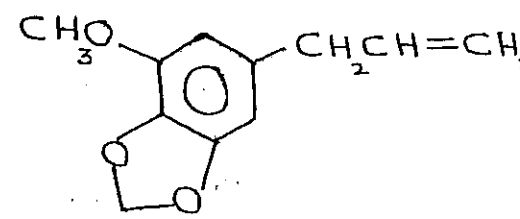
CHU 3131/ CHU 5131
Chemistry of Amino acids, Sugars and related compounds
Level 05
Continuous Assessment Test I (NBT)

Answer Guide

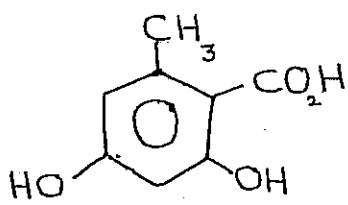
1



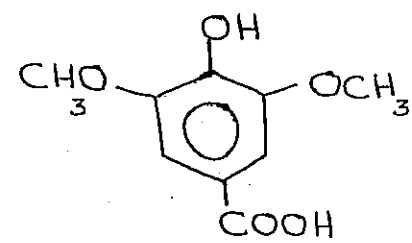
Shikimic acid pathway



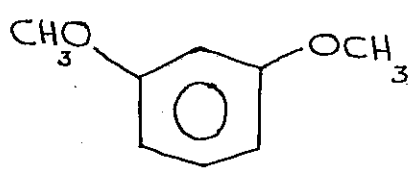
Shikimic acid pathway



polyketide pathway



Shikimic acid pathway



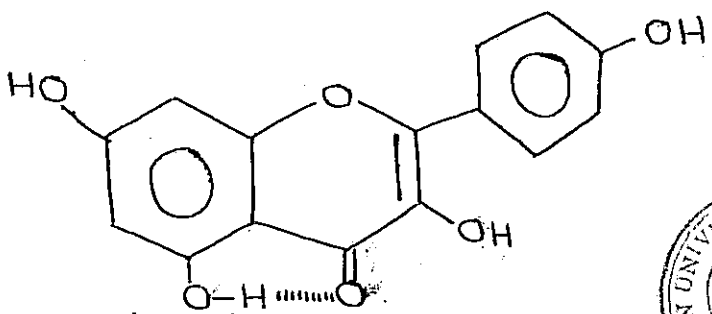
polyketide pathway

2 i)

complex formation takes place with kaemferol (A) containing CO group at C-4 with OH groups at C-5 and C-3. Complex formation shows strong bathochromic shift.(bands get shifted to longer wave length side).OH group at C-3,the complex is more stable than at C-5.

ii) Absorption band ii UV (is due to ring A)get shifted to longer wave length.(Bathochromic shift)
In alcoholic NaOAC the alkalinity is low. Therefore only the phenolic functions with the strongest acidity are ionized. The hydroxyl group at C-7 , the most acidic is affected and showed bathochromic shift of band ii.

iii)



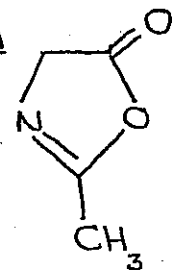
intermolecular H bond

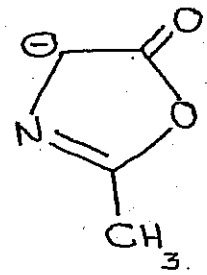
OH group C-5 can form intermolecular H bonds with CO at C-4.(more stable) therefore the OH at C-7 is more acidic than OH at C-5.

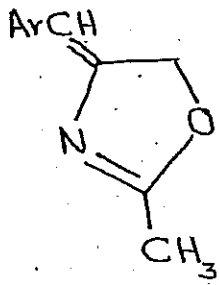
3 i)

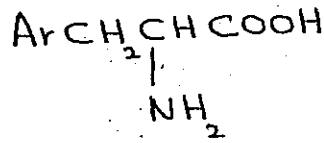
1 Responsible for the beautiful colors of flowers and autumn leaves.
2 Protect plants against disease
3 Protect plants against herbivores
4 Antimicrobial
5 Antiviral
6 Antifungal
7 Antioxidant

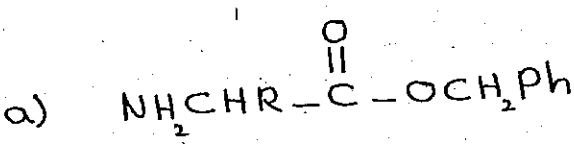
ii) Certain Coumarins act as anticoagulants and inhibit Vitamin K. Vitamin K is required as a Co-enzyme in the synthesis of prothrombin and three other blood clotting factors.Therfore blood clotting is reduced.

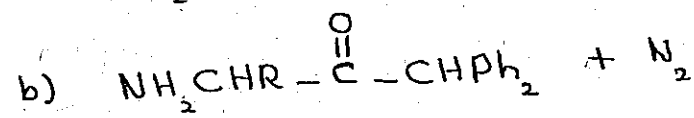
4) i) A 

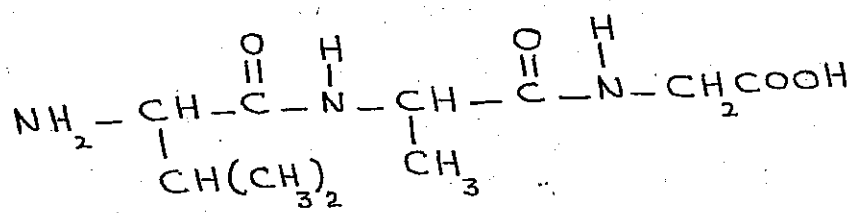
B 

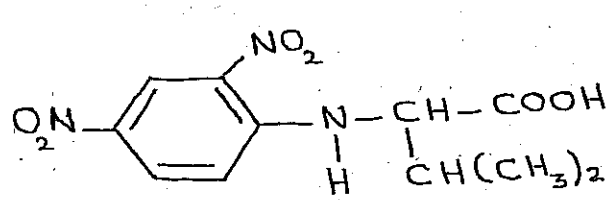
C 

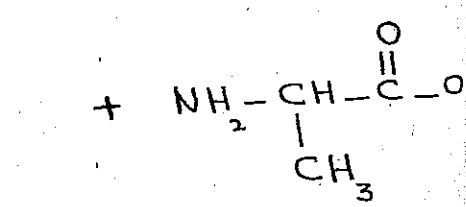
D 

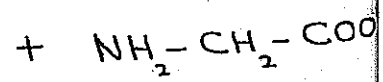
ii) a) 

b) 

5) i) 

ii) 

+ 

+ 

THE OPEN UNIVERSITY OF SRI LANKA

B Sc Degree Programme/ Stand Alone Course-2008/2009

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

CHU 3131/CHE 5131 – Chemistry of Amino Acids, Sugars and Related Compounds

Time : 1 1/2 Hours

Date : Sunday 05th April 2009 Time : 3.30 pm – 5.00 pm

ANSWER ALL QUESTIONS IN THE SPACE PROVIDED.

Registration Number

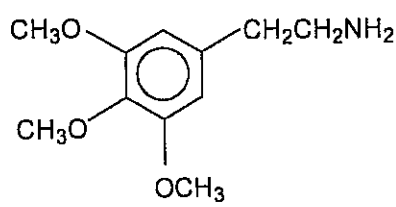
Question No.	Marks
1	
2	
3	
4	
Total	

(1) (a)A plant extract gave positive response to the Dragendoff and Iodoplatinate reagent. What group of natural products answer these tests? How would you separate this group of compounds from the plant extract?

(10 marks)

(b) Classify the following alkaloids in their groups according to the nucleus present.

(i)



Mescaline

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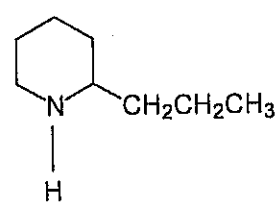
(ii)



Coniine

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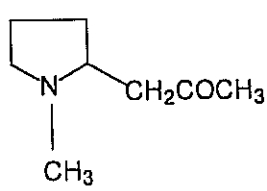
(iii)



Hygryne

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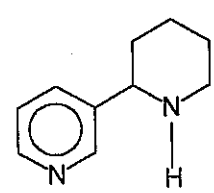
(iv)



Anabasine

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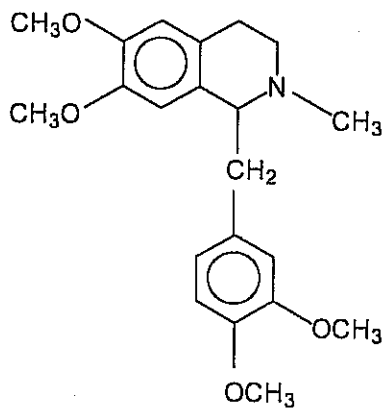
(v)



Laudanosine

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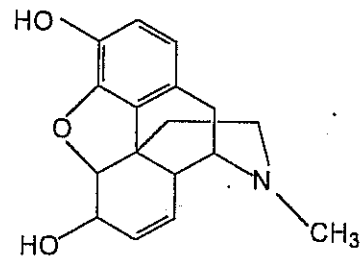
(vi)



Morphine

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(12 marks)

(2) (a) (i) Draw the chair conformations for α and β-D-glucopyranose.

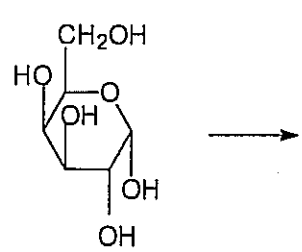
α-D-glucopyranose

β-D-glucopyranose

(08 marks)

(b) Give the structure of the major product when galactose is treated with,

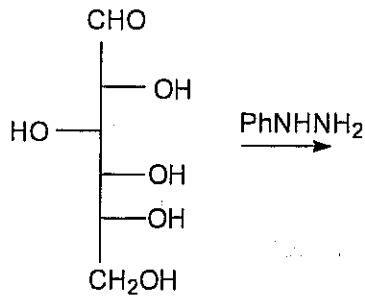
(i) CH_3COCH_3/anhy. $CuSO_4$/Conc. H_2SO_4



Galactose

(05 marks)

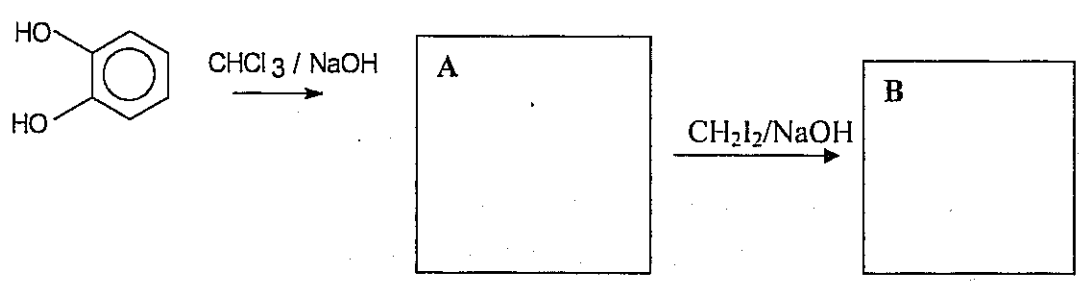
(c) Give the final product from the reaction of D-glucose with $PhNHNH_2$. Show the intermediates and name the product.



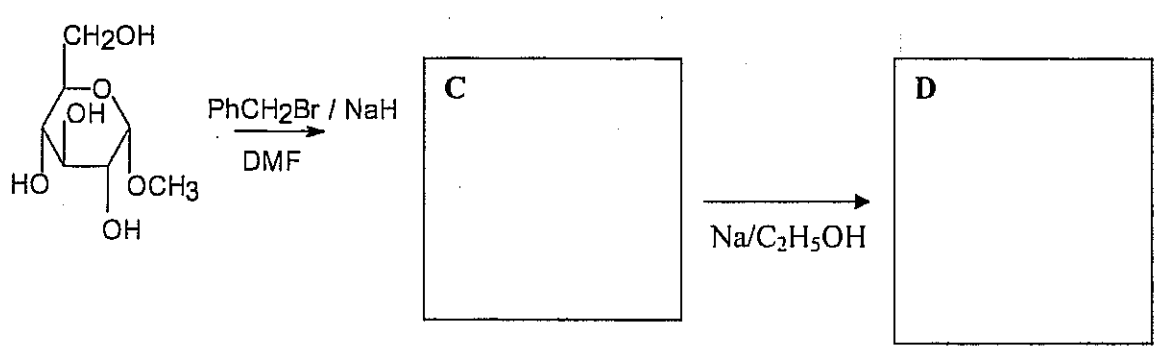
(10 marks)

(3) Give the structures of the compounds, **A-G** of the following reaction schemes.

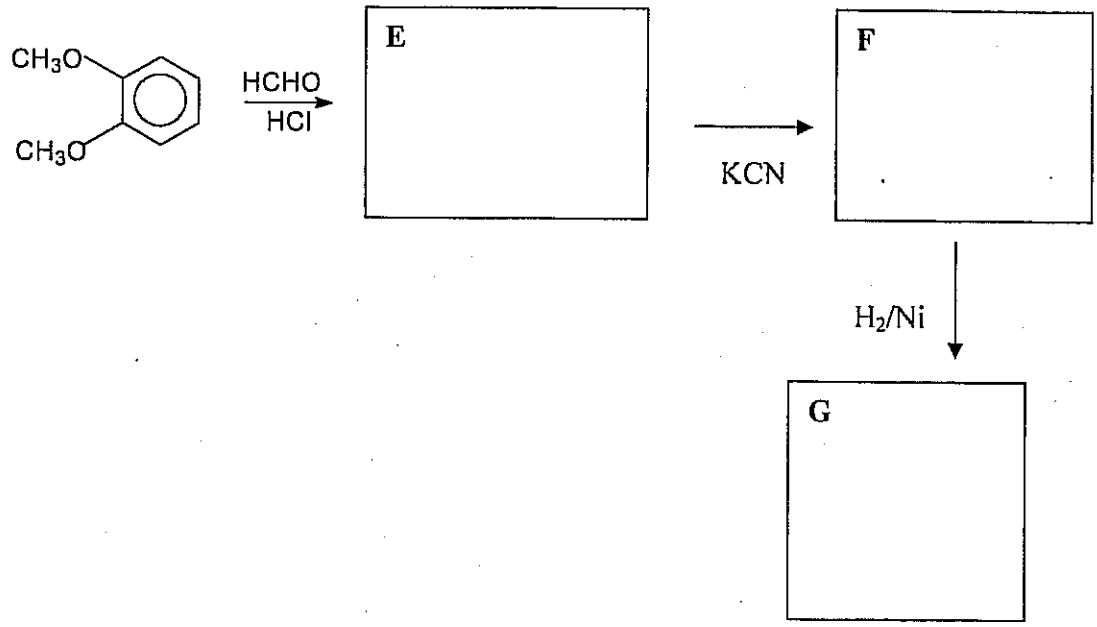
(a)



(b)

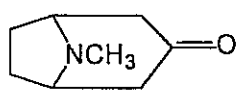


(c)



(35 marks)

(4) Propose a simple synthesis of tropine using succindialdehyde $OHCCH_2CH_2CHO$, methylamine CH_3NH_2, and acetone CH_3COCH_3 as the only organic starting materials. Give the mechanism at each step.

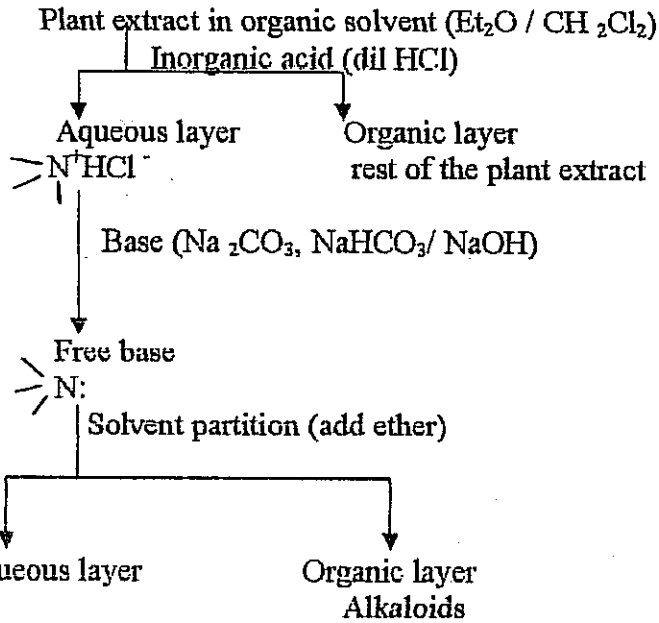


tropine

(20 marks)

CUH 3131
Chemistry of Amino acids, Sugars and Related Compounds
Answer guide for Assessment Test 11 (2008/2009)

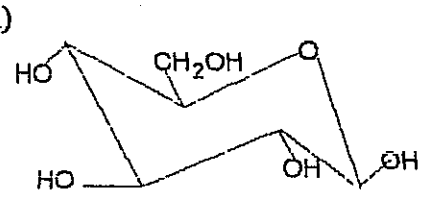
1) a) Alkaloids



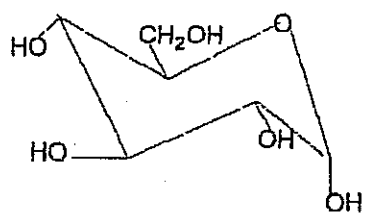
b)

i) Mescaline - phenylethylamine
ii) Coniine - piperidine
iii) Hygryne - pyrrolidine
iv) Anabasine - pyridine alkaloid
v) Laudanosine-tetrahydroisoquinoline
vi) Morphine - phenanthrene alkaloid

2) a) (i)

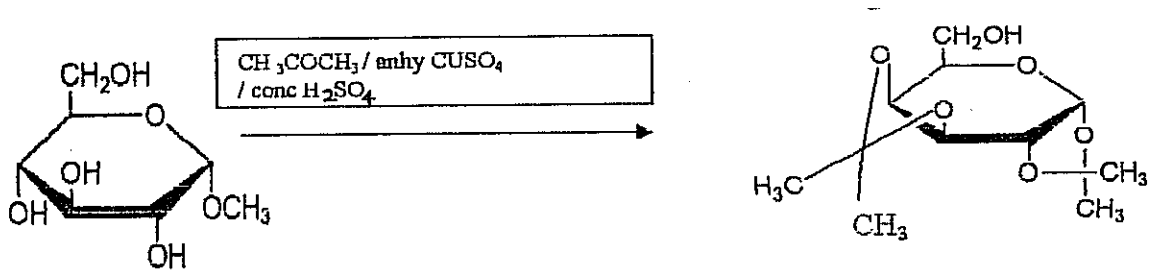


β- D-glycopyranose

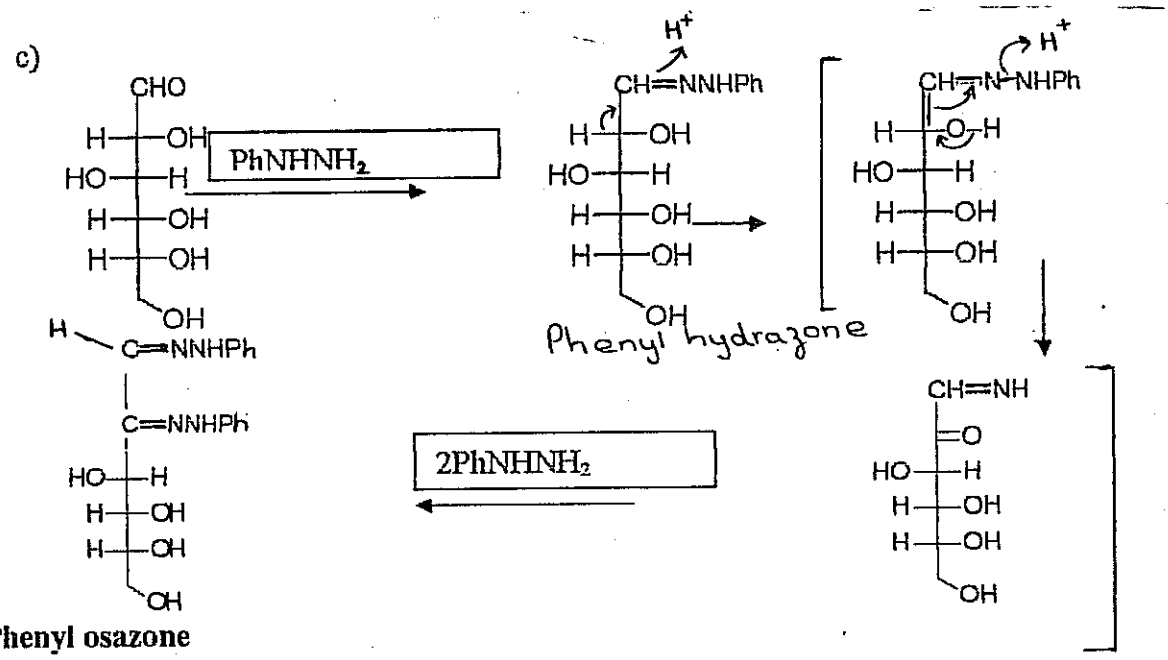


α-D- glycopyranose

b)



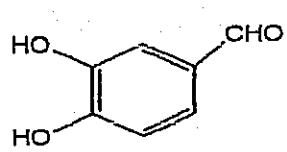
c)



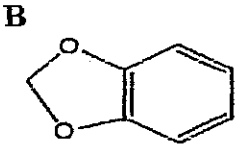
Phenyl osazone

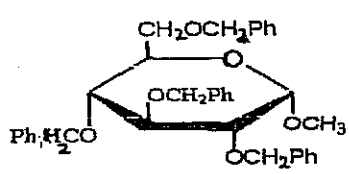
3) a)

A

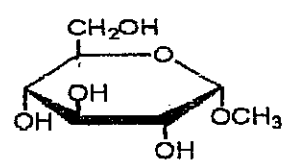


B



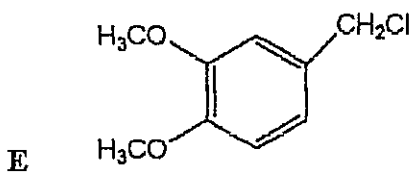


C

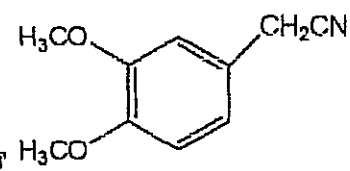


D

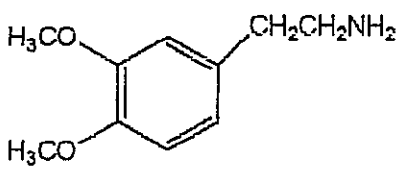
c)


H3CO
CH2Cl
H3CO

E

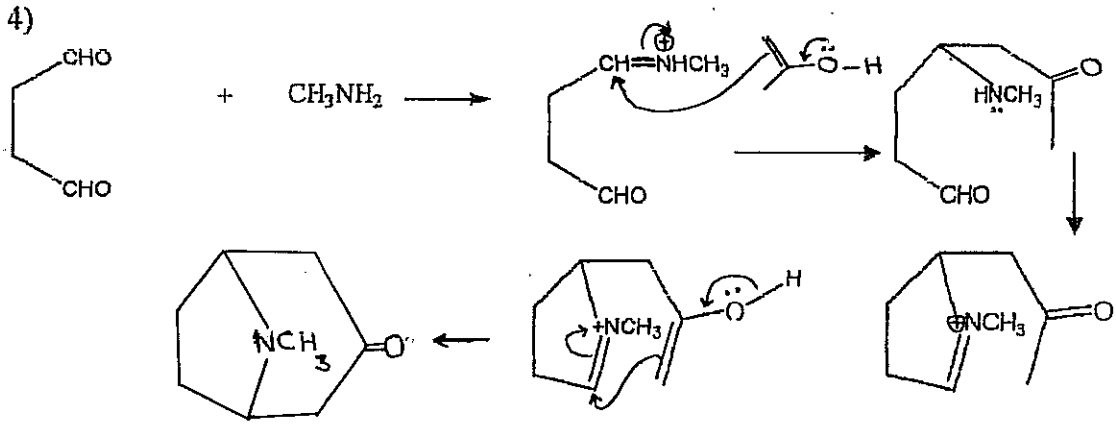

H3CO
CH2CN
H3CO

F


H3CO
CH2CH2NH2
H3CO

G

4)


CHO
CHO
+
CH3NH2
CH=NHCH3
O–H
CHO
HNCH3
O
CHO
NCH3
O
+NCH3
O
H
NCH3
O