

This question paper contains 4 printed pages.]

Your Roll No. ....

4325

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**M. Tech./Sem. III**  
**CHEMICAL SYNTHESIS AND PROCESS**  
**TECHNOLOGIES**  
**Paper—Module—16 : Bioactive Compounds**  
**of Natural Origin**  
**(Admissions of 2008 and onwards)**

Time : 2 Hours

Maximum Marks : 38

*(Write your Roll No. on the top immediately  
on receipt of this question paper.)*

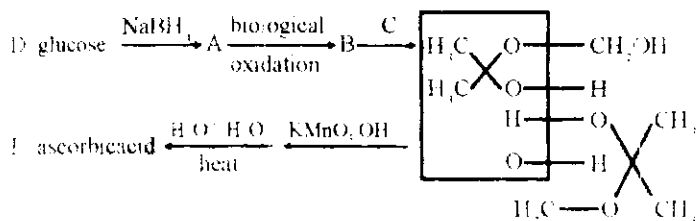
*Attempt all questions.*

1. (a) (i) Give a reaction showing the presence of one  $\beta$ -ionone nucleus in vitamin  $A_1$ .
- (ii) Write down the occurrence and structure of a biologically active geometrical isomer of vitamin  $A_1$ .
- (b) (i) Define the terms apoenzyme and holoenzyme. Which one is biologically active ?
- (ii) Mention important reactions that have been postulated for the biosynthetic conversion of amino-acid into alkaloids.
- (c) Write down the synthesis of pyridoxine.

[P.T.O.]

(d) (i) How will you establish the presence of keto-enol system in ascorbic acid?

(ii) In the synthesis shown below, give the structures of the compounds A - C.

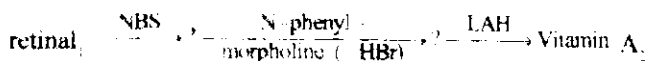


2, 2, 2, 4

2. (a) (i) Vitamin D<sub>3</sub> exists in the more stable S-trans conformation. How can it be attained?

(ii) When exposed to ultraviolet radiation from the sun, 7-dehydrocholesterol is converted into vitamin D<sub>3</sub>. Write the sequence of reactions.

(b) Complete the following reaction.



(c) Write important characteristics, regarding the structure of vitamin B<sub>12</sub>.

Or

N-acetyl glucosamine is an important constituent of surface membranes in mammalian cells. How is it synthesized in nature?

- (d) (i) Write down the chemical composition, properties and uses of Aloe vera plant.
- (ii) Give the chief constituents and uses of the following :
- (I) eucalyptus oil
- (II) clove oil 2, 2, 2, 3
3. (a) Write down the enzyme function of vitamin B<sub>1</sub>, pyridoxine, vitamin B<sub>12</sub> and vitamin D.
- (b) (i) Why is vitamin B<sub>2</sub> also called lactoflavin ?
- (ii) What happens when a neutral solution of lactoflavin is exposed to light ?
- (iii) Write the structure of riboflavin and establish that it contains a side chain attached to N-9.
- (c) (i) Write down the usual sources of thiamine. How does it occur in all cells ?
- (ii) 
$$C_{12}H_{18}C_2N_4OS + Na_2SO_3 \rightarrow C_6H_9NOS + C_6H_9N_3O_3S + 2NaCl$$

(thiamine)
(A)
(B)

Give the structures of A and B. How are these fragments united in thiamine ? Explain giving suitable reasons.
- (d) Give a possible mechanism for the biosynthesis of any one of the following :
- (i) cuscohygrine
- (ii) nicotine. 2, 3, 3, 2

[P.T.O.]

4. (a) Propose a detailed mechanism for decarboxylation of an  $\alpha$ -amino acid catalyzed by pyridoxal phosphate.
- (b) Write a note on the following :
- (i) Downstream processes
  - (ii) Importance of natural products in drug discovery.
- (c) Write down the structure of  $\alpha$ ,  $\beta$  and  $\gamma$ -tocopherols. What happens when each one of them is heated with HI ?

*Or*

Give the synthesis of  $\gamma$ -tocopherol.

- (d) (i) Describe pathways for biosynthesis of a linear polyketide. What happens when it is reduced ?
- (ii) Explain the biogenesis of 6-methyl salicylic acid.

3, 2, 2, 2