

M.Sc. CHEMISTRY
FOURTH SEMESTER
NATURAL PRODUCT CHEMISTRY
MSC - 401A
[USE OMR FOR OBJECTIVE PART]

**SET
A**

Duration: 3 hrs.

Full Marks: 70

Time: 30 min.

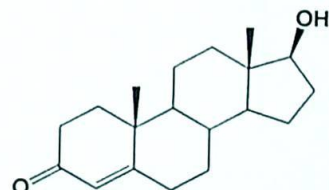
(PART-A: Objective)

Marks: 20

Choose the correct answer from the following:

1X20=20

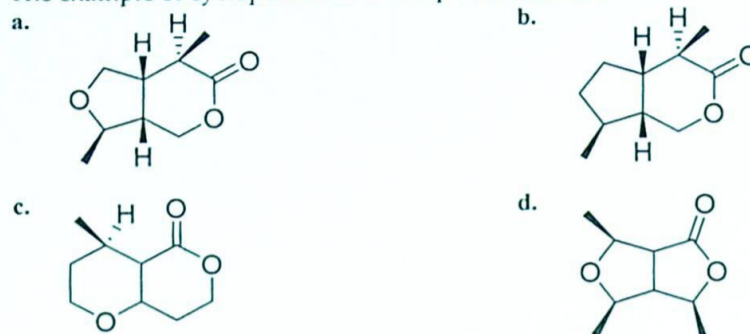
- The structure of Steroids is based on
 - Anthracene type ring
 - Cyclopenta-naphthalene type ring
 - Cyclohepta-phenanthrene type ring
 - Cyclopenta-phenanthrene type ring
- Lutein is a xanthophyll which has molecular formula
 - $C_{40}H_{56}O_2$
 - $C_{48}H_{64}O_2$
 - $C_{40}H_{64}O_2$
 - $C_{48}H_{76}O_2$
- Estrogens contains
 - two -OH group
 - one -OH group and one -C=O group
 - two -C=O group
 - no functional group
- Ascorbic acid is
 - Vitamin B9
 - Vitamin B7
 - Vitamin A
 - Vitamin C



This structure corresponds to

- Vitamin
 - Testosterone, C-19 class steroid
 - Provitamin A
 - Hydrocortisone, C-19 class steroid
- The IPP & DMAPP are formed in the cytosol from
 - Acetyl-CoA & D-glyceraldehyde-3-phosphate (G3P)
 - Pyruvic acid & D-glyceraldehyde-3-phosphate
 - Acetyl-CoA
 - Mevalonic acid & pyruvic acid

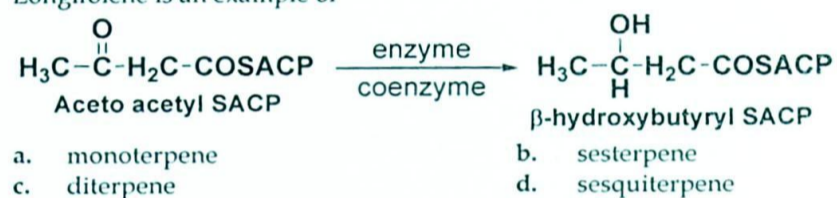
7. The example of cyclopentato monoterpene lactone is



8. In the biosynthesis of trans-chrysanthemic acid, the cyclopropane ring formation takes place due to the reaction between

- a. DMAPP & DMAPP
b. DMAPP & IPP
c. FPP & IPP
d. IPP & IPP

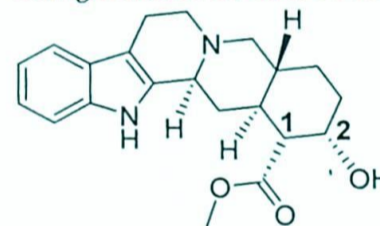
9. Longifolene is an example of



10. Biosynthesis of Reticuline starts from an amino acid which is

- a. L-Proline
b. L-tyrosine
c. L-Tryptophan
d. Phenylalanine

11. Configuration of the C1 & C2 carbons of the alkaloid 'Yohimbine' are



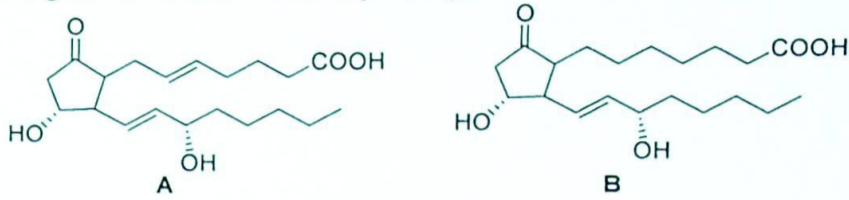
Yohimbine

- a. R, S
b. S, R
c. R, R
d. S, S

12. Starting material for bio-synthesis of cis-jasmone is

- a. Arachidonic acid
b. Linolenic acid
c. Linolic acid
d. Oleic acid

13. The following molecules A and B are respectively.



are

- a. A = PGE₂, B = PGE₁ b. A = PGE₁, B = PGE₂
 c. A = PGD₂, B = PGD₁ d. A = PGF₂, B = PGF₁
14. Which of the following is a wrong statement
 a. Triglycerides are saponifiable lipid b. Muscone is a saponifiable lipid
 c. Bio-synthesis of palmitic acid involve CH₃COSCoA d. steroids are non saponifiable lipid
15. Lecithins are
 a. Simple triglycerides b. Phosphoglycerides
 c. Non saponifiable lipids d. Terpenoids
16. The correct statement during extraction of an alkaloid, as shown in the following scheme:
- Crude alkaloid extract**
 added: (i) H₂O & P^H adjusted to 2
 (ii) steam distilled to remove CH₃OH used in earlier step
 (iii) allowed to stand and filtered
- | | |
|---|--|
| <p>Filtrate</p> <p>a. Filtrate will contain alkaloid in salt form
 c. Residue will contain alkaloid in salt form</p> | <p>Residue</p> <p>b. Filtrate will contain alkaloid in native form
 d. Residue will contain alkaloid in native form</p> |
|---|--|
17. Base sequence in DNA strand is 5'-GTCCTCGA-3', its corresponding m-RNA base sequence will be
 a. 5'-CAGGAGCT-3' b. 3'-GUCCUCGA-5'
 c. 3'-CAGGAGCT-5' d. 5'-GUCCUCGA-3'
18. Which of the RNA molecules is used to carry genetic information copied from DNA?
 a. tRNA b. tRNA
 c. rRNA d. snRNA

19. Which ratio is constant in DNA

- a. $[A + U] / [G + T]$ b. $[A + T] / [G + C]$
c. $[A + C] / [G + T]$ d. $[A + G] / [T + C]$

20. A DNA segment contains 60 adenine and 50 guanine, how many nucleotides are present in the segment.

- a. 110 b. 170
c. 160 d. 220

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(Descriptive)

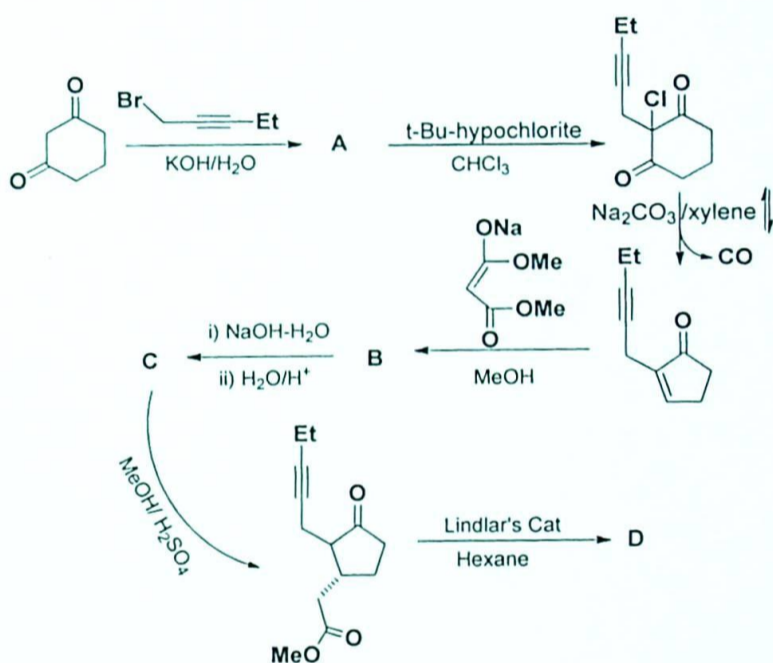
Time : 2 hrs. 30 mins.

Marks : 50

[Answer question no.1 & any four (4) from the rest]

1. a. Write notes on codons. 5+2+3=
10
- b. Write down the structure of FPP and show its biosynthesis from IPP.
- c. Describe the synthesis of Equilenin

2. a. What are alkaloids? How alkaloids can be extracted from their natural sources? 3+4+3
=10
- b. Write down the structure of A, B, C & D in the following sequence of reactions.



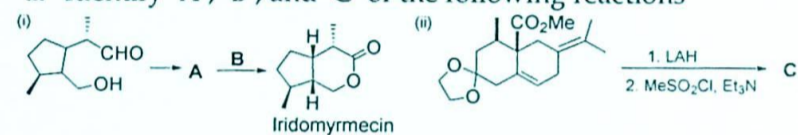
- c. How you will establish the position of CH_3 - group with respect to ketonic group in muscone?

3. a. What will be the structure of DNA segment (base sequence) that will be responsible to synthesise the hexapeptide having the sequence Lys.Gly.Ala.Ala.Val.Leu. The codons for these amino acids are Ala=GCU, Lys=AAG, Gly=GGA, Leu=UUG and Val=GUC. 5+5=10

b. Write a short account of bio-synthesis of nucleic acids.

4. What are lipids? How are they classified? Discuss general bio-synthesis of prostaglandins. 2+3+5=10

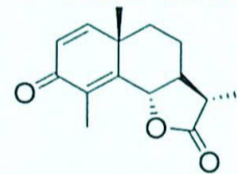
5. a. Identify 'A', 'B', and 'C' of the following reactions 3+3+4=10



- b. Give the synthetic route of tylophorine from 2,3,6,7-tetramethoxy-9,10-dimethylphenanthrene.



- c. Discuss the bio-synthesis of α -Santonin from FPP



6. a. Which type of terpenoid is Squalene? Describe its synthesis. 5+5=10
- b. What do you mean by corticosteroids? Describe its classification with proper examples.

7. a. Write down the name and structure of chemical component of Vitamin E. Describe the function of Vitamin E and its deficiency symptom.

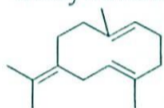
1+1+3
=5

b. The base sequence of a segment of DNA is [3'-AGGCTAACCTCAATCAGC-5']. Write down the complementary segment of the DNA. What will be the base sequence of the m-RNA during the process of transcription? Also, write down the peptide that is going to be synthesized from this m-RNA, using RNA codon table.

5

8. a. What is the starting material for the biosynthesis of germacrene B? Write down the mechanistic pathway of the biosynthesis of germacrene B.

3+3+4
=10



Germacrene B

b. Write the structure of geraniol and show its chemical synthesis.

c. Write the biosynthetic route of trans-chrysanthenic acid from IPP



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RNA Codon Table:

		Second Letter							
		U		C		A		G	
1st letter	U	UUU Phe UUC UUA Leu UUG	UCU UCC Ser UCA UCG	UAU Tyr UAC UAA Stop UAG Stop	UGU Cys UGC UGA Stop UGG Trp	U C A G			
	C	CUU Leu CUC CUA CUG	CCU CCC Pro CCA CCG	CAU His CAC CAA Gln CAG	CGU CGC Arg CGA CGG	U C A G			
	A	AUU Ile AUC AUA AUG Met	ACU ACC Thr ACA ACG	AAU Asn AAC AAA Lys AAG	AGU Ser AGC AGA Arg AGG	U C A G			
	G	GUU Val GUC GUA GUG	GCU GCC Ala GCA GCG	GAU Asp GAC GAA Glu GAG	GGU GGC Gly GGA GGG	U C A G			
								3rd letter	