

M.Sc. CHEMISTRY  
THIRD SEMESTER  
ORGANIC CHEMISTRY- III  
MSC – 301  
(USE OMR FOR OBJECTIVE PART)

**SET  
B**

Duration : 3 hrs.

Full Marks : 70

( Objective )

Time : 30 min.

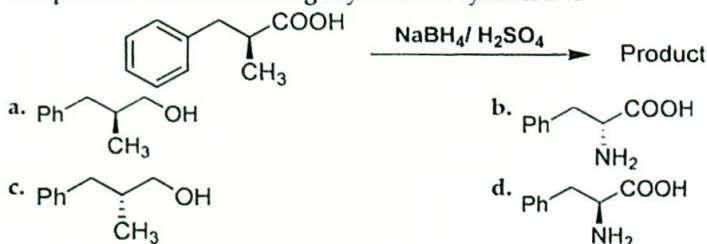
Marks : 20

Choose the correct answer from the following:

1x20=20

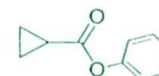
1. The catalyst used by Noyori for asymmetric hydrogenation consist of  
a. Rh  
b. Ir  
c. Ru  
d. W

2. The product of the following asymmetric synthesis is



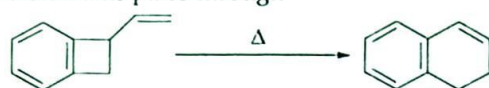
3. Jacobsen-Katsuki Epoxidation used the metal  
a. Zn  
b. Mg  
c. Mn  
d. Cu
4. The term retrosynthetic analysis coined by  
a. K B Sharpless  
b. E J Corey  
c. E. N. Jacobsen  
d. H O House
5. The nucleotides are joined to one another by phosphodiester bonds between the 3'-hydroxyl group of deoxyribose sugar of one nucleotide and the 5'-phosphate group of the next nucleotide forming an alternating-----.  
a. Nucleoside-phosphate backbone  
b. Nucleotide-phosphate backbone  
c. Sugar-phosphate backbone  
d. Glycoside-phosphate backbone
6. The method of combination of a silylated heterocycle and protected sugar acetate in the presence of a Lewis acid resulting in the formation of a mono-nucleoside is called  
a. silyl-Hilbert-Johnson method  
b. The fusion method  
c. The metal salt method  
d. none of these
7. In more recently developed *metal salt method* of the chemical synthesis of mono-nucleoside, the metal used as the metal salt of the base with a protected sugar halide is  
a. sodium  
b. gold  
c. silver  
d. nickel

8. The process by which methyl guanosine triphosphate gets attached at the 5' end of hnRNA produced during eukaryotic transcription is called
- Capping
  - Tailing
  - Splicing
  - None of the above
9. In a nucleoside, the anomeric carbon of sugar is linked through a glycosidic bond to the -----.
- N-7 of a purine or the N-1 of a pyrimidine.
  - N-5 of a purine or the N-1 of a pyrimidine.
  - N-9 of a purine or the N-2 of a pyrimidine.
  - N-9 of a purine or the N-1 of a pyrimidine.
10. The oxidizing agent used in Sharpless epoxidation is
- $\text{CrO}_3$
  - $\text{tBuOOH}$
  - $\text{CF}_3\text{COOH}$
  - $\text{KMnO}_4$
11. The triplet energy of benzophenone in kcal/mol is
- 49
  - 69
  - 59
  - 79
12. The major route that Cyclobutanone follows in Norrish-I reaction in alcohol is
- decarbonylation
  - hydrogen abstraction
  - Five membered ring formation
  - Three membered ring formation
13. The major product obtained from the following molecule under photochemical reaction condition will be *via*



- $\alpha$ -cleavage (C-C bond)
  - $\beta$ -cleavage
  - $\alpha$ -cleavage (C-O bond)
  - $\gamma$ -H abstraction
14. The reaction is an example of:
- 
- [5,5]sigmatropic rearrangement
  - [3,3]sigmatropic rearrangement
  - [1,3]sigmatropic rearrangement
  - [1,7]sigmatropic rearrangement
15. Which one of the followings is correct for the most of the carbonyl compounds?
- $S_0 \rightarrow S_1$  corresponds to  $\pi \rightarrow \pi^*$
  - $S_0 \rightarrow S_1$  corresponds to  $n \rightarrow \pi^*$
  - $S_1 \rightarrow S_2$  corresponds to  $\pi \rightarrow \pi^*$
  - $S_0 \rightarrow S_1$  corresponds to  $n \rightarrow \pi^*$

16. the following conversion take place through



- a.  $4\pi$  disrotation and  $6\pi$  conrotation  
 b.  $4\pi$  conrotation and  $6\pi$  disrotation  
 c.  $4\pi$  disrotation and  $6\pi$  disrotation  
 d.  $6\pi$  conrotation and  $4\pi$  disrotation

17. The product of the following electrocyclic ring closing reaction



- a.
- b.
- c.
- d.

18. Barton reaction occurs upon photolysis on

- a. phospho ester  
 b. nitrite ester  
 c. carboxylic ester  
 d. organic nitrates

19. The reaction of 1-bromo 2-fluoro benzene with furan in presence of one equivalent of Mg gives:

- a.
- b.
- c.
- d.

20. 1,3 - dipolar compounds are

- a. 4 - centre 4-electron system  
 b. 3 - centre 4-electron system  
 c. 3 - centre 3-electron system  
 d. 3 - centre 4-electron system

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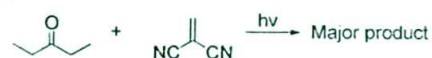
**( Descriptive )**

Time : 2 hrs. 30 mins.

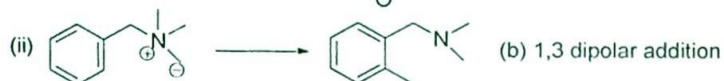
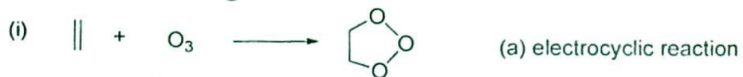
Marks : 50

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

1. a. Write the major product of the following reactions with justification 3



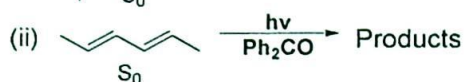
- b. Match the following 2



- c. Starting from (S)- (-) Leucine how will you synthesize the corresponding (s)-hydroxy acid. Show the mechanistic pathway. 2

- d. What are codons? Explain the term "degeneracy of codons" with examples? 3

2. a. Write the probable products of the following reactions with justification 5+2+3  
=10

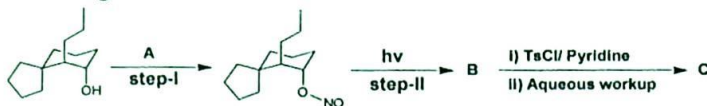


- b. Explain with justification the type of excited state of carbonyl compound involves in the  $\alpha$ -cleavage (C-C bond cleavage) reaction.

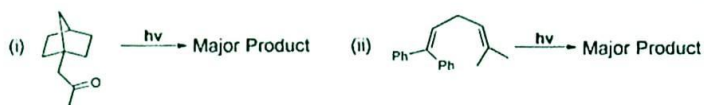
- c. Write the probable major products of the following reactions with justification



3. a. Identify the reagent (A) and the products (B & C) of the following reactions. Show the reaction mechanism. 3+2=5



- b. Write the major products of the following reactions



- c. Explain post transcriptional modification of hnRNA. 2
- d. Define translation What are the different RNAs taking part in the process of translation. Explain their role in this process. 3
4. a. What are nucleosides? How do they differ from nucleotides? Draw the structure of a DNA dinucleotide formed with the bases adenine and thymine and show the formation of phosphodiester bond. 5+3+2  
=10



b. Describe in brief the structure DNA molecule with a neat diagram.

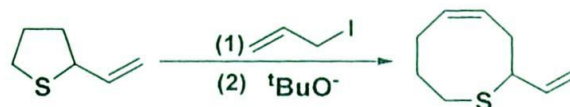
c. Write down the basic differences between prokaryotic and eukaryotic transcription.

5. a. Write the starting material for the following Diels Alder reaction product. 2+2+3+3  
=10

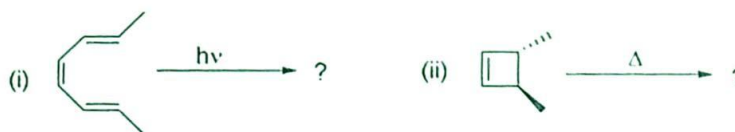


b. Write note on Cope rearrangement.

c. Justify the formation of the following reaction:

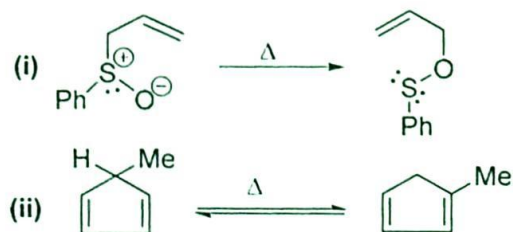


d. Write down the product formed.

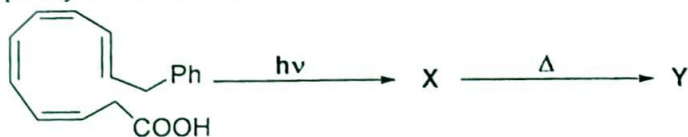


6. a. What are ene-reactions? Explain with suitable example. 2+2+3+3  
=10

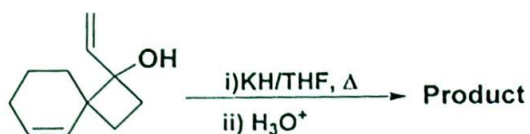
b. Find out the order of following sigmatropic rearrangements:



- c. Predict the products X and Y in the following sequence of pericyclic reactions.

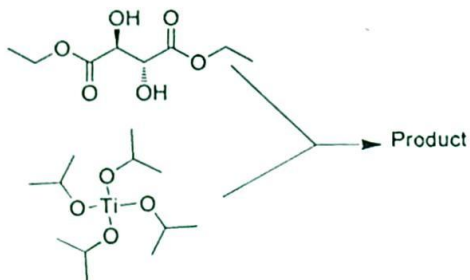


- d. Predict the product formed in the following reaction with mechanism,

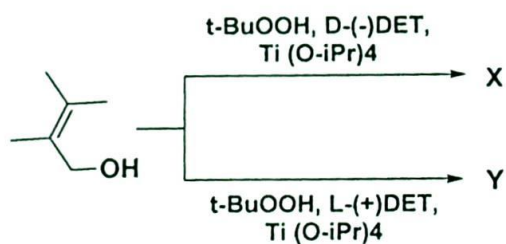


7. a. What is the product of the following reaction? Deduce the structure.

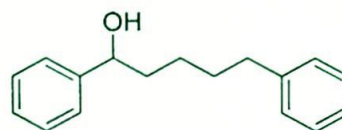
2+2+2+4  
= 10



- b. Draw the structure of (R)- $\text{Ru}(\text{OAc})_2(\text{BINAP})$  and (S)- $\text{Ru}(\text{OAc})_2(\text{BINAP})$
- c. Write down the product X and Y



- d. Draw the structure of Jacobsen's Catalyst and deduce the mechanistic pathway for its synthesis.
8. a. Deduce the detailed cyclic mechanistic pathway of Noyori asymmetric hydrogenation reaction. 5+5=10
- b. Through retrosynthetic analysis write the all the possible disconnection approach, synthons and their synthetic equivalent for the following compound. Mention the best synthetic pathway to prepare the compound.



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