

M.Sc. CHEMISTRY  
THIRD SEMESTER  
ORGANIC CHEMISTRY- III  
MSC – 301 [SPECIAL REPEAT]  
[USE OMR FOR OBJECTIVE PART]

**SET  
A**

Duration : 3 hrs.

Full Marks : 70

Time : 30 min.

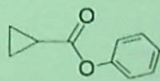
Marks : 20

(Objective)

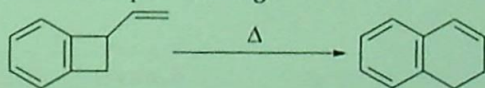
Choose the correct answer from the following:

1X20=20

- The triplet energy of benzophenone in kcal/mol is
  - 49
  - 69
  - 59
  - 79
- 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  $n \rightarrow \pi^*$
- The major route that Cyclobutanone follows in Norrish-I reaction in alcohol is
  - decarbonylation
  - hydrogen abstraction
  - Five membered ring formation
  - Three membered ring formation
- The major product obtained from the following molecule under photochemical reaction condition will be via

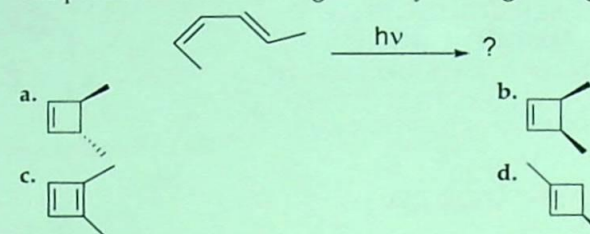


- $\alpha$ -cleavage (C-C bond)
  - $\beta$ -cleavage
  - $\alpha$ -cleavage (C-O bond)
  - $\gamma$ -H abstraction
- Barton reaction occurs upon photolysis on
    - phospho ester
    - nitrite ester
    - carboxylic ester
    - organic nitrates
  - 1,3 - dipolar compounds are
    - 4 - centre 4-electron system
    - 3 - centre 4-electron system
    - 3 - centre 3-electron system
    - 3 - centre 4-electron system
  - the following conversion take place through



- 4 $\pi$  disrotation and 6 $\pi$  conrotation
- 4 $\pi$  conrotation and 6 $\pi$  disrotation
- 4 $\pi$  disrotation and 6 $\pi$  disrotation
- 6 $\pi$  conrotation and 4 $\pi$  disrotation

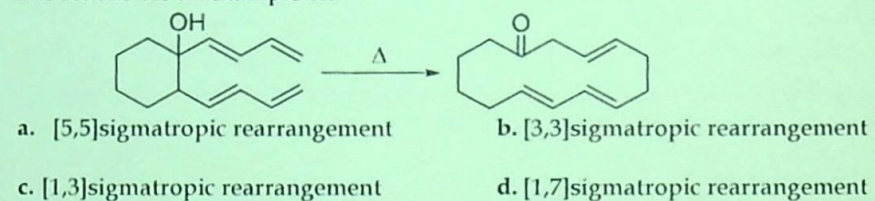
8. The product of the following electrocyclic ring closing reaction



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



10. The reaction is an example of:



11. The process by which methyl guanosine triphosphate gets attached at the 5' end of hnRNA produced during eukaryotic transcription is called

- a. Capping      b. Tailing  
c. Splicing      d. None of the above

12. In a nucleoside, the anomeric carbon of sugar is linked through a glycosidic bond to the -----.

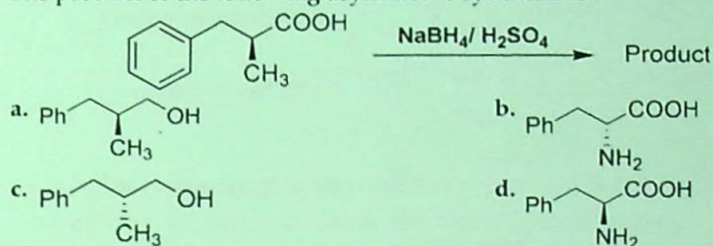
- a. N-7 of a purine or the N-1 of a pyrimidine.      b. N-5 of a purine or the N-1 of a pyrimidine.  
c. N-9 of a purine or the N-2 of a pyrimidine.      d. N-9 of a purine or the N-1 of a pyrimidine.

13. 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



14. 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
- silyl-Hilbert-Johnson method
  - The fusion method
  - The metal salt method
  - none of these
15. 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-----.
- Nucleoside-phosphate backbone
  - Nucleotide-phosphate backbone
  - Sugar-phosphate backbone
  - Glycoside-phosphate backbone
16. The term retrosynthetic analysis coined by
- K B Sharpless
  - E J Corey
  - E. N. Jacobsen
  - H O House
17. The product of the following asymmetric synthesis is



18. Jacobsen-Katsuki Epoxidation used the metal
- Zn
  - Mg
  - Mn
  - Cu
19. The catalyst used by Noyori for asymmetric hydrogenation consist of
- Rh
  - Ir
  - Ru
  - W
20. The oxidizing agent used in Sharpless epoxidation is
- CrO<sub>3</sub>
  - <sup>t</sup>BuOOH
  - CF<sub>3</sub>COOH
  - KMnO<sub>4</sub>

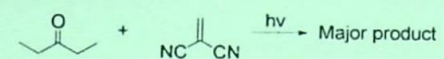
**( Descriptive )**

Time : 2 hrs. 30 mins.

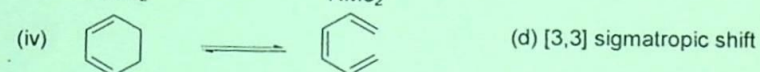
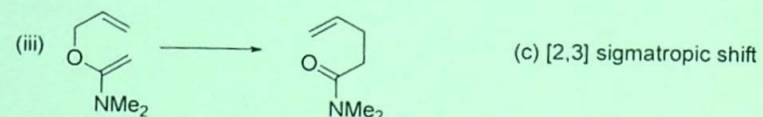
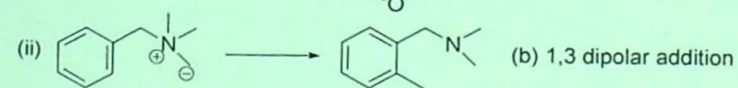
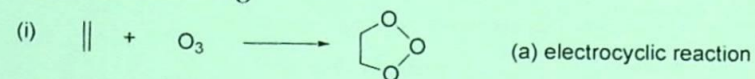
Marks : 50

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

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



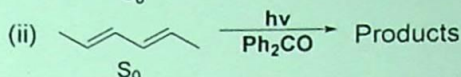
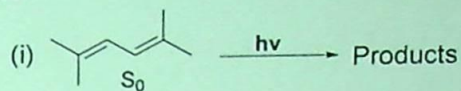
- b. Match the following 2



- 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

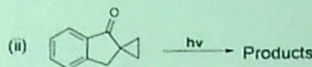
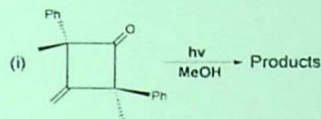
2. a. Write the probable products of the following reactions with justification

5+2+3  
=10



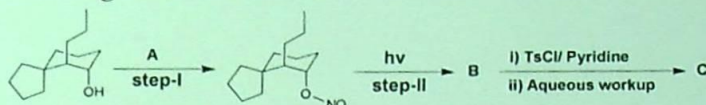
- b. Explain with justification the type of excited state of carbonyl compound involved in the  $\alpha$ -cleavage (C-C bond cleavage) reaction.

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

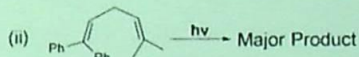
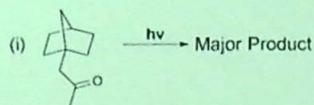


3. a. Identify the reagent (A) and the products (B & C) of the following reactions. Show the reaction mechanism.

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.

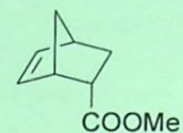
5+3+2  
=10

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



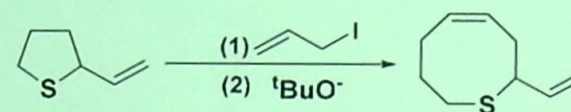
c. Write down the basic differences between prokaryotic and eukaryotic transcription.

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

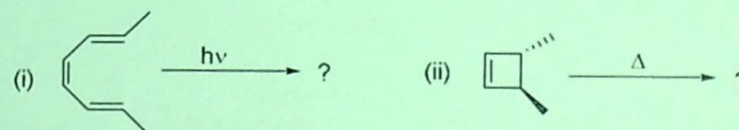


b. Write note on Cope rearrangement.

c. Justify the formation of the following reaction:

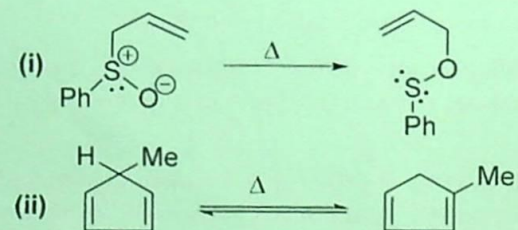


d. Write down the product formed.

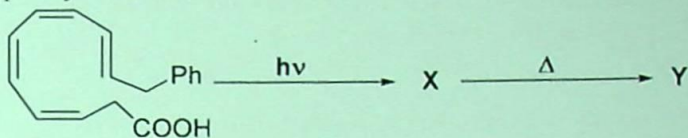


6. a. What are ene-reactions? Explain with suitable example. 2+2+3+3  
=10

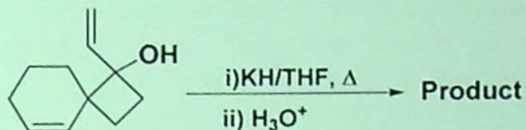
b. Find out the order of following sigmatropic rearrangements:



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

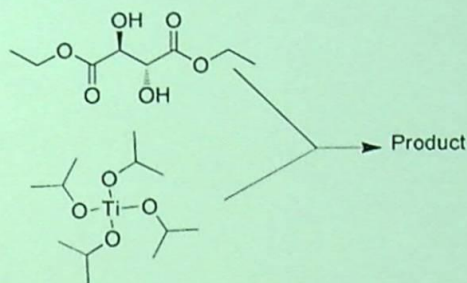


- d. Predict the product formed in the following reaction with mechanism,

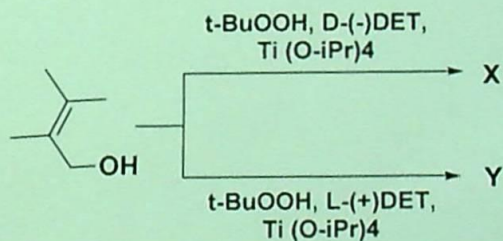


7. a. What is the product of the following reaction? Deduce the structure.

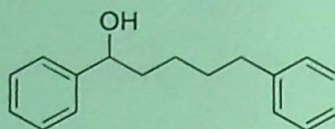
2+2+2+4  
= 10



- b. Draw the structure of (R)-Ru(OAc)<sub>2</sub>(BINAP) and (S)-Ru(OAc)<sub>2</sub>(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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