

**DN-107**

December-2013

M. Sc. (Sem-I)

**CHE-402 : Chemistry  
(Organic Chemistry)**

Time : 3 Hours]

[Max. Marks : 70

- Instructions :** (1) All questions are compulsory.  
(2) Figure to the right indicate full marks.

1. (A) Answer the following :

- (I) Giving orientation draw structures for all possible  $E_2$  products when 2-bromo butane reacts with concentrated potassium ethoxide. 4  
(II) Explain Hoffmann and Saytzeff's rule of elimination with evidence. 3

**OR**

- (I) Discuss  $E_1$  reaction with supporting evidences.  
(II) Compare Chugaev and Cope reactions with suitable example.

(B) Answer the following :

- (I) When enantiomerically pure (S)-2-bromo propanoic acid reacts with conc. KOH it gives (R)-lactic acid. When the same reaction is carried out in the presence of  $Ag_2O$  and low concentration of hydroxide ion it gives (S)-lactic acid. Explain. 4  
(II) What is allylic rearrangement ? Explain allylic rearrangement giving suitable example. 3

**OR**

- (I) Acetolysis of erythro 3-phenyl-2-tosyl butane gives erythro 3-phenyl-2-acetyl butane with retention of configuration while its threo isomer gives racemic mixture. Explain.  
(II) Compare  $SN^1$  and  $SN^2$  reaction with suitable examples.

2. (A) Answer the following :

- (I) Using frost circle method show why cyclooctatetraene is not aromatic while cycloheptatrienyl cation is aromatic ? 4  
(II) Discuss aromaticity in different annulenes. 3

**OR**

DN-107

1

P.T.O.

- (I) State Huckel's rule of aromaticity. Explain the terms of non-aromaticity and anti-aromaticity given illustrations.
- (II) Discuss aromatic character of azulene.

(B) Answer the following :

- (I) Discuss the effect of hydrogen bonding on the strength of an acid. 4
- (II) Discuss the applications and limitations of Hammett equation. Explain deviation from Hammett equation. 3

OR

- (I) Comment on the acidity of C-H bond in a haloform.
- (II) Give Hammett equation. Explain all the terms and show that the Hammett equation is a linear free energy relationship.

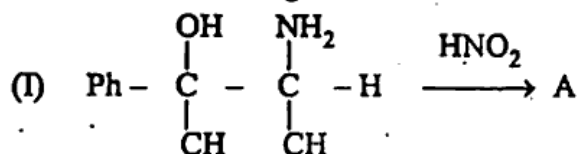
3. (A) Answer the following :

- (I) Discuss three different reactions in which carbanion is a reactive intermediate. 4
- (II) Discuss non-classical carbocations. 3

OR

- (I) What are free radicals ? How they are generated ? Discuss their stability.
- (II) Discuss methods to distinguish singlet & triplet carbenes.

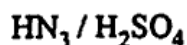
(B) Answer the following :



Identify product A. Name the rearrangement and offer suitable mechanism for this conversion. 4

- (II) Discuss the mechanism and application of Favorskii rearrangement. 3

OR



- (I) Cyclohexanone  $\xrightarrow{\quad\quad\quad}$  A

Identify product A. Name the rearrangement and offer suitable mechanism for this conversion.

- (II) Discuss migratory aptitude in Baeyer-Villiger's rearrangement.

4. (A) Answer the following :

- (I) What is resolution ? Give any three methods of resolution of racemates. 4
- (II) Discuss stereochemistry of allenes. 3

OR

- (I) Discuss prochiral relationship with suitable examples.
- (II) Discuss stereochemistry of spiranes.

- (B) Discuss the stereochemistry of quaternary ammonium salts.

7

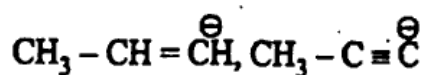
OR

Explain stereo-selective and stereo-specific reactions. Give a brief account on asymmetric synthesis.

5. Answer the following :

14

- (I) Arrange Se, O, Te and S in increasing order of nucleophilicity.
- (II) Name the factors which affect the overall reactivity of elimination reaction.
- (III) Giving the reaction show the end product when alcohol is dehydrated ?
- (IV) Give the limitations of Huckel's rule.
- (V) Which is more basic ? Aniline or methyl amine ? Why ?
- (VI) What are nitrenes ?
- (VII) Which of the following carbanions are more stable ?



- (VIII) Which type of double bonded compounds will produce carbene on photolysis ?
- (IX) Giving example discuss geometrical isomerism.
- (X) Giving one example each define chiral and achiral molecule.
- (XI) How acid chloride is converted to urethane ?
- (XII) Give mechanism for carbyl amine reaction.
- (XIII) Explain helicity.
- (XIV) Explain homotopic & enantiotopic hydrogen atoms.