FACULTY OF SCIENCE

M.Sc. III – Semester Examination, December 2016
Subject: Organic Chemistry
Paper – II
Asymmetric Synthesis, Synthesis Strategies & Heterocycles

Time: 3 Hours
Max. Marks: 80

Note: Answer all questions from Part-A and Part-B. Each question carries 8 marks in Part-A and 12 marks in Part-B.

PART – A (4x8 = 32 Marks)
[Short Answer Type]

1 a) Define and explain the following terms with an example each.
   i) Diastereomeric excess
   ii) Chiral shift reagents
   b) Assign Si and Re nomenclature to the following compounds.

2 a) Give the structures of the following:
   i) CBS reagent
   ii) DET and Ti(Opr)₄ complex
   b) Explain diastereoselective aldol condensation with one example.

3 a) Give the synthetic equivalents for the following synthons.

   b) Suggest heterosynthetic analysis and synthesis of the following compounds.

4 Offer the explanation for the following:
   a) Imidazole undergoes electrophilic substitution only under vigorous conditions.
   b) A hydroxyl derivative of pyrimidine is less soluble in water than pyrimidine itself.

PART – B (4x12 = 48 Marks)
[Essay Answer Type]

5 Discuss the following briefly with suitable examples.
   a) What are stereoheterotopic groups / faces? Explain with suitable examples based on symmetry criteria.
   b) Enantioselective reactions.

OR

   c) How % ee is determined by specific rotation and chiral derivatising agents? Explain.
   d) Write a brief note on methods of inducing enantioselectivity.

   ..2
6  a) Discuss any one method for chiral auxiliary controlled asymmetric synthesis. 6
   b) What is Jacobsen expoxidation. Explain it with suitable examples. 6
      OR
   c) Complete the following reaction and give its mechanism. 6
      \[
      \text{Ph} - \text{C} = \text{O} + \text{Et}_2\text{MgBr} \rightarrow \text{PhC} - \text{O} - \text{C} = \text{O}
      \]
d) Explain asymmetric hydrogenation using Nayori catalysts and give the mechanism of reaction. 6

7  a) Give retero synthetic analysis and synthesis of the following compounds. 6
   i) \( \text{PhCO}_2\text{CH}_3 \)
   ii) \( \text{H}_2\text{C} = \text{C} - \text{Cl} \)
   b) Define and explain the following taking suitable examples each. 6
   i) Convergent synthesis
   ii) Regioselective reactions
      OR
   c) What is criteria for disconnection of strategic bonds? Explain. 6
   d) Discuss the retrosynthetic analysis and synthesis of the following compounds. 6
      i) \( \text{Ph} - \text{COOH} \)
      ii) \( \text{Me} - \text{C} = \text{C} - \text{Ph} \)

8  Discuss briefly the following:
   a) Synthesis and reactivity of isoxazole 6
   b) Electrophilic substitution in thiazole
      OR
   c) How do you prepare thiazole and imidazole taking phenacyl bromide as one of the starting material? 6
   d) i) Discuss briefly about the electrophilic substitutions on oxazole.
      ii) What happens when acetyl acetone is treated with \( \text{NH}_2\text{NH}_2\cdot\text{H}_2\text{O} \). Give the reaction and its mechanism. 6

****