FACULTY OF SCIENCE
M.Sc. IV Semester Examination, April/May 2013
ORGANIC CHEMISTRY
Paper – III (403) : Advanced Heterocyclics Chemistry (Elective)

Time : 3 Hours] [Max. Marks : 80

Note : Answer all questions.

SECTION – A (Short Answer Type) (4x8=32 Marks)

1. a) Describe two methods for the preparation of oxivanes.
   b) Illustrate two reactions to explain the ring opening reactions of Thievans.

2. a) Describe the reactivity of 1, 2, 4 - triazole.
   b) Outline the Fisher synthesis of caffeine and theophylline.

3. a) Suggest a method for the synthesis of methyl oxepin – 4, 5– dicarboxylate.
   b) How many isomers of monocyclic diazepins are there? Write the synthesis of any one of them.

4. a) Explain the aromaticity of \textit{Squarones}.
   b) Give a method for the synthesis of
     i) Quinolozines
     ii) Benzimidazole.

SECTION – B (Essay type) (4x12=48 Marks)

5. a) Explain different strains associated with non-aromatic 3 and 4 membered heterocyclics.
   b) Draw the structure of A, B, C and D in the following reactions.

\[
\begin{align*}
\text{i) } & \quad \begin{array}{c}
\text{EfMg Br/Ether} \\
\text{H}_3\text{O}^+ \\
\end{array} \\
& \quad \text{A} \\
& \quad \text{B} \\
\text{ii) } & \quad \begin{array}{c}
\Delta \\
\text{OR} \\
\end{array} \\
& \quad \text{C} \\
& \quad \text{D}
\end{align*}
\]

(This paper contains 3 pages) 1  P.T.O.
c) Give the synthesis and reactivity of Diaziridines.

d) Predict the products in the following:

i) \( \text{Ph} + \text{CH}_3 \xrightarrow{\text{hv}} ? \)

ii) \( \text{H}_2 \text{C} \xrightarrow{\text{(Eto)}_3 \text{P}} ? \)

iii) \( \text{H}_2 \text{C} + \text{Na}_2 \text{S} \xrightarrow{?} \)

6. a) Discuss the synthesis and reactivity of 1, 3, 4 – Thiadiazoles.

b) Explain the products formed in the following reactions.

i) \( \text{R}_1 \xrightarrow{\text{hv or } \Delta} ? \)

ii) \( \text{R}_2 \xrightarrow{\text{hv}} ? \)

iii) \( \text{R}_3 + \text{RNH}_2 \xrightarrow{?} \)

OR

c) Give the synthesis of i) pteridine ii) 1, 3, 4 – oxadiazo1e

d) Predict the products in the following reactions. Explain their formation.

i) \( \text{R} \xrightarrow{\text{mC}} ? \)

ii) \( \text{R'} \text{NH}_2 \xrightarrow{?} \)

7. a) Give the synthesis of

i) 1H – 1, 2 – benzodiazepine

ii) Selenophenes
b) Predict the products in the following reactions. Explain their formation:

i)

\[ \text{structure} \rightarrow \text{structure} \]

ii)

\[ \text{structure} + \text{DMAD} \rightarrow ? \]

OR

c) Write the synthesis of i) Boroles ii) Benzopyridins

d) Write the products in the following reaction. Explain their formation.

i)

\[ \text{structure} + \text{structure} \rightarrow \text{structure} \]

ii)

\[ \text{structure} \xrightarrow{\text{hv}} \text{structure} \]

8. a) Explain a each method for the synthesis of Benzimidazole benzoxazole and benzothiazole.

b) Discuss the synthesis and reactivity of Indolizines.

OR

c) Explain the aromaticity and reactivity of pyridine N-Oxide.

d) What are mesoionic compounds? Give such two examples mention their characteristics.