



**NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY**  
**FACULTY OF APPLIED SCIENCES**  
**DEPARTMENT OF APPLIED CHEMISTRY**  
**INDUSTRIAL ORGANIC CHEMISTRY II**  
**SCH 4115**  
**FOR SCH STUDENTS ONLY**

**First Semester Examination Paper**  
**DECEMBER 2017**

This examination paper consists of 3 pages

**Time Allowed: 3 hours**  
**Total Marks: 100**  
**Special Requirements: NONE**  
**Examiner's Name: DR C T PAREKH**

**INSTRUCTIONS**

1. Answer all questions from Section A and any three from Section B. Section A carries 40 marks and each question in Section B carries 20 marks.
2. Show mechanism, chemical steps or synthesis by means of curved arrows.

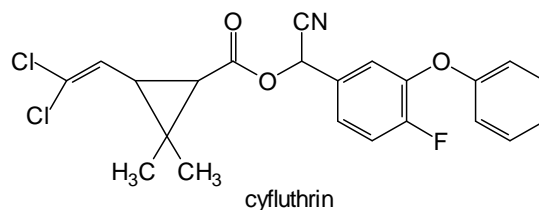
**MARK ALLOCATION**

<b>QUESTION</b>	<b>MARKS</b>
1.	<b>40</b>
2.	<b>20</b>
3.	<b>20</b>
4.	<b>20</b>
5.	<b>20</b>
<b>TOTAL POSSIBLE MARKS</b>	<b>100</b>

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**SCH 4115**

**SECTION A:**

- (a) Draw the structure of the acid moiety and alcohol moiety for the following pyrethroid. What is the name given to acid moiety?

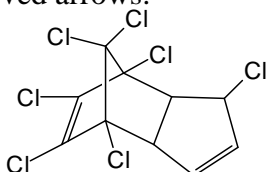


- (b) Suggest four principal areas where pyrethrin products are in use. (4 Marks)
- (c) Draw the structure of cholinesterase and suggest its function in the animal kingdom? (4 Marks)
- (d) How can one differentiate soap from detergent? (6 Marks)
- (e) Suggest the name of the plant from which atropine is extracted. Draw its structure and indicate the function of atropine. (2 Marks)
- (f) Suggest the name of the plant from which atropine is extracted. Draw its structure and indicate the function of atropine. (6 Marks)
- (g) Give one of the two names (botanical name) of plants from which natural pyrethrins are obtained. (2 Marks)
- (h) Draw the general structure of carbamate. (2 Marks)
- (i) Why are the avermectins very useful insecticides? (2 Marks)
- (j) Define plant hormone in your own words. (2 Marks)
- (k) Draw the structure of parathion and in brief describe the toxicity in humans of parathion. (6 Marks)
- (l) Draw the structures of 2,4-D, 2,4,5-T and the structure of the teratogen agent that was produced as a by-product during the production of 2,4-D and 2,4,5-T. (4 Marks)

## **SECTION B:**

2. (a) Transfluthrin (Baygon mosquito coil) is synthesised by the esterification of permethrin acid with 2,3,5,6-tetrafluorobenzyl alcohol. Write the synthesis of transfluthrin. Use reagents of your choice. (Use curved arrows). (6 Marks)
- (b) Carbaryl is a very useful insecticide. There are four different methods in which carbaryl can be synthesised. Synthesise carbaryl from any one methods. (No mechanism required). (4 Marks)
- (c) Draw schematic diagram for the manufacture of detergents. (10 Marks)

3. (a) Heptachlor's insecticidal activity is three times stronger than that of chlordane. The structure of the insecticide is shown below. One of the starting materials to synthesise heptachlor is cyclopentadiene. Write the reaction mechanism for heptachlor. Use any chemicals and/or reagents needed for the synthesis of heptachlor. Use curved arrows.



- (b) MCPA (4-chloro-2-methylphenoxy acetic acid) is a well-known herbicide used in this country. Write the synthesis of MCPA from *o*-cresol (2-hydroxy methyl benzene) and any reagents of your choice. (5 Marks)
- (c) What do you understand by acute and subacute rodenticides? (4 Marks)
- (d) What do you understand by pre-emergent herbicides? (3 Marks)
4. (a) Synthesise DDT from chlorobenzene, trichloroacetaldehyde and sulphuric acid. Use any reagents that require the synthesis. (No mechanism required). (10 Marks)
- (b) Describe the process of extraction of natural pyrethroids from the chrysanthemum flower. Draw a possible glassware that one can use to extract pyrethroids. Give the name of the glassware. (10 Marks)
5. (a) There are three different types of detergents that are available: (i) anionic (ii) cationic and (iii) neutral detergents. Draw the structures of these detergents. (3 Marks)
- (b) Illustrate the disruption of nervous system in insects with carbamate insecticide which result in death? (10 Marks)
- (c) Methoxychlor is an analogue of DDT. Draw the structure of methoxychlor and suggest its action. (7 Marks)

\*\*\*\*\*END OF QUESTION PAPER\*\*\*\*\*