NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF APPLIED SCIENCE

DEPARTMENT OF APPLIED CHEMISTRY

INDUSTRIAL ORGANIC CHEMISTRY II

SCH 4115

First Semester Examination Paper

December 2014

This examination paper consists of 3 pages

Time Allowed: 3 hours

Total Marks: 100

Special Requirements:

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.

MARK ALLOCATION

QUESTION	MARKS
1.	**40**
2.	**20**
3.	**20**
4.	**20**
TOTAL	**100**

SECTION A:

1. (a) Draw the structure of pyrethrin I and suggest the botanical name of the plant from which natural pyrethrin I is extracted.

(4 Marks)

(b) Draw the structure of acetylcholine.

(2 Marks)

(c) What do you understand by the term pesticides?

(4 Marks)

(d) Suggest four principal areas where pyrethrin products are in use.

(4 Marks)

(e) What do you understand by acute and subacute rodenticides.

(4 Marks)

(f) Rotenone is a natural insecticide extracted from *Derris Spp*. Draw the structure of rotenone. Indicate how this insecticide acts on insects.

(4 Marks)

(g) Draw the structure of phenothrin which is the active pyrethroid found in DOOM spray.

(2 Marks)

(h) Define auxin. Draw the structure of one naturally occurring auxin and one synthetic analogue. Give IUPAC name of both auxins.

(6 Marks)

(i) Draw the general structure of carbamate.

(2 Marks)

(j) What is the difference between a soap and detergent?

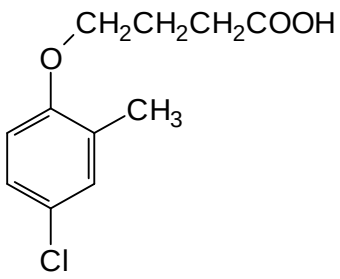
(4 Marks)

(k) Suggest four types of teratogens.

(4 Marks)

SECTION B:

1. (a) The structure of MCPB is as follows:



MCPB

It is a selective, systemic, hormone type herbicide that is used as post emergence for the control of annual and perennial broad-leaved weeds. Synthesise MCPB from benzene. Use reagents of your choice.

(10 Marks)

(b) Explain with the aid of schematic diagram how an organophosphate insecticide mimics acetylcholine. What is the effect on insects and animals?

(10 Marks)

3. (a) Draw the structures of acid moiety and the alcohol moiety of naturally occurring pyrethrins and synthetic pyrethroids.

(10 Marks)

(b) Warfarin is a first generation rodenticide and acts as an anticoagulant. Draw the structure of warfarin and explain its function a rodenticide.

(10 Marks)

4. (a) Dieldrin is a potent, non-specific insecticide which is long-lasting and highly toxic to humans. This insecticide is synthesised from chlorination of cyclopentadiene and norbornadiene which forms aldrin, followed by peroxide treatment to produce dieldrin. Write a reaction mechanism for the production of aldrin and the final product, dieldrin. (use curved arrows wherever necessary). (10 Marks)

(b) Why are naturally occurring pyrethroids used with synergists? Explain the action of synergists. Draw the structure of a known synergist.

(10 Marks)

5. (a) What do you understand by the term insect repellent?
In the supermarket, Mylol (brand name) insect repellent is available. Its main synthetic active compound that acts as a repellent is diethyltoluamide known as DEET. Draw the structure of diethyltoluamide.

(7 Marks)

(b) Describe the process of extraction of natural pyrethroids from the plant described in 1(a). Give the name of the other two pyrethroids apart from pyrethrin.

(8 Marks)

(d) Paraquat is a bipyridinium herbicide which is available to the farming community. If it is not used correctly it can kill crops and also harm livestock and humans.
(i) Draw the structure of paraquat. (ii) Suggest (a) what type of herbicide is it? and (b) also indicate how it acts on plants.

(5 Marks)

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