NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF APPLIED SCIENCE

DEPARTMENT OF APPLIED CHEMISTRY

INDUSTRIAL ORGANIC CHEMISTRY III

SCH 4215

Supplementary Examination Paper

August 2015

This examination paper consists of 5 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 QUESTIONS IN SECTION B. SECTION A CARRIES 40 MARKS AND EACH QUESTION IN SECTION B CARRIES 20 MARKS.
2. START EACH QUESTION ON A NEW PAGE. (NOT EACH PART OR SUB SECTION OF THE QUESTION)
3. SHOW MECHANISM, CHEMICAL STEPS OR SYNTHSIS BY MEANS OF CURVED ARROWS.

MARK ALLOCATION

QUESTION	MARKS
1.	**40**
2.	**20**
3.	**20**
4.	**20**
5.	**20**
TOTAL POSSIBLE MARKS	**100**

SECTION A

1. (a) Name the microbial organism used in the industrial fermentation of lactic acid. (2 marks)

(b) Give the name of the gland which excretes the hormone called thyroxin. Draw the structure of thyroxin and explain importance of this hormone. (4 marks)

(c) What is the name of the first synthetic dye? Who synthesised the dye? (2 marks)

(d) Suggest therapeutic classes for the following drug:

(i) aspirin
(ii) amoxicillin
(iii) digoxin
(iv) vasotec
(iv) procardia XL
(v) prozac

(6 marks)

(e) Explain the importance of vitamins? (4 marks)

(f) What do you understand by the term bioavailability? (3 marks)

(g) What do you understand by ***"first pass effect"***? (4 marks)

(h) What causes the deficiency of Vitamin C? Draw the structure of Vitamin C. (4 marks)

(i) Give three ways of administering a drug to a patient. (3 marks)

(j) Write reaction mechanism (use curved arrows) of a diazo coupling reaction between phenol and N,N-dimethylaniline . Indicate reagents and reaction conditions. (6 marks)

SECTION B

2. (a) Draw the labelled schematic diagram for the manufacture of polypropene. (10 marks)

(b) Write reaction mechanism for the synthesis of anthraquinone from phthalic anhydride. Use reagents of your choice. Use curved arrows to illustrate the mechanism. (5 marks)

(c) Explain what the letter A, E, M, D and Z stand for in the dye industry. (5 marks)

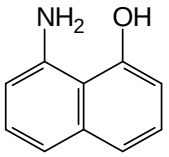
3. (a) The following compounds are classified as natural products. Draw the structure of the compound and also indicate the name of the plant from which it is derived.
(i) (R) - sulphoraphane
(ii) capsaicin

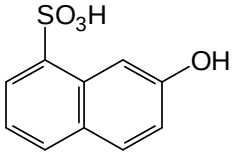
(4+4 marks)

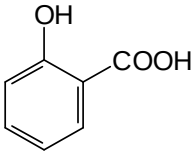
(b) Write two synthetic methods for the manufacture of phthalic anhydride. Use reagents of your choice.

(6 marks)

(c) State condition(s) and indicate the position by an arrow where the following Intermediate couple during dye manufacturing. Also indicate wherever possible where the first coupling will take place.

(i) 

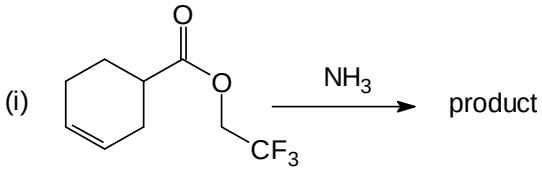
(ii) 

(iii) 

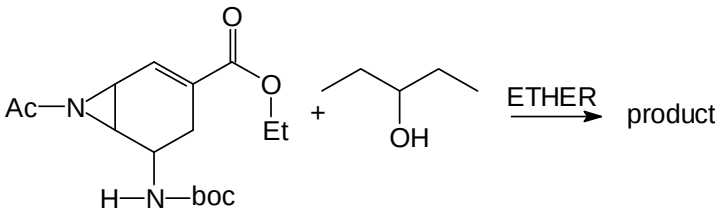
(6 marks)

4. (a) Swine flu is caused by a virus and there are two anti-viral drugs that are available for the treatment of swine flu. (i) oseltmivir-phosphate (Tamiflu) and (ii) zanamivir (relenza). Among these two drugs Tamiflu is widely prescribed. There are two to three pathways to synthesise this drug such as Corey et al synthesis, Fukuyama synthesis and Sibasaki synthesis etc. they used different starting raw material to produce Tamiflu. You are given following steps from three different syntheses.
Write reaction mechanism for each of them. (Use curved arrows for movement of electrons).

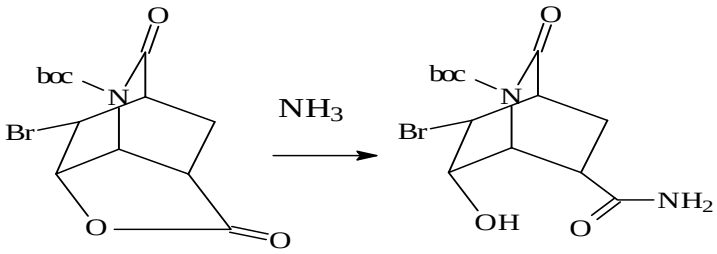
(i)



(ii)

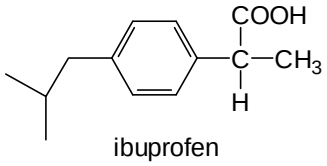


(iii)



(4+4 +4 Marks)

(b) Outline the synthesis of ibuprofen from isobutylbenzene. Use reagents of your choice.



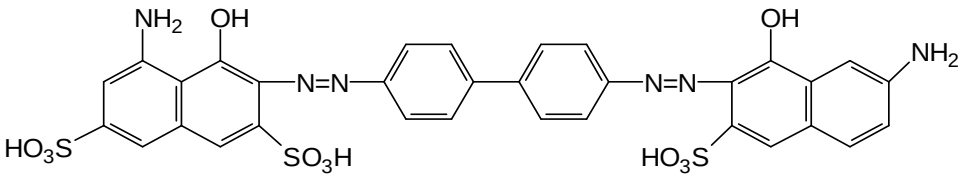
ibuprofen

(8 Marks)

5. (a) Aspirin is an analgesic drug which is available over the counter at pharmacy and many supermarkets. Outline the synthesis of aspirin from phenol. Use reagents of your choice . Write reaction mechanism for one of the steps which includes Kolbe-Schmitt reaction.

(10 marks)

(b) Write free components for the following dye. Write reaction mechanism step by step to synthesise the dye. Indicate Winther's formula for it.



(10 marks)

End of question Paper!!!