MERU UNIVERSITY OF SCIENCE AND TECHNOLOGY

P.O. Box 972-60200 – Meru-Kenya
Tel: +254(0) 799 529 958, +254(0) 799 529 959, + 254 (0) 712 524 293,
Website: info@must.ac.ke Email: info@must.ac.ke

University Examinations 2024/2025

FIRST YEAR FIRST SEMESTER EXAMINATION FOR THE DEGREE MASTER OF SCIENCE IN CHEMISTRY

SCH 7115: MODERN SYNTHETIC METHODS IN ORGANIC CHEMISTRY

DATE: JANUARY 2025 **TIME: 3 HOURS**

INSTRUCTIONS: *Answer question **one** and any other **two** questions*

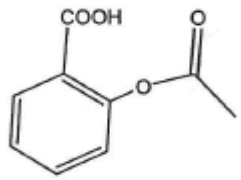
QUESTION ONE (30 MARKS)

a) Briefly, explain the following terms Chemoselectivity, Regioselectivity and Stereoselectivity (3 Marks)

b) i) what are pericyclic reactions (1 Marks)

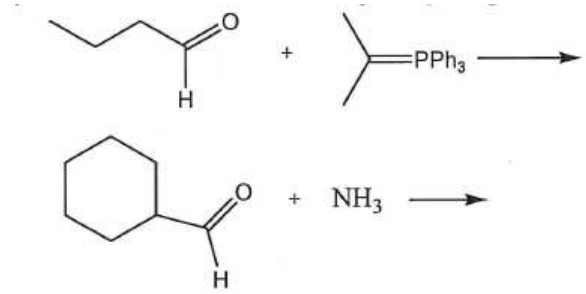
ii) with illustrations how are pericyclic reactions classified (4 Marks)

c) Outline step by step, the synthetic protocol of the pain reliever Aspirin shown below starting from benzene. (7 marks)

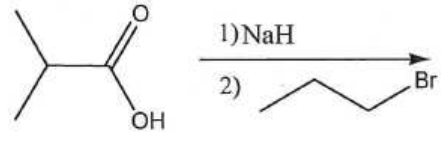


Aspirin

d) Draw the structure of the major organic product for each of the following reaction



b)



(5 Marks)

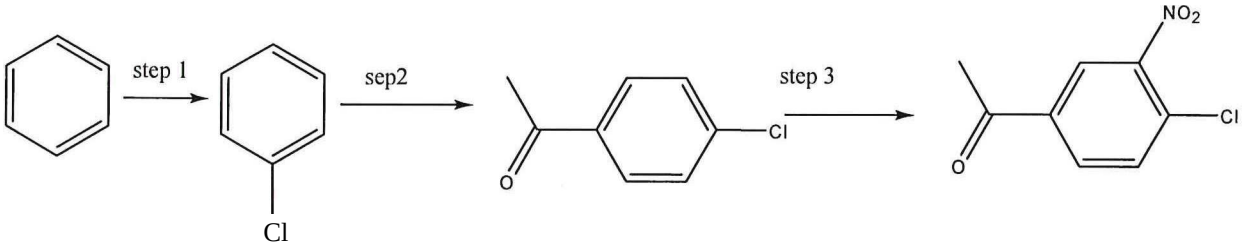
QUESTION TWO (20 MARKS)

a) (i) What are protecting groups (1 mark)

(ii) State four criteria of a good protecting group (4 marks)

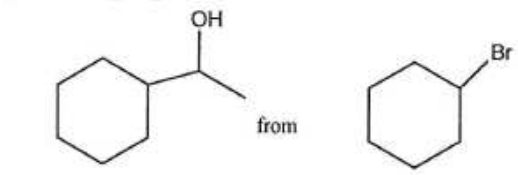
b) Describe the rules that govern Diels – Alder reaction (4 marks)

c) (i) Give the reagent required in steps 1,2,3 (3 marks)



(ii) Write the reaction mechanism involved in step 1 (4 marks)

d) Show how you can prepare (4 marks)



QUESTION THREE (20 MARKS)

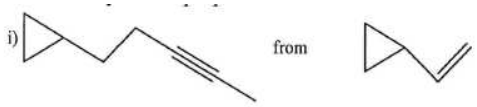
a) explain the following types of reaction (4 marks)

i) Aldol condensation (2 Marks)

ii) Wittig reaction (2 Marks)

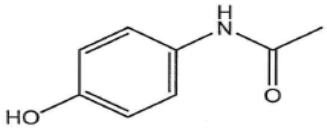
b) State two advantages and disadvantages of using enzymes in synthesis (4 Marks)

c) Show how you can prepare



(4 Marks)

e) Consider the muscle relaxant paracetamol



i carry out a retrosynthetic analysis (3 marks)

ii write its possible synthesis. (4 marks)

iii support your choice for the synthetic equivalent (l marks)

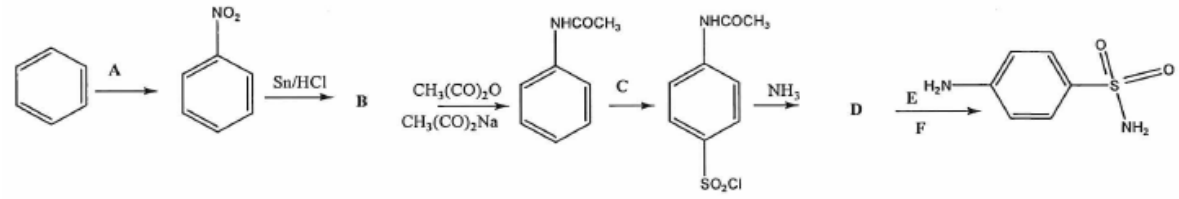
QUESTION FOUR (20 MARKS)

a) Increased environmental awareness and challenging limiting resources scientists are focusing on green chemistry approaches in the synthesis of organic compounds.

i) Define green chemistry (1 Marks)

ii) Explain four principles of green chemistry approaches (4 Marks)

b) Sulfanilamide is a sulfonamide antibacterial drug used for treatment of yeast infection caused by *Candida albicans*. Sulfanilamide synthesis follows below scheme, study the scheme and answer questions that follows:



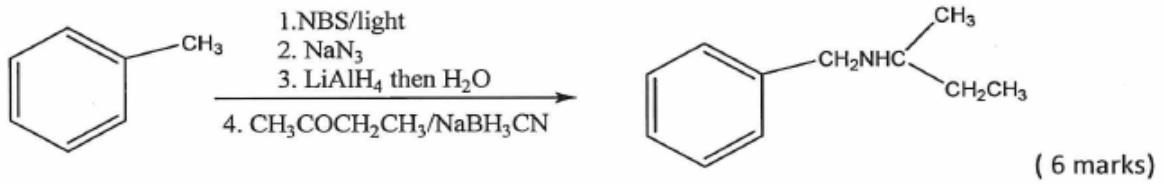
Identify the molecules/ reagents named A, B, C, D, E and F (5 marks)

c) Explain how

i Acetylene is protected and deprotected during synthesis (2 Marks)

ii Base is chosen so as to favor enolate formation. (2 Marks)

Study the reaction write up below, show how each step of the reaction from reactants to the product



(6 marks)