



**NATIONAL OPEN UNIVERSITY OF NIGERIA**  
PLOT 91, CADASTRAL ZONE, NNAMDI AZIKIWE EXPRESSWAY, JABI - ABUJA  
**FACULTY OF SCIENCES**  
**DEPARTMENT OF PURE & APPLIED SCIENCES**  
**2021\_1 EXAMINATION**

**COURSE CODE: CHM416**

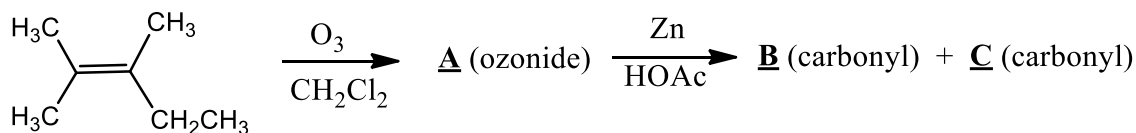
**TIME ALLOWED: 2 Hours**

**COURSE TITLE: ORGANIC SYNTHESIS**

**CREDIT: 2 Units**

**INSTRUCTION: Answer Question ONE (1) and any other Three (3) Questions**

- Q1. a) With equation only, show how pyridinium chlorochromate is prepared (5 marks)  
b) What is the product of  $\text{CH}_3\text{COCH}_2\text{COOC}_2\text{H}_5$  with  $\text{NaBH}_4$  (5 marks)  
c) Distinguish between syn- and anti-addition in alkene (5 marks)  
d) Without any equation, explain Clemmensen reduction (5 marks)  
e) What is the limitation of Wittig reaction and suggest a way out of it (5 marks)
- Q2. a) With the aid of equation alone, illustrate Wolff-Kishner reduction (7 marks)  
b) Give an account of cis- and trans-isomers formation in Wittig reaction (8 marks)  
c) With equation and brief explanation, how can you prepare peracetic acid (5 marks)  
d) Give structures and names of ozonolysis product of 2-methylbut-2-ene (5 marks)
- Q3. a) Wittig reaction can be classified into three groups; name them (3 marks)  
b) State one main drawback of Wolff-Kishner reduction (5 marks)  
c) How can you obtain 95% oleic acid from stearic acid. Support your explanation with appropriate chemical equation(s) (7 marks)
- Q4. a) In concise term, describe the preparation of ozone ( $\text{O}_3$ ) (3 marks)  
b) Provide the structures of **A**, **B** and **C** in the Scheme below: (12 marks)



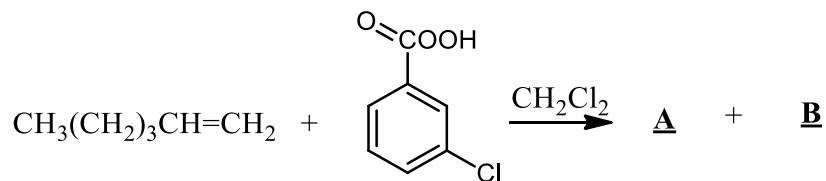
Q5. a) Arrange the following compounds in increasing order of oxidation:

methanol, carbon dioxide, methane, methanoic acid, methanal

(5 marks)

b) Provide the structures of compound A and B below:

(5 marks)



c) Provide the structures of compounds X and Y in two pathways below:

(5 marks)

