Catholic University Institute of Buea (CUIB)

2019/2020 ACADEMIC YEAR

First Semester Examinations – March 2020

School	ENGINEERING		Department	Chemical	
Course Code	CME 205	Course Title	ORGANIC CHEMISTRY		
Status	C	Credit Value	6		
Date	06/03/2020	Venue	LH 8	Time	11:30-2:30
Course Master(s)	Mr. NKONGHO EPEY LEWIS				

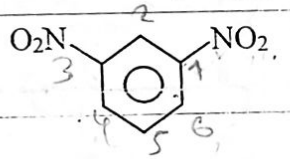
Instructions: ***Answer ALL Questions in Sections I and II.***

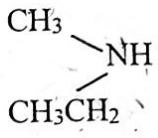
Section I:

1. Consider the following compounds **(5 marks)**

A) CH_3CHCH_3 (CN)

B) $CH_3CH_2CH_2NH_2$

C) 

D) 

E) $CH_3CH_2CONH_2$

F) $(CH_3CH_2CH_2)_3N$

a) Which is a primary amine? **(0.5mark)**

b) Which is a nitrite? **(0.5mark)**

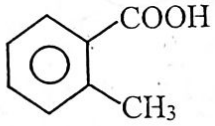
c) Which is an amide? **(0.5mark)**

d) Which is a tertiary amine? **(0.5mark)**

e) Name compounds A to F above **(3.0marks)**

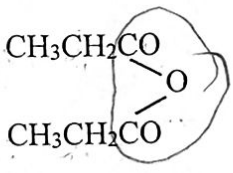
2. Consider the following compounds: **(4 marks)**

A) $CH_3CHCOOH$ (CH_3)

B) 

C) $CH_3CH_2COOCH_3$

D) $HOOCCH_2CH_2COOH$

E) 

a) Which is an ester? **(0.5mark)**

b) Which is a dibasic acid? **(0.5mark)**

c) Which is an acid anhydride? **(0.5mark)**

d) Name compounds A to E above **(2.5mark)**

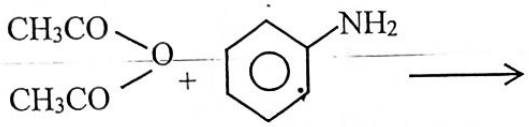
3. Predict the formulas of the products of the following reactions. **(3 marks)**

a) $CH_3CH_2COOH + PBr_3 \longrightarrow$

b) $C_6H_5COOH + LiAlH_4 \longrightarrow$

c) $CH_3COO(CH_2)_4CH_3 + NaOH_{(aq)} \xrightarrow{\text{boil}}$

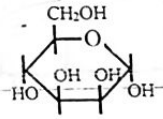
d) $CH_3COOH + Ca(OH)_{2(aq)} \longrightarrow$

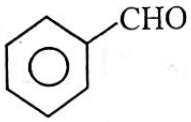
e) 

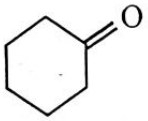
4. Consider the following compounds. **(6 marks)**

A) $CH_3COCHCH_2CH_3$ (with CH_3 branch)

B) $CH_3CH_2CH_2CH_2CHO$

C) 

D) 

E) 

a) Which are aldehydes? **(1.5marks)**

b) Which are ketones? **(1.0mark)**

c) Which is a hexose? **(0.5mark)**

d) Name compounds A, B, D and E. **(2.0marks)**

e) Which would be reduced to a secondary alcohol by hydrogen in the presence of a nickel catalyst? **(1.0mark)**

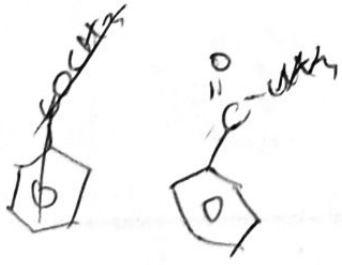
5. Predict the formulas of the product(s) of the following reactions. **(0.5 ×4 marks)**

a) $CH_3COCH_2CH_3 + H_2 \xrightarrow{Ni}$

b) $C_6H_5COCH_3 + NH_2OH \longrightarrow$

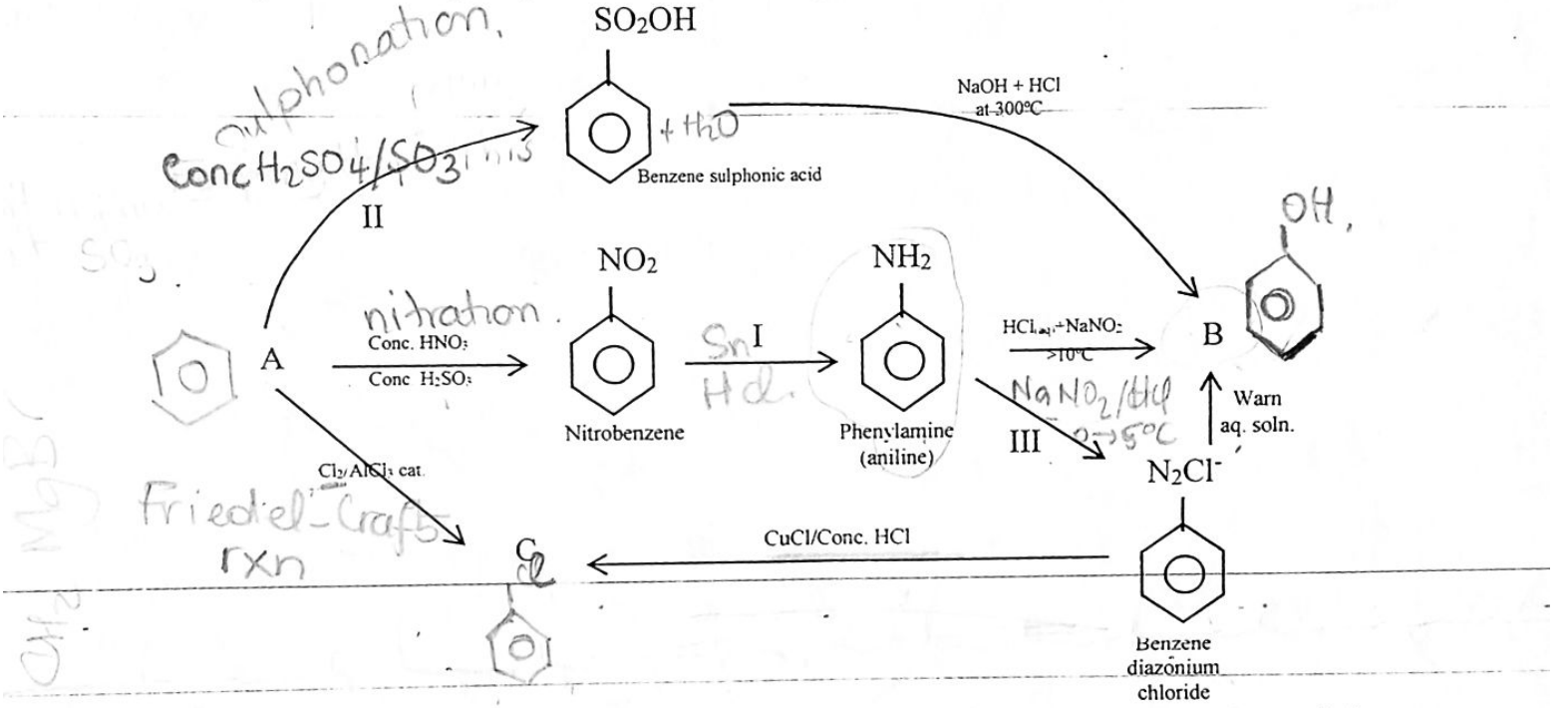
c) $CH_3CH_2COCH_2CH_3 + HCN \longrightarrow$

d) $C_6H_5CHO + KMNO_4 \longrightarrow$



SECTION II

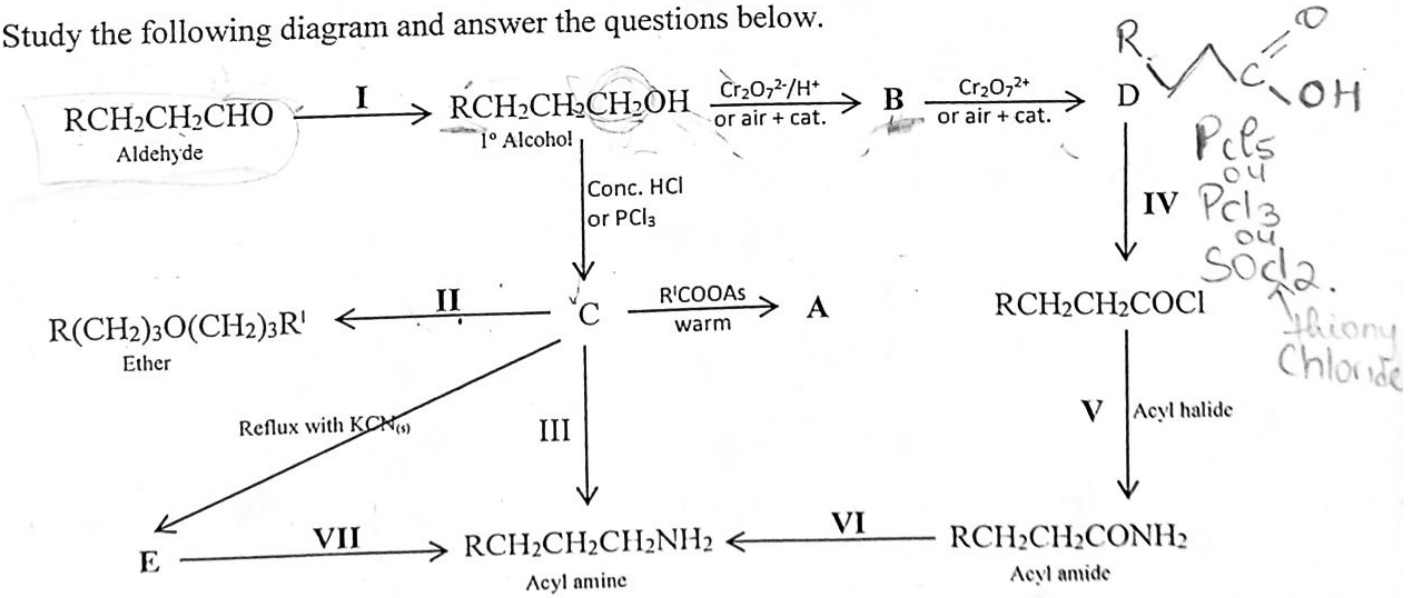
1. Study the following diagram and answer the questions below. (6 marks)



a) Give the formula of compounds A to C. **(3 marks)**

b) Give the reagents and reaction condition(s) of **I** to **III** **(3 marks)**

2. Study the following diagram and answer the questions below.



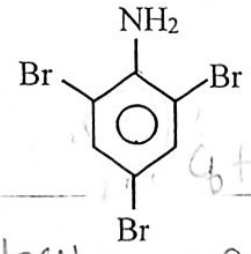
a) Give the name and formula of the compounds represented by **A** to **E**. **(4.5marks)**

b) Give the reagents and reaction condition of **I** to **VII**. **(3.5marks)**

3. Explain how you would convert the following compounds to the products listed below. Each conversion may involve one or more steps. **(10marks)**

a) $CH_2=CH_2$ to $H_2NCH_2CH_2NH_2$

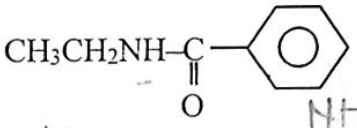
ethane-1,2-diamine

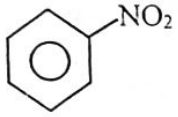
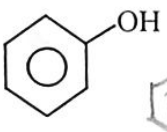
b)  to 

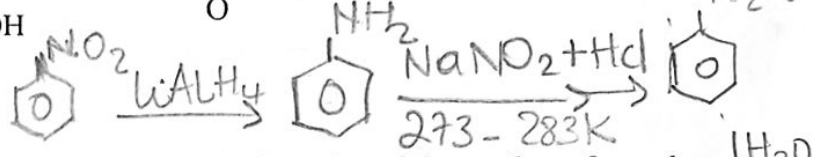
c) $CH_2=CH_2$ to $CH_3CH_2CH_2NH_2$

$R-CH_2Br + NaCN \rightarrow RCH_2CN + NaBr$

$RCH_2CN \xrightarrow[H_2O]{LiAlH_4} RCH_2-NH_2$

d) $CH_3CH_2NH_2$ to 

f)  to 

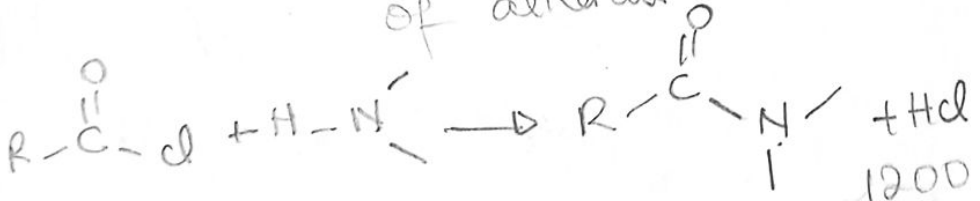


4. Copy out the following reaction sequences, inserting the formulas of the products formed in the blank spaces (**A, B, C, D, E & F**). **(1 x 6 = 6 marks)**

a) $CH_3COCl \xrightarrow{NH_3} \mathbf{A} \xrightarrow{LiAlH_4} \mathbf{B} \xrightarrow{HCl} \mathbf{C}$

b) $CH_3CH_2CH_2CH_2Br \xrightarrow{NH_3} \mathbf{D}$, $\mathbf{E}$, $CH_3CH_2CH_2CH_2NH_2 \xrightarrow{CH_3COCl} \mathbf{F}$

Catalytic asymmetric diamination of alkenes.



Amide

GOOD LUCK