

University of Ruhuna- Faculty of Technology**Bachelor of Biosystems Technology Honours Degree****Level 1 (Semester II) Examination, November 2022****Academic year 2020/2021****Course Unit: BST 1232 Organic Chemistry (Theory) Duration: 1 & 1/2 hours**
.....**Index Number:****Instructions to candidates:**

Please read and follow the instructions carefully before answering the questions.

- Answer **only Four (4)** questions.
- Answers should be given in the spaces allocated in the question paper.

Total number of questions

05

Total number of pages

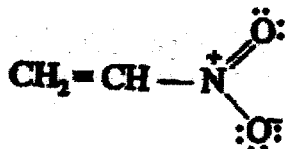
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Question Number	Marks out of 25
01	
02	
03	
04	
05	
Total out of 100	

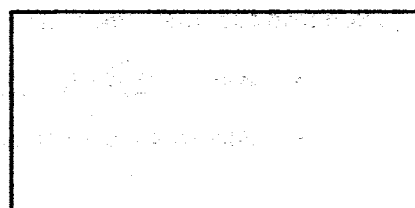
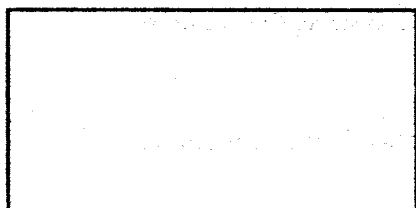
1. Answer all parts.

Resonance is a way to describe the combination of several contributing structures (resonance structures) into a hybrid resonance in valence bond theory in certain molecules or ions.

A) Lewis structure of Nitroethene (CH_2CHNO_2) is given below.



i. Draw another two resonance structures of the nitroethene.



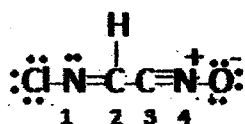
(4 marks x 2 = 8)

ii. Explain the stability of resonance structures drawn in part i.

.....

(4 marks)

B) Complete below table based on the Lewis structure given below.



	1	2	3	4
VSEPR pairs around the atom				
Electron geometry around the atom				
Shape around the atom				
Hybridization of the atom				

(8 marks)

C) Indicate the strongest type of intermolecular forces between the molecules in the following:

	Polar or non-polar	Strongest intermolecular force
H ₂ O		
NaCl in H ₂ O		
Cl ₂		
ICI		
H ₂		

(5 marks)

2. Answer all parts

A) Draw the structures for the following compounds.

i. 2,3-dimethylpentane

ii. 1,1-dichloroethene

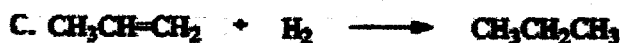
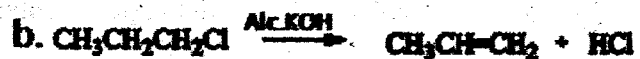
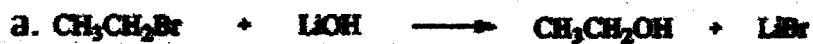
iii. 2-methylpropanal

iv. Cyclopentane

v. Ethanol

(2 marks x 5 = 10)

B) State whether each reaction is addition, substitution or elimination.



a.

b.

c.

(2 marks x 3 = 6)

C) i. Explain the $\text{S}_{\text{N}}2$ reaction mechanism with suitable example.

(7 marks)

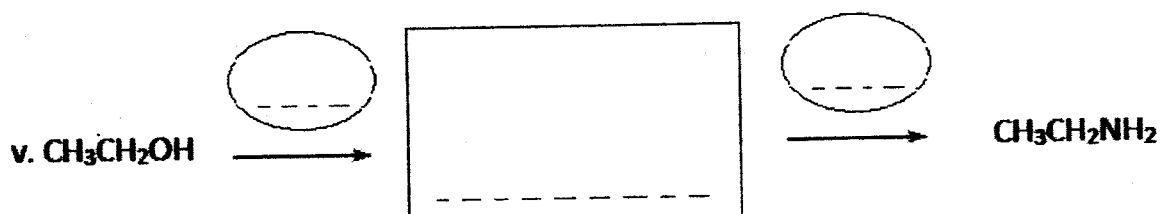
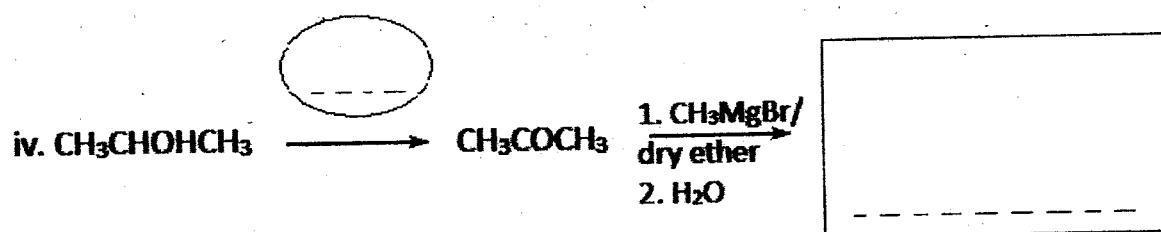
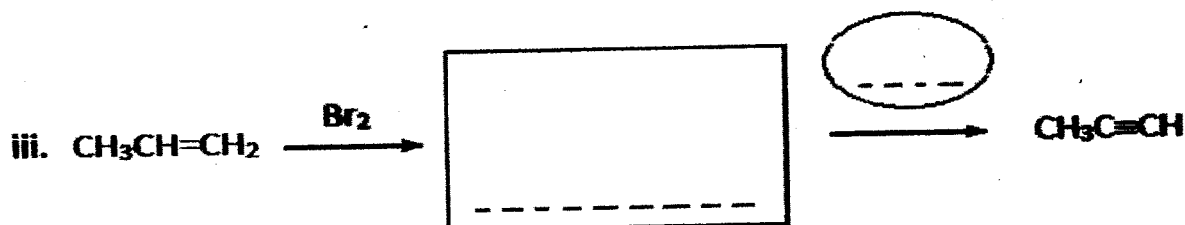
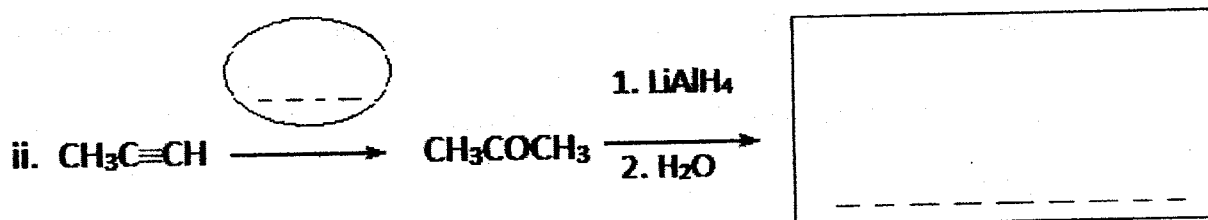
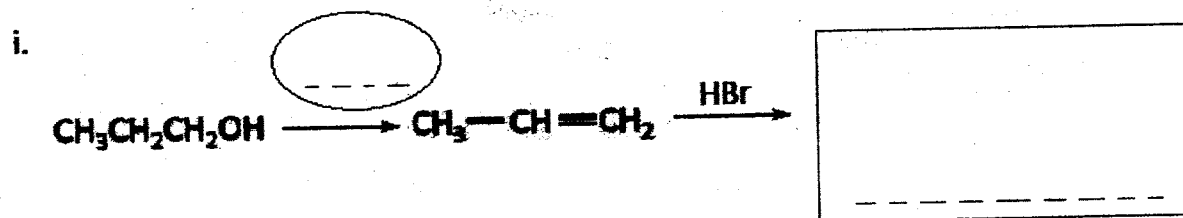
ii. What is the major difference between $\text{S}_{\text{N}}1$ and $\text{S}_{\text{N}}2$ reaction mechanisms?

.....
.....

(2 marks)

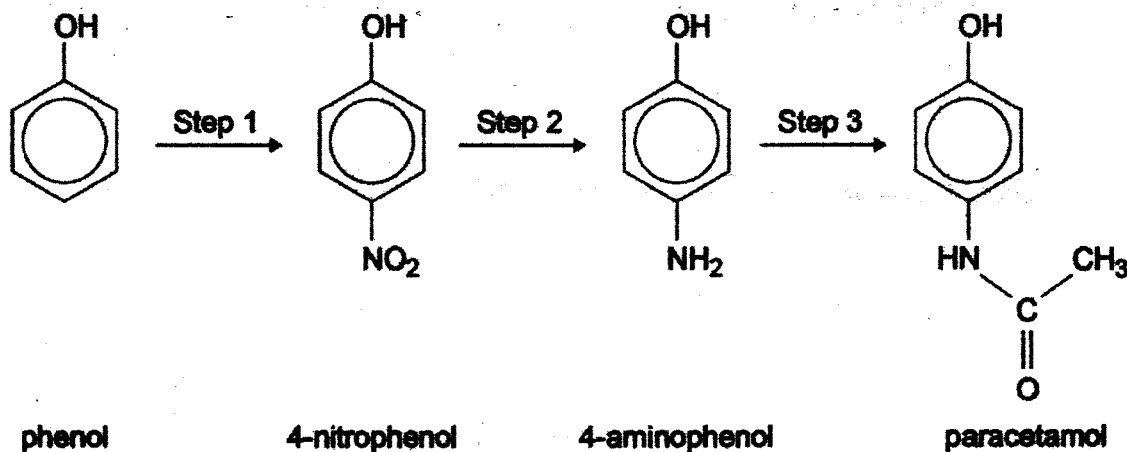
3. Answer all parts

A) Complete following conversions by filling reagents/catalyst in eclipse and compound in rectangles.



(4 marks x 5 = 20)

B) Paracetamol is a medicine commonly used as a pain killer. The following reaction sequence is used to synthesis paracetamol from phenol.



i. Write the reagents/catalysts that used to step 01 to step 03.

Step1:.....

Step2:.....

Step3:.....

(5 marks)

4. Answer all parts

A) i. what is the characteristic reaction type of benzene.

.....
 (3 marks)

ii. Briefly explain your answer in part A (i).

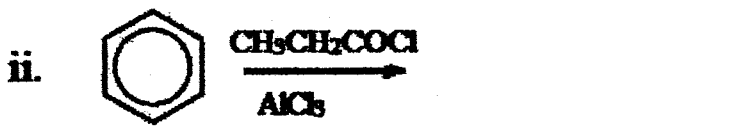
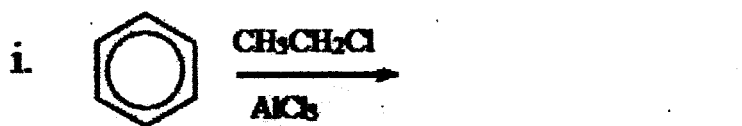
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 (3 marks)

B) Explain the mechanism of nitration of benzene.

(10 marks)

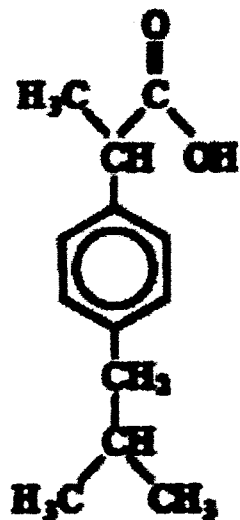
C) Draw the structures of products for following reactions.



(3 marks x 3 = 9)

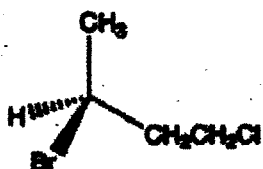
5. Answer all parts

A) i. Ibuprofen is a drug used as an alternative to aspirin for the relief of pain, fever and inflammation. The structure of ibuprofen is shown below and mark the chiral centers using asterisk (*).



(4 marks)

ii. Determine the R/S configuration of the chirality center in following compounds



.....



.....

(4 marks)

B) i. Draw structures of three constitutional isomers of butanal ($\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{COH}$).

(9 marks)

C) Which compounds can exist as cis-trans isomers? Draw the cis and trans conformations for each compound.

- i. $\text{CH}_2=\text{CHCH}_2\text{CH}_2\text{CH}_3$
- ii. $\text{CH}_3\text{CH}=\text{CHCH}_2\text{CH}_3$
- iii. $\text{CH}_3\text{CH}_2\text{CH}=\text{CHCH}_2\text{CH}_3$

(8 marks)

Total =100 marks