Universiti Malaysia PAHANG

Engineering • • Creativity

FACULTY OF INDUSTRIAL SCIENCES & TECHNOLOGY
FINAL EXAMINATION

COURSE	:	ORGANIC CHEMISTRY
COURSE CODE	:	BSK1103
LECTURER	:	AZHARI HAMID NOUR ABDUELRAHMN
DATE	:	14 JUNE 2013
DURATION	:	3 HOURS
SESSION/SEMESTER	:	SESSION 2012/2013 SEMESTER II
PROGRAMME CODE	:	BSK

INSTRUCTIONS TO CANDIDATES

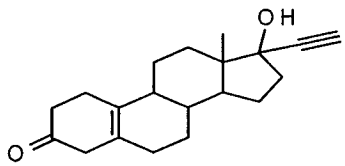
1. This question paper consists of **FOUR (4)** questions. Answer **ALL** questions.
2. All answers to a new question should start on new page.
3. Candidates are not allowed to bring any material other than those allowed by the invigilator into the examination room.

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO

This examination paper consists of **SEVEN (7)** printed pages including front page.

QUESTION 1

(a) In the compound shown below, in addition to an alkane skeleton, the molecule also contains other functional groups. Show or name all the different types of functional groups.



(4Marks)

(b) Given below are two groups of compounds **(a & b)**

(a)

I. $CH_3CH_2C(CH_3)_3$ II. $CH_3CH_2CH_2CH(CH_3)_2$

III. $CH_3CH_2CH_2CH_2CH_2CH_3$ IV. $(CH_3CH_2)_2CHCH_3$ V. $(CH_3)_2CHCH(CH_3)_2$

(b)

I. $CH_3CH_2COCH_2CH_3$ II. $CH_3CH_2CH_2OCH_2CH_3$

III. $CH_3CH_2CH_2CONH_2$

(i) In each group which one has the highest boiling point?

(2 Mark)

(ii) In each group explain why the compound has the highest boiling point. Provide a brief comment

(2 Marks)

(c) Calculate the degree of unsaturation in:

(i) C_6H_6

(ii) $C_{10}H_8$

(4 Marks)

(d) Draw the structure of a compound representing each of the following classes:

(i) 2^{o} alcohol

(ii) Ester

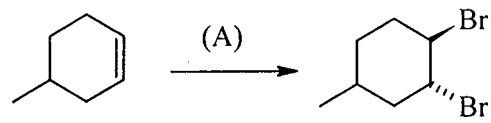
(iii) Imine

(iv) Hemiacetal

(8 Marks)

QUESTION 2

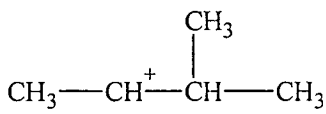
(a) What is the missing or best reagent (**A**) in order to complete the reaction below?



(2 Marks)

(b) From the list of possible carbocations (**I-V**), which one would ***not*** **be** likely to rearrange and why?

I.



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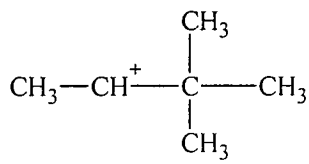

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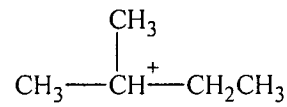

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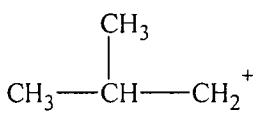
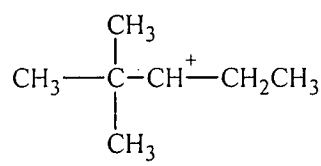
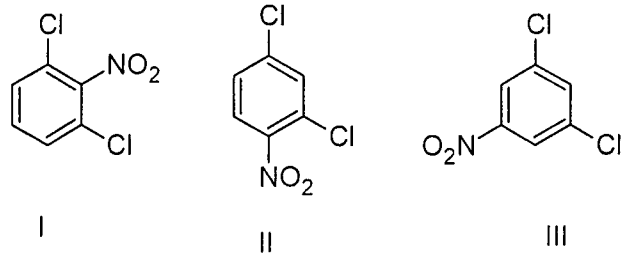


V.



(4 Marks)

(c) What would you expect to be the **major** product obtained from the mononitration of m-dichlorobenzene; why? (Please give a rationale).

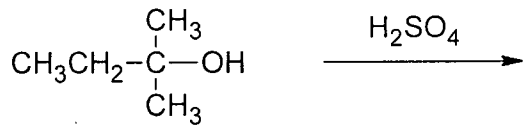


I II III

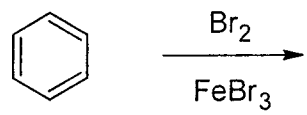
(4 Marks)

(d) Given below are two types of chemical reactions (**A&B**)

A.



B.



(i) What is the main product in each reaction (**A& B**)

(4 Marks)

(ii) Draw a stepwise mechanism for each reaction (**A& B**)

(6 Marks)

QUESTION 3

(a) Briefly explain on the industrial application of the following groups of chemicals (as raw materials used by the chemical industry), with an example of each group.

(i) Alkanes

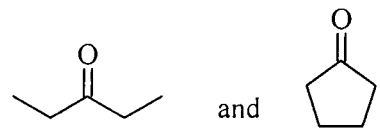
(ii) Alkenes

(iii) Alcohols

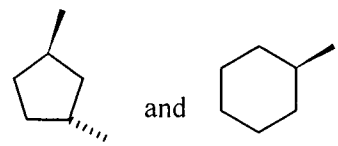
(9 Marks)

(b) Specify the isomeric relationship between the following pairs of compounds, if any:

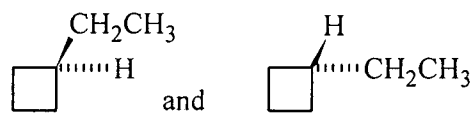
(i)



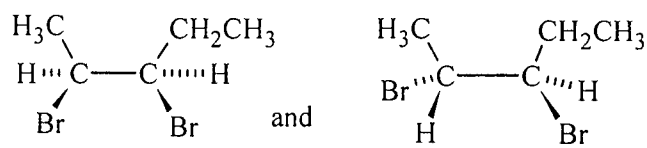
(ii)



(iii)



(iv)



(8 Marks)

(c) Which member in each pair is assigned the higher priority in **R, S** nomenclature?

(i)

$-CH(CH_3)_2$, $-CH_2OH$

(ii)

$-CH(CH_3)_2$, $-C\equiv C-H$

(iii)

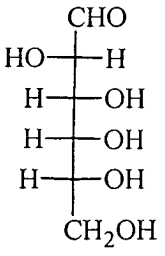
$-OH$, $-NH_2$

(iv)

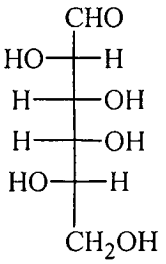
$-CH_2NH_2$, $-CH_2-NH-CH_3$

(4 Marks)

(d) Consider the following sugar structures, and then answer the questions below:



I



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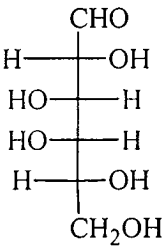
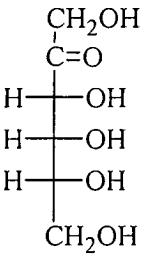


III



IV

Mention one pair of:

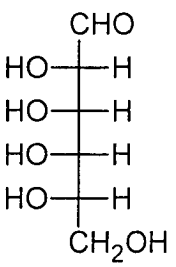
(i) Enantiomers

(ii) Constitutional isomers

(iii) Diastereomers, but not epimers

(3 Marks)

(e) How many possible stereoisomers are there of the following hexose?



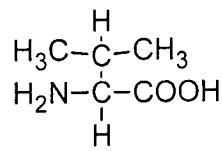
(2 Marks)

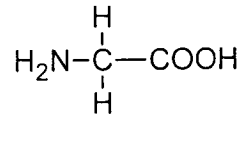
(f) The negative environmental impact of polymer synthesis has prompted the development of Green Polymer Syntheses; mention two points onapproaches which are more environmentally benign (friendly) to synthesize polymers.

(4 Marks)

QUESTION 4

(a) Given the following two amino acids


valine


glycine

(i) Draw the structures of the four different dipeptides that could be formed from them. Name the dipeptides formed.

(8 Marks)

(ii) Show a controlled synthetic scheme that would lead to the formation of only the dipeptide gly-val.

(12 Marks)

(b) Briefly explain the following:

(i) The planar geometry of the peptide bond.

(5 Marks)

(ii) How the secondary and tertiary structures of a protein are stabilized (the nature of the forces involved).

(5 Marks)

END OF QUESTION PAPER