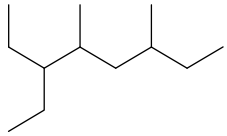
CHEM 2311
E2 practice-ii (answers provided)

YOU MAY USE A SMALL MODEL KIT ON THIS EXAM

1. (32 points) Circle the letter *on the right* which corresponds to the answer to each question. There is only one correct answer for each question.

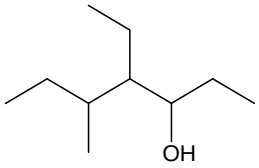
(i) What is the correct IUPAC name for the following structure?



A. 3,5-dimethyl-2,4-diethylheptane **B.** 2,5-diethyl-4-methylheptane
C. 3-ethyl-4,6-dimethyloctane **D.** 6-ethyl-3,5-dimethyloctane

A **B** **C** **D**

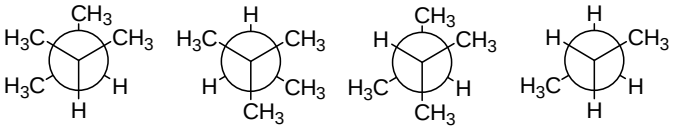
(ii) What is the correct IUPAC name for the following structure?



E. 1,2-diethyl-4-methyl-1-pentanol
F. 4-ethyl-5-hydroxy-2-methylheptane
G. 4-ethyl-5-methyl-3-heptanol
H. 4-ethyl-2-methyl-5-heptanol

E **F** **G** **H**

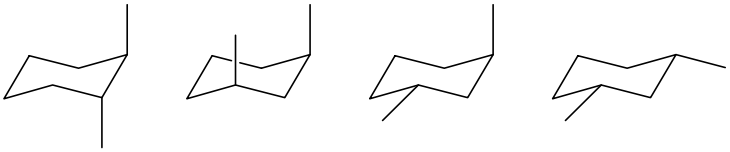
(iii) Which of the following represents the lowest energy conformation of 2,3-dimethylbutane?



I **J** **K** **L**

I **J** **K** **L**

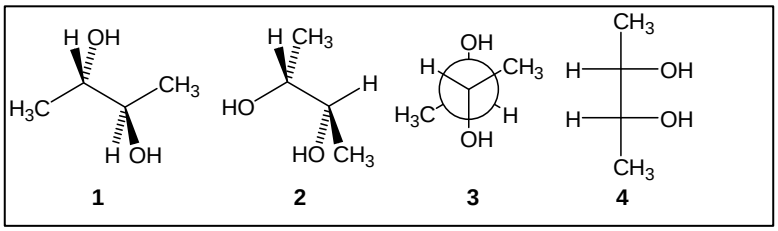
(iv) Which of the following represents the lowest energy conformation of *trans* 1,3-dimethylcyclo-hexane?



M **N** **O** **P**

M **N** **O** **P**

*For parts (v) – (viii), consider compounds **1**, **2**, **3** and **4***



1 **2** **3** **4**

Q **R** **S** **T**

(v) What is the relationship between compounds **1** and **2**?

Q. identical **R.** enantiomers **S.** diastereomers **T.** constitutional isomers

U **V** **W** **X**

(vi) What is the relationship between compounds **1** and **3**?

U. identical **V.** enantiomers **W.** diastereomers **X.** constitutional isomers

Y **Z** **AA** **BB**

(vii) What is the relationship between compounds **1** and **4**?

Y. identical **Z.** enantiomers **AA.** diastereomers **BB.** constitutional isomers

CC **DD** **EE** **FF**

(viii) Which compounds (**1**-**4**) rotate plane polarized light?

CC. none of them **DD.** only **1** and **4** **EE.** only **2** **FF.** **1**, **2**, **3** and **4**

2. (32 points).

(a) (8 points) Compound **A**, C_6H_{10}, rotates plane polarized light. Hydrogenation of **A** gives **B**, C_6H_{12}. Provide structures of **A** and **B** consistent with this data.

A	**B**

(b) (8 points) Draw line-bond structures of the following compounds

(i) bicyclo[3.2.0]heptane	(ii) 4-bromo-5-methyl-2-cyclohexenol

(c) (8 points) Draw *the most stable chair conformation* of the following compounds

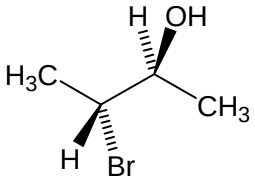
(i) *trans* 1-isopropyl-2-methylcyclohexane	(ii) *trans* 1-*tert*-butyl-3-methylcyclohexane

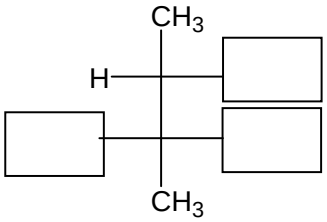
(d) (8 points) Provide the value of SODAR (hydrogen deficiency index) of the following two molecular formulas.

$C_7H_{10}O_3$	$C_6H_{12}BrNO_2$

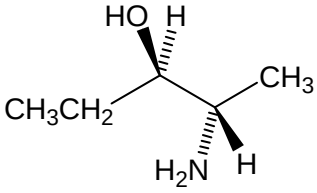
3. (36 points).

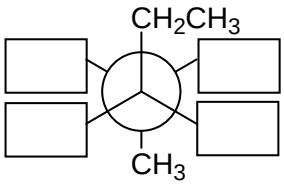
(a) (4 points) Place the remaining substituents on the *Fischer projection* to accurately represent the stereoisomer shown.





(b) (5 points) Place the remaining substituents on the *Newman projection* to accurately represent the stereoisomer shown.





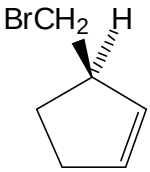
(c) (10 points) The specific rotation, [α], of the pure S enantiomer of compound **C** is -50°. A student prepared a mixture of R and S enantiomers of **C**. She took 0.2 g of the mixture, dissolved it in 1.0 mL of chloroform and measured an optical rotation of +5° in a 10 cm polarimeter tube.

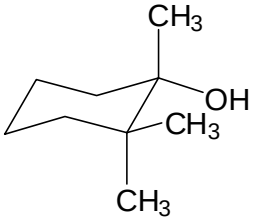
(i) Which enantiomer is in excess in the mixture? _____

(ii) What is the %ee of the mixture? _____ %

(iii) What mass of the S enantiomers is present in 100 g of the mixture? _____

(d) (8 points) Assign the R/S configurations to the stereogenic centers in the following two molecules





(e) (9 points) How many stereoisomers exist for each of the following compounds?

(i) 2-methyl-2-pentanol _____

(ii) 3-methyl-2-pentanol _____

(iii) 4-methyl-2-pentanol _____