

Name of the Student: _____

Max. Marks : 21 Marks

Time : 21 Minutes

Q1.

Compound **J**, known as leaf alcohol, has the structural formula $\text{CH}_3\text{CH}_2\text{CH}=\text{CHCH}_2\text{CH}_2\text{OH}$ and is produced in small quantities by many green plants. The *E* isomer of **J** is responsible for the smell of freshly cut grass.

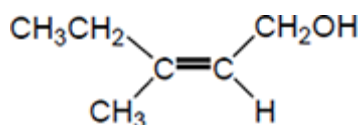
(a) Give the structure of the *E* isomer of **J**.

(1)

(b) Give the **skeletal formula** of the organic product formed when **J** is dehydrated using concentrated sulfuric acid.

(1)

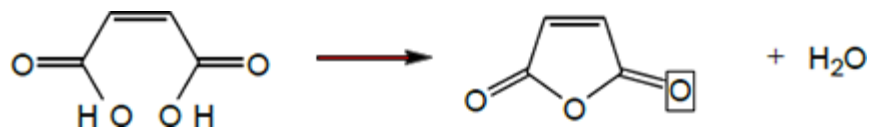
(c) Another structural isomer of **J** is shown below.



Explain how the Cahn-Ingold-Prelog (CIP) priority rules can be used to deduce the full IUPAC name of this compound.

(6)

- (d) The effect of gentle heat on maleic acid is shown below.



A student predicted that the yield of this reaction would be greater than 80%.

In an experiment, 10.0 g of maleic acid were heated and 6.53 g of organic product were obtained.

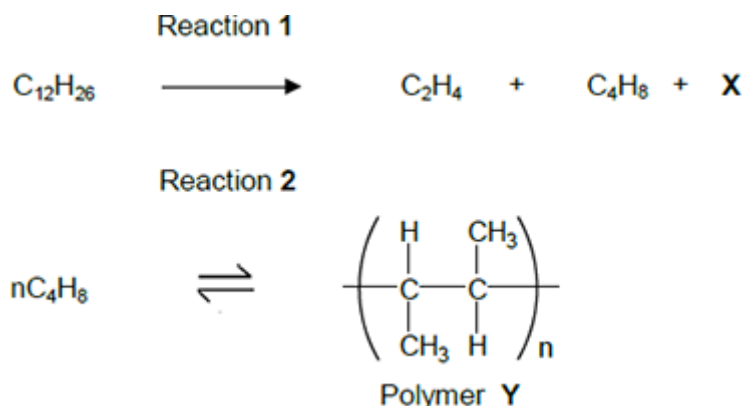
Is the student correct? Justify your answer with a calculation using these data.

(2)

(Total 10 marks)

Q2.

Dodecane ($C_{12}H_{26}$) is a hydrocarbon found in the naphtha fraction of crude oil. Dodecane can be used as a starting material to produce a wide variety of useful products. The scheme below shows how one such product, polymer Y, can be produced from dodecane.



- (a) Name the homologous series that both C_2H_4 and C_4H_8 belong to.
Draw a functional group isomer of C_4H_8 that does **not** belong to this homologous series.

Name _____

Functional group isomer

(2)

- (b) Identify compound X.

(1)

- (c) Name polymer Y.

(1)

- (d) Reaction 1 is an example of thermal cracking and is carried out at a temperature of 750°C .

State **one other** reaction condition needed.

(1)

- (e) Reaction 2 is exothermic. A typical compromise temperature of 200°C is used industrially for this reaction.

Explain the effect of a change of temperature on both the position of equilibrium and the rate of reaction, and justify why a compromise temperature is used industrially.

(6)
(Total 11 marks)