Final Examination
2018/2019 Academic Session

June 2019

JIK422 – Organic Chemistry III
(Kimia Organik III)

Duration : 3 hours
(Masa : 3 jam)

Please check that this examination paper consists of **ELEVEN (11)** pages of printed material before you begin the examination.

*[Sila pastikan bahawa kertas peperiksaan ini mengandungi **SEBELAS (11)** muka surat yang bercetak sebelum anda memulakan peperiksaan ini].*

Instructions : Answer **FIVE (5)** questions. Answer the questions in English. You may also answer the questions in Bahasa Malaysia, but not a mix of both languages.

*[**Arahan** : Jawab **LIMA (5)** soalan. Jawab soalan-soalan dalam Bahasa Inggeris. Anda juga dibenarkan menjawab soalan dalam Bahasa Malaysia, tetapi campuran antara kedua-dua bahasa ini tidak dibenarkan].*

In the event of any discrepancies, the English version shall be used.

[Sekiranya terdapat sebarang percanggahan pada soalan peperiksaan, versi Bahasa Inggeris hendaklah digunapakai].

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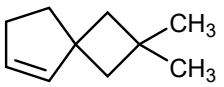
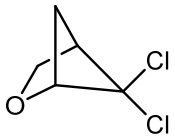
1. (a). Name the following compounds using IUPAC system.
Namakan sebatian-sebatian berikut dengan menggunakan sistem IUPAC.

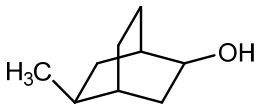
(i).



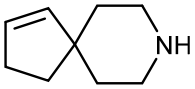
(ii).



(iii).



(iv).

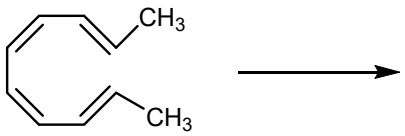


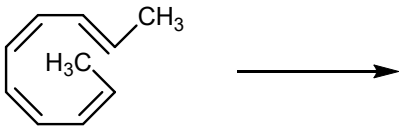
(8 marks/*markah*)

(b). Draw the structure of the products formed (with correct stereochemistry) when each of the following compounds undergoes an electrocyclic reaction:
Lukiskan struktur hasil-hasil yang terbentuk (dengan stereokimia yang betul) apabila setiap sebatian berikut menjalani tindak balas elektrosiklik:

(i). under thermal conditions
di bawah keadaan terma

(ii). under photochemical conditions
di bawah keadaan fotokimia

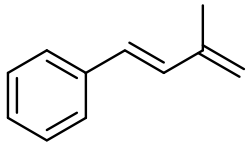




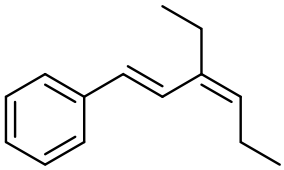
(12 marks/*markah*)

2. (a). Show how you would use a styrene ($C_6H_5CH=CH_2$) as the starting material to synthesize the following compounds using the Heck reaction. List the reagents used in the reaction.
Tunjukkan bagaimana anda menggunakan stirena ($C_6H_5CH=CH_2$) sebagai bahan permulaan untuk mensintesis sebatian berikut dengan menggunakan tindak balas Heck. Senaraikan reagen yang digunakan dalam tindak balas.

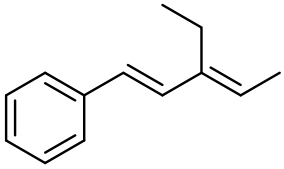
(i).



(ii).

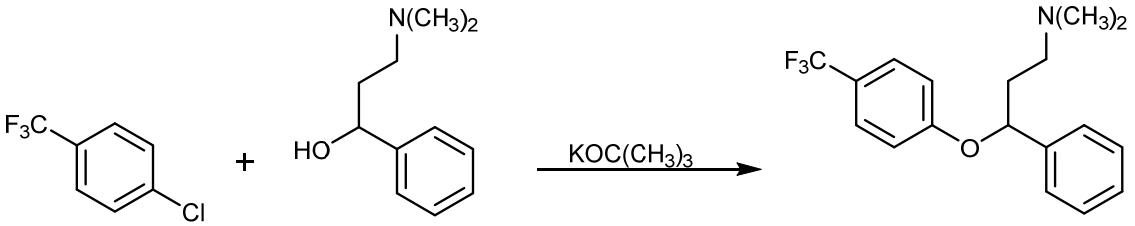


(iii).



(9 marks/*markah*)

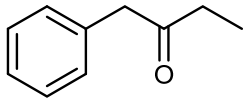
(b). Draw a stepwise mechanism for the following reaction.
Lukiskan suatu mekanisme langkah demi langkah untuk tindak balas berikut.



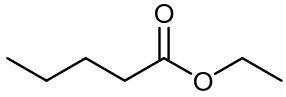
(11 marks/*markah*)

3. (a). Draw the structure of the enol tautomer(s) for each compound below. Label the more stable structure.
Lukiskan struktur tautomer enol untuk setiap sebatian di bawah. Labelkan struktur yang lebih stabil.

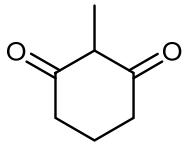
(i).



(ii).

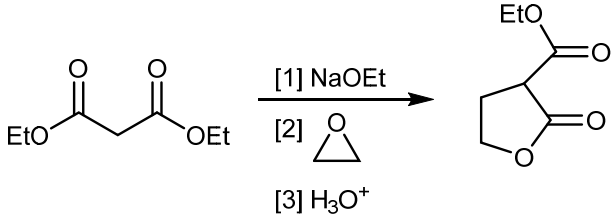


(iii).



(10 marks/*markah*)

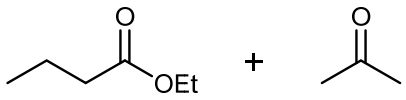
(b). Draw a stepwise mechanism for the following reaction.
Lukiskan suatu mekanisme langkah demi langkah untuk tindak balas berikut.



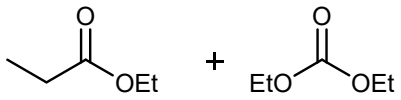
(10 marks/*markah*)

4. (a). Draw the structure of the product formed from Claisen condensation with the given starting materials in the presence of $^{-}$OEt, EtOH.
Lukiskan struktur hasil yang terbentuk daripada kondensasi Claisen dengan bahan permulaan yang diberikan dengan adanya $^{-}$OEt, EtOH.

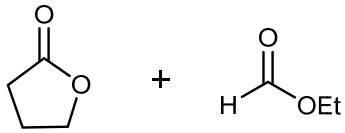
(i).



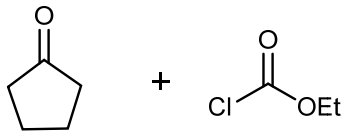
(ii).



(iii).



(iv).



(8 marks/*markah*)

(b). Define the terms below.
Definisikan istilah yang di bawah.

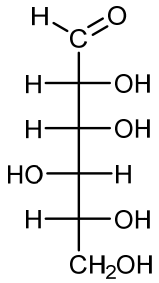
(i). Epimer

(ii). Anomer

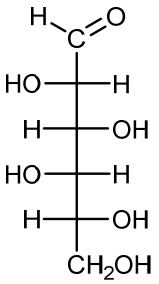
(4 marks/*markah*)

(c). Draw both pyranose anomers of each aldohexose below using a chair conformation. Label each anomer as *α* or *β*.
Lukiskan kedua-dua anomer piranosa untuk setiap aldoheksosa di bawah dengan menggunakan konformasi kerusi. Labelkan setiap anomer sebagai α atau β.

(i).



(ii).



(8 marks/*markah*)

5. (a). Which D-aldopentoses are reduced to optically inactive alditols using $NaBH_4$? Name and draw their structures.
Aldopentosa-D yang mana akan terturun kepada alditol tak aktif optik dengan menggunakan $NaBH_4$? Namakan dan lukiskan struktur mereka.

(6 marks/*markah*)

(b). Draw the structure (in Fisher projection) of the product(s) obtained when D-glucose reacts with each reagent given below.
Lukiskan struktur (dalam unjuran Fisher) hasil yang diperoleh apabila D-glukosa bertindak balas dengan setiap reagen yang diberikan dibawah:

(i). $NaOH, H_2O$
$NaOH, H_2O$

(ii). H_2, Ni
H_2, Ni

(iii). $NaBH_4$
$NaBH_4$

(iv). Br_2, H_2O
Br_2, H_2O

(v). product from (iv), then H_2O_2, $Fe_2(SO_4)_3$
hasil dari (iv), kemudian H_2O_2, $Fe_2(SO_4)_3$

(vi). KCN, HCN
KCN, HCN

(vii). product from (vi), then H_2, $Pd/BaSO_4$, and H_3O^+
hasil dari (vi), kemudian H_2, $Pd/BaSO_4$, dan H_3O^+

(14 marks/*markah*)

6. (a). Show how you would use the Gabriel-Malonic ester synthesis to make the following amino acids.
Tunjukkan bagaimana anda menggunakan sintesis ester Gabriel-Malonic untuk menyediakan asid amino yang berikut.

(i). valine
valina

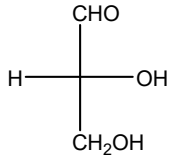
(ii). phenylalanine
fenilalanina

(8 marks/*markah*)

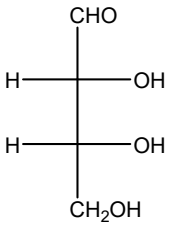
(b). Show how you would use solution-phase synthesis to make the tripeptide Phe-Ala-Leu.
Tunjukkan bagaimana anda menggunakan sintesis fasa-larutan untuk menyediakan tripeptida Phe-Ala-Leu.

(12 marks/*markah*)

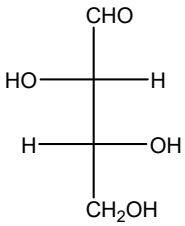
[APPENDIX JIK 422]



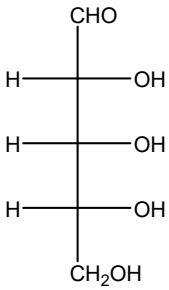
D-(+)-Glyceraldehyde



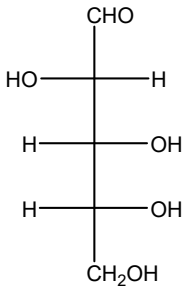
D-(-)-Erythrose



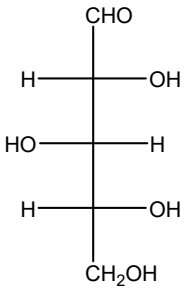
D-(-)-Threose



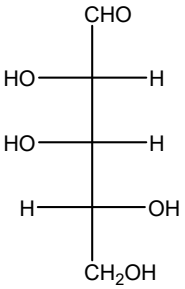
D-(-)-Ribose



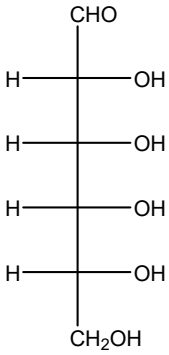
D-(-)-Arabinose



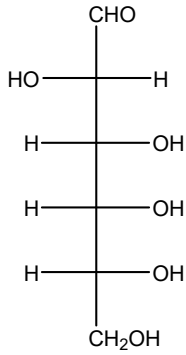
D-(+)-Xylose



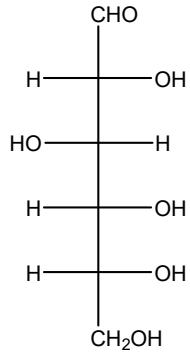
D-(-)-Lyxose



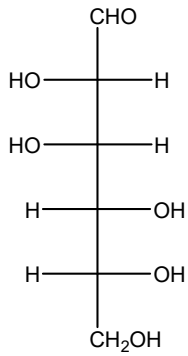
D-(+)-Allose



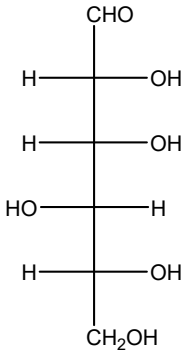
D-(+)-Altrose



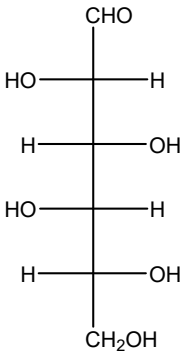
D-(+)-Glucose



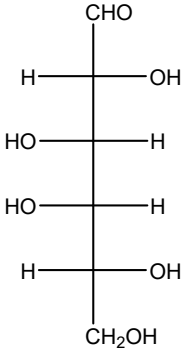
D-(+)-Mannose



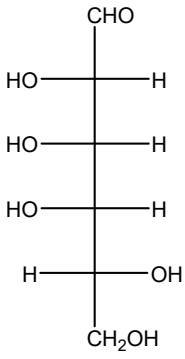
D-(-)-Gulose



D-(-)-Idose



D-(+)-Galactose



D-(+)-Talose

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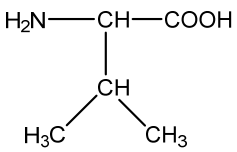
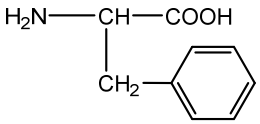
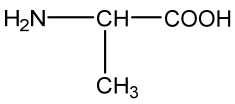
[APPENDIX JIK 422]



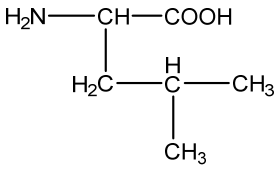
Valine (Val)



Phenylalanine (Phe)



Alanine (Ala)



Leucine (Leu)

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