Index No: ..... (3)

UNIVERSITY OF RUHUNA – FACULTY OF MEDICINE

ALLIED HEALTH SCIENCES DEGREE PROGRAMME

~~FOURTH~~ Second BPHARM PART II EXAMINATION – DECEMBER 2016

PH 2244 MEDICINAL CHEMISTRY AND PHARMACOGNOSY IA (SEQ)

TIME: THREE HOURS

INSTRUCTIONS

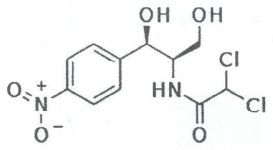
- Answer **all** questions.
- No paper should be removed from the examination hall.
- Do not use any correction fluid.
- Use illustrations where necessary.

01.

1.1 Define the terms partition coefficient (P), log P. State the importance of log P in drug design. ***(10 marks)***

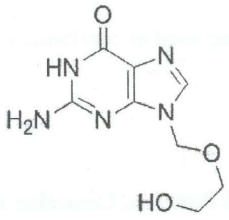
1.2 State the important forces (bonds) that govern the solublization process of drugs. ***(10 marks)***

1.3 Indicate the lipophilic and hydrophilic sites of the following antibiotic chloramphenicol. ***(10 marks)***



1.4 Lipinski's *Rule of five* is useful in drug design. Explain ***(10 marks)***

1.5 Following drug ($C_8H_{11}N_5O_3$, MW 225, log P -1.83) is mainly used for the treatment of herpes simplex virus infections, chickenpox, and shingles.



Write down how many hydrogen bond donors and hydrogen bond acceptors are associated with this drug and state whether this drug can be administered orally.

(15 marks)

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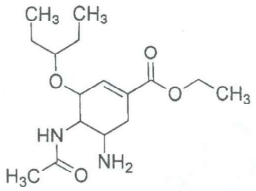
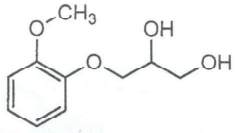
1.6 Using the table given below, predict the water solubility of the following drugs A and B. State how the water insoluble drugs are formulated.

Functional Group		Molecule with one functional group solubilizes	Molecule with multiple functional groups solubilize
Alcohol	R-OH	5 or 6 carbons	3 or 4 carbons
Ether	R-O-R	4 or 5 carbons	2 carbons
Ketone	R-C(=O)-R	5 or 6 carbons	2 carbons
Ester	R-C(=O)-OR	6 carbons	3 carbons
Amine	$R-NH_2$	6 or 7 carbons	3 carbons
Amide	$R-C(=O)-NH_2$	6 carbons	2 or 3 carbons



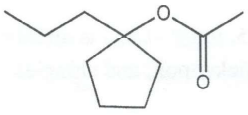
(A)



(B)

(15 marks)

1.7 Use retrosynthetic analysis to design a synthesis for the following compound using cyclopentanone and any other necessary conditions.

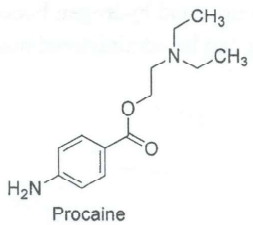


(20 marks)

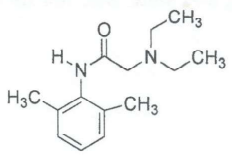
1.8 Briefly describe the synthesis types which are used in combinatorial synthesis. ***(10 marks)***

02.

2.1 Of the following anaesthetics Lidocaine and Procaine, Lidocaine has a longer lasting effect. Explain giving reasons.



Procaine



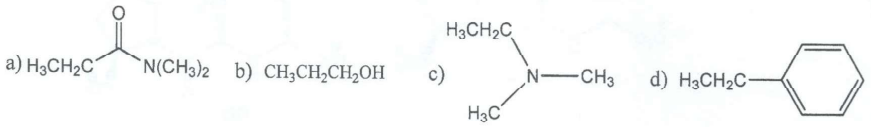
Lidocaine

(15 marks)

2.2 Write down two Hansch Equations related to QSAR studies for small and large ranges of lipophilicities and define the terms involved in them. State the instances for which these equations are applied and their usefulness. ***(10 marks)***

2.3 Write down the structures of the products formed in the metabolism of the following compounds, indicating the appropriate reagents involved in each reaction.

State phase of the metabolic reaction involved in each reaction.

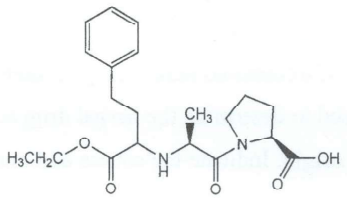


(15 marks)

2.4 Enalapril is the esterprodrug of the ACE inhibitor Enalaprilat.

2.4.1 Write down the chemical structures of the drug and the by- product(s) that would form on activation.

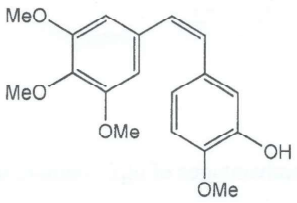
2.4.2 State the enzyme responsible for this reaction.



Enlapril

(10 marks)

2.5 The following is a potent anti-cancer drug which is a natural product isolated from the bark of a South African Willow tree.

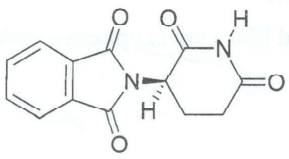


2.5.1 Both reduction and isomerisation of its double bond reduced its anti-cancer activity. Explain.

2.5.2 How do you test whether the OH group is important for the activity/target binding of combretastatin?

(15 marks)

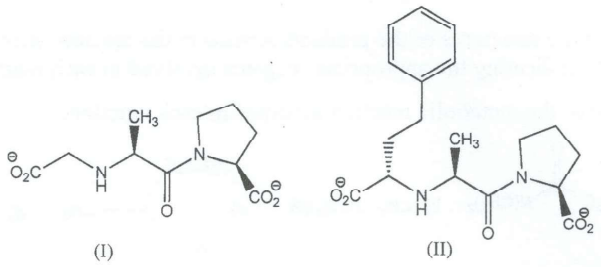
2.6 (+) (R)-thalidomide is a sedative, but (-) (S)-thalidomide is a drug which can harm fetus in the womb.



(+)(R)- thalidomide

The harmful side effects of thalidomide could not be avoided even when only the pure (+) (R)-thalidomide was prescribed. Explain this complication briefly. ***(10 marks)***

2.7 The lead compound (I) is an antihypertensive agent which acts by inhibiting the enzyme ACE (Angiotensin-converting-enzyme). Structure (II) was designed to get the optimum activity.



(I) (II)

Comment on the modifications that have been made to (1) and explain why these modifications optimized the antihypertensive activity of the drug. ***(10 marks)***

2.8 Give a comprehensive account on steric factors that influence the pharmacological activity. ***(15 marks)***

03.

3.1 Following questions are based on herbal drug adulteration.

3.1.1 What is meant by herbal drug adulteration? (***10 marks***)

3.1.2 Briefly explain the types of intentional herbal drug adulteration. (***30 marks***)

3.1.3 List five (**05**) methods used to determine the herbal drug adulteration. (***20 marks***)

3.2 Following drugs are of animal origin. Indicate the source and one (**01**) pharmaceutical use of each. (***40 marks***)

3.2.1 Wool fat

3.2.2 Cochineal

3.2.3 Cantharides

3.2.4 Shellac

04.

4.1 Briefly discuss the advantages and disadvantages of alphabetical, taxonomical and pharmacological classification of crude drugs. (***30 marks***)

4.2

4.2.1 List the environmental factors affecting the production of secondary metabolites in plants.

4.2.2 Give one (**01**) example to justify your answer.

(***25 marks***)

4.3 What are the advantages of "supercritical fluid extraction" over conventional extraction methods for natural products? (***25 marks***)

4.4 Name four (**04**) regenerated fibers used in pharmaceutical industry. (***20 marks***)

5.

5.1 Draw diagrams to show palmately compound leaf and pinnately compound leaf. ***(10 marks)***

5.2

5.2.1 List different types of underground stem modifications and give one example for each modification. ***(08 marks)***

5.2.2 Name four types of dehiscent fruit types. ***(04 marks)***

5.3 Describe the given floral formula. ***(10 marks)***

5.4 Distinguish between,

5.4.1 Racemose inflorescence and cymose inflorescence ***(05 marks)***

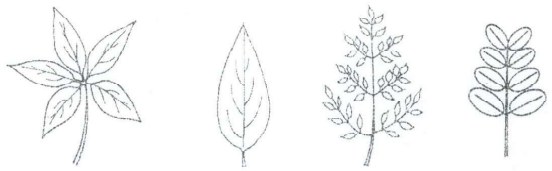
5.4.2 Superior ovary and inferior ovary ***(05 marks)***

5.4.3 Sepals and petals ***(05 marks)***

5.4.4 Marginal and basal placentation ***(05 marks)***

5.5 Briefly describe importance of morphological and anatomical characteristics to be considered in plant taxonomy. ***(40 marks)***

5.6 Identify A,B,C and D leaf types. ***(08 marks)***



A B C D

A. ..... B. .....

C..... D. .....

6.

6.1 List three (**03**) important factors that are considered drug evaluation. ***(06 marks)***

6.2 Give five (**05**) different methods that can be used in drug evaluation. ***(10 marks)***

6.3 Briefly describe organoleptic techniques used in drug evaluation. ***(30 marks)***

6.4 List three (**03**) main types of calcium oxalate crystal that occur in monocotyledons. ***(06 marks)***

6.5 What is the use of studying calcium oxalate crystals in plants? ***(08 marks)***

6.6 Briefly explain the economic importance of plants in family Fabaceae. ***(40 marks)***

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