– Original – (10)

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UNIVERSITY OF RUHUNA – FACULTY OF ALLIED HEALTH SCIENCES

DEPARTMENT OF PHARMACY

SECOND BPHARM PART II EXAMINATION – NOVEMBER/DECEMBER 2021

PH 2244 MEDICINAL CHEMISTRY & PHARMACOGNOSY IA – SEQ

TIME: THREE HOURS

INSTRUCTIONS

- There are **six** questions in part **A**, **B**, **C** and **D** in this SEQ paper.
- Answer **all** questions.
- No paper should be removed from the examination hall.
- Do not use any correction fluid.
- Use illustrations where necessary.

PART A

01. Answer all parts.

1.1. What are the two main classes under which drugs can be classified according to their medicinal uses? (***10 marks***)

1.2.

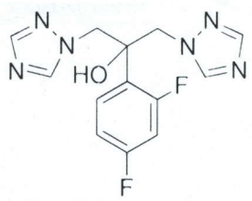
1.2.1. What are the most important physiochemical properties of a drug? (***10 marks***)

1.2.2. Explain why a balance of water and lipid solubility is important to achieve good pharmacokinetics of a drug. (***10 marks***)

1.3.

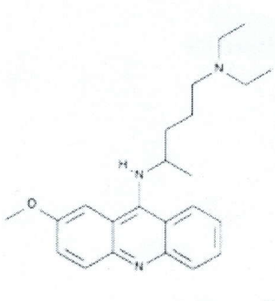
1.3.1. One way to screen out compounds with probable absorption problems is known as Lipinski's Rule of five. Explain the reasons why certain drugs fail this rule. (***15 marks***)

1.3.2. Indicate whether the compound (fluconazole) shown below follows the Lipinski's Rule. (***15 marks***)

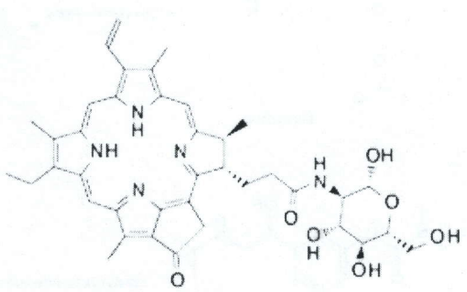


Fluconazole
MW 306.271 g mol^{-1}
Solubility in water 1 mg ml^{-1} and n-octanol > 60 mg ml^{-1}

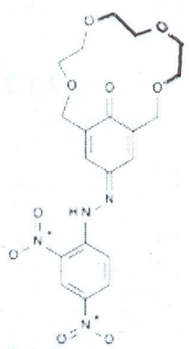
1.3.3. Each of the following molecules violates Lipinski's rule of 5 for at least one reason. Indicate which reasons are violated and which are satisfied for each molecule. (***30 marks***)



MW = 365.51
log(P) = 5.4

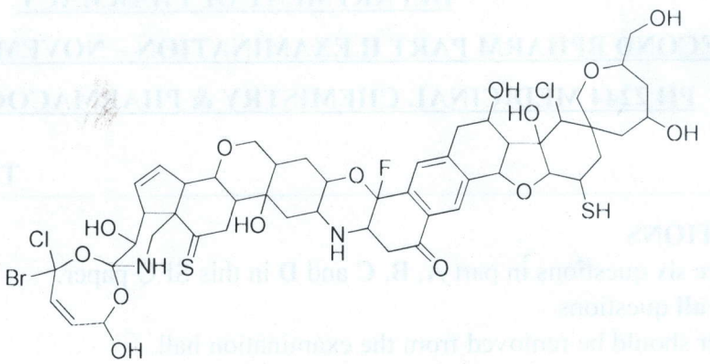


MW = 695.80
log(P) = 2.7



MW = 462.41
log(P) = 1.2

1.3.4. Giving reasons verify whether the following molecule is likely to be orally bioavailable. ***(10 marks)***



Log P = 4.6

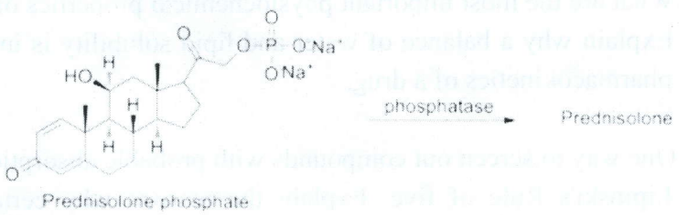
02. Answer all parts

2.1.

2.1.1. Explain the meaning of a prodrug briefly. ***(10 marks)***

2.1.2. Predict the structure of the corresponding drug of each of the following prodrugs. ***(25 marks)***

2.1.2.1.

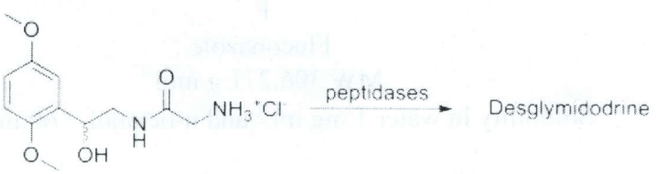


Prednisolone phosphate

2.1.2.2.

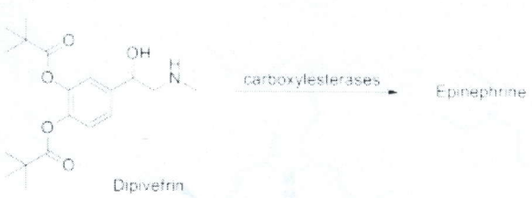
Oseltamivir

2.1.2.3.



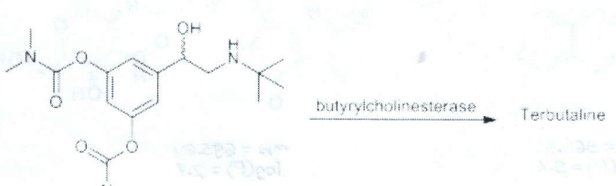
Midodrine

2.1.2.4.



Dipivefrin

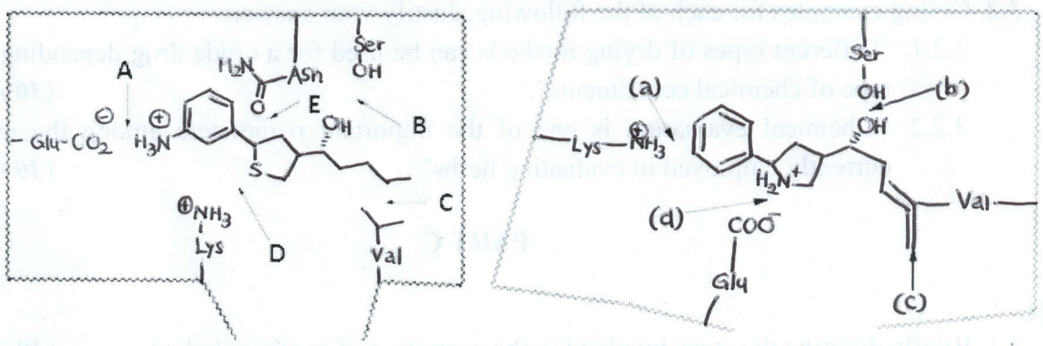
2.1.2.5.



Bambuterol

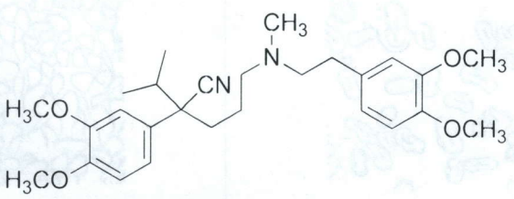
2.2. Drugs interact with the receptors and initiate a chain of biochemical and physiologic events leading to the drug's observed effects. A typical drug-receptor interaction is shown in the following figures.

Indicate what drug-receptor interactions are involved at every arrow of the two figures. Note that more than one kind of interactions may be possible at each letter. (***10 marks***)



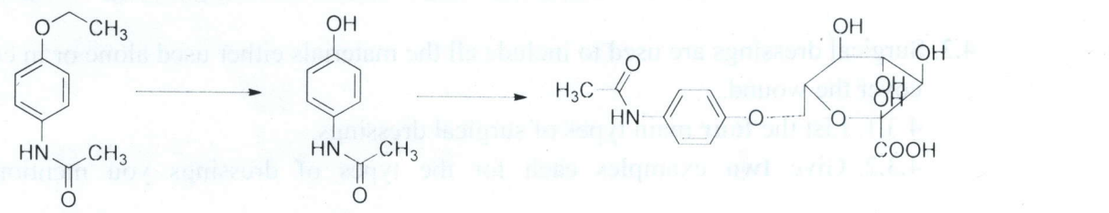
2.3.

2.3.1. Verapamil is a drug used for treating high blood pressure. It undergoes metabolism in the liver by cytochrome P450 oxidation to form two products one of which has a molecular formula $C_{10}H_{12}O_3$. Provide the mechanism for this metabolic process and draw structures of both products formed. (***15 marks***)



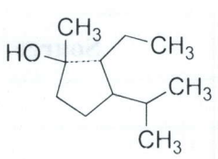
Verapamil

2.3.2. Identify the phase(s) of drug metabolism that the drug, phenacetin undergoes based on the reaction scheme below. Also mention the enzymes that catalyze the two steps. (***15 marks***)



Phenacetin Paracetamol Paracetamol glucuronide

2.4. The following compound was synthesized from a conjugated enone using a multi-step synthesis that included a direct addition and a conjugate addition.



2.4.1. What are the nucleohiles used in the direct and conjugate additions? (***10 marks***)

2.4.2. Use a reterosynthetic analysis to design a synthetic route for this molecule. (***15 marks***)

PART B

03.

3.1. Write short accounts on each of the following.

3.1.1. Basic principles of Ayurveda. (***20 marks***)

3.1.2. Chemical classification of crude drugs. (***20 marks***)

3.2. Giving examples for each of the following, Justify your answer.

3.2.1. "Different types of drying methods can be used for a crude drug depending on the type of chemical constituents". (***30 marks***)

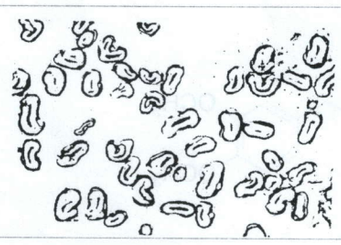
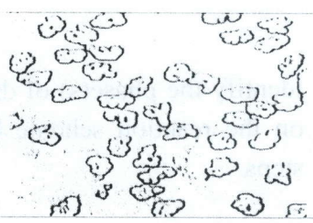
3.2.2. "Chemical evaluation is one of the important parameters among the methods currently employed in evaluating herbs". (***30 marks***)

PART C

04.

4.1. Briefly describe the steps involved in the extraction of medicinal plants. (***30 marks***)

4.2. Following images show transverse section of some natural fibers. Identify the source and list one pharmaceutical use of each fiber. (***20 marks***)

4.2.1.	4.2.2.
	
4.2.3.	4.2.4.
	

4.3. Surgical dressings are used to include all the materials either used alone or in combination to cover the wound.

4.3.1. List the **four** main types of surgical dressings. (***08 marks***)

4.3.2. Give **two** examples each for the types of dressings you mentioned in 4.3.1. (***12 marks***)

4.4. The crude drugs given in the following table are animal originated. Complete the table with the appropriate answers. (***30 marks***)

Crude drug	Source	Pharmaceutical uses
4.4.1. Cantharides		
4.4.2. Shellac		
4.4.3. Cod-liver oil		
4.4.4. Spermaceti		
4.4.5. Lanolin		

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PART D

05.

5.1. Illustrate the following leaf morphological characterization using line diagrams only. ***(30 marks)***

5.1.1. Laceolate Leaf shape
5.1.2. Reticulate Leaf venation
5.1.3. Serrate leaf margin
5.1.4. Cordate leaf base
5.1.5. Peltate leaf attachment

5.2. Name two main types of inflorescence. ***(10 marks)***

5.3. Draw diagrams to illustrate the following. ***(40 marks)***

5.3.1. Twisted aestivation
5.3.2. Imbricate aestivation
5.3.3. Pedicellate flower
5.3.4. Sessile flower

5.4. Briefly desctibe the floral characters of the floral formula given below using technical terms. ***(20 marks)***

06.

6.1. Name **four** stomatal types found in dicot plants. ***(10 marks)***

6.2. List the tissue types and cell types in a hurbacious dicot stem. ***(15 marks)***

6.3. Briefly describe **three** medicinally important plant families with their most prominent botanical features. ***(45 marks)***

6.4. Name **ten** commercially important medicinal crops in Sri Lanka and list the economically important products of each crop. ***(30 marks)***

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