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UNIVERSITY OF RUHUNA – FACULTY OF ALLIED HEALTH SCIENCES
DEPARTMENT OF PHARMACY
FOURTH BPHARM PART II EXAMINATION – OCTOBER 2021
PH 4213 ADVANCED MEDICINAL CHEMISTRY II (SEQ)

TIME: TWO HOURS

INSTRUCTIONS

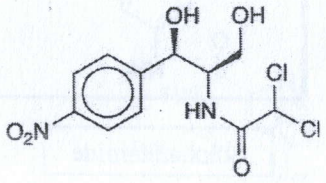
- There are four (**04**) questions in Parts A, B, C, and D in the SEQ paper.
- Answer all questions.
- No paper should be removed from the examination hall.
- Do not use any correction fluid.
- Use illustrations where necessary.

PART A

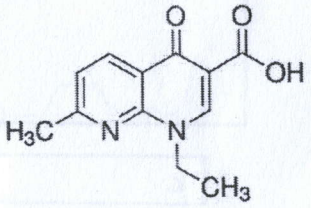
1. Answer all parts.

1.1. Write the generic name of each antibacterial agent given below. (***15 marks***)

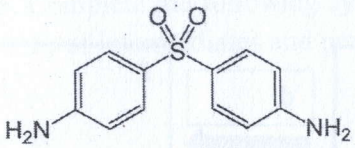
1.1.1.



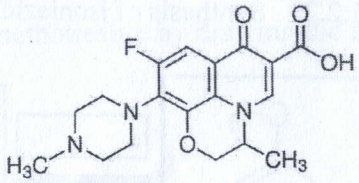
1.1.2.



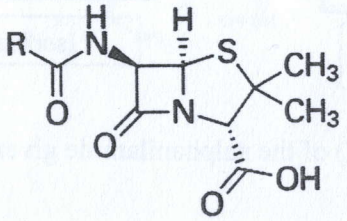
1.1.3.



1.1.4.

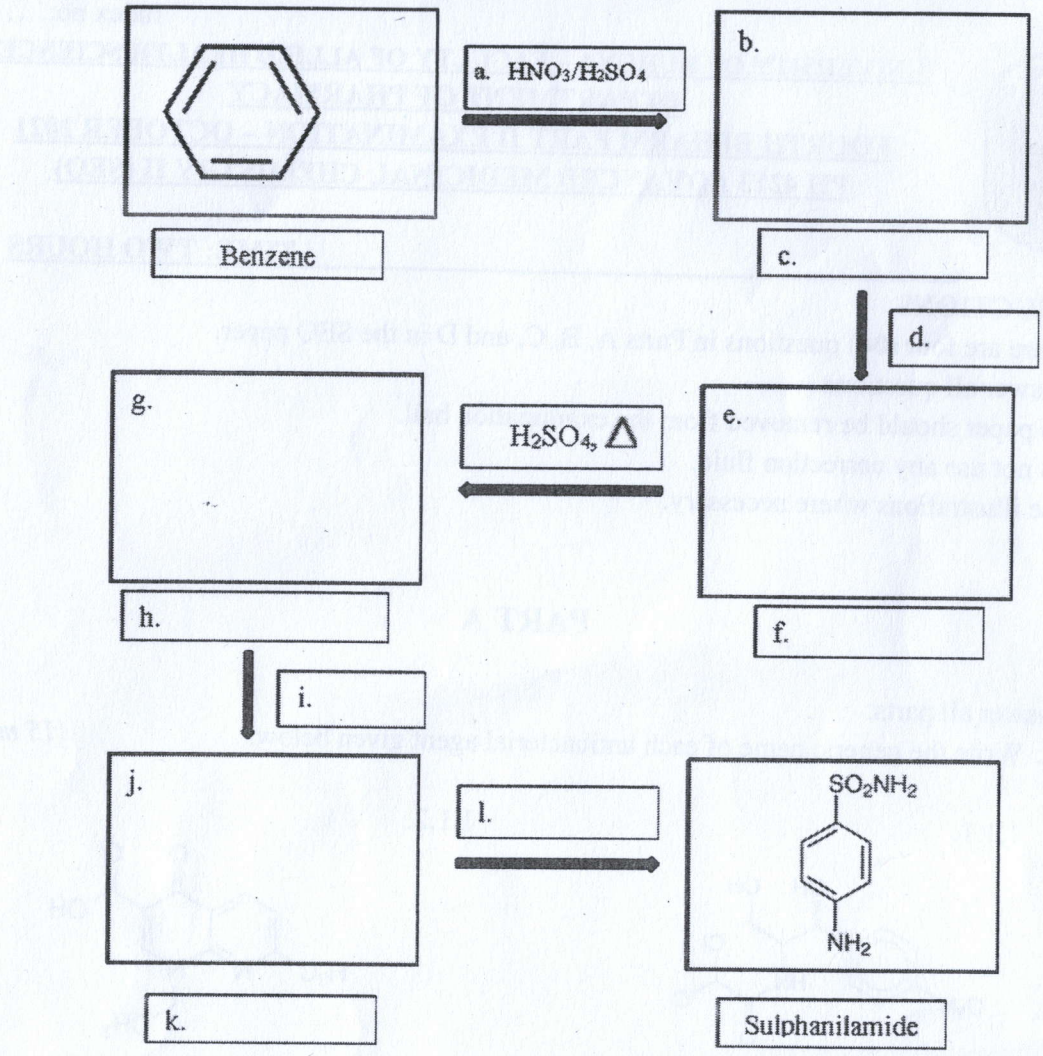


1.1.5.

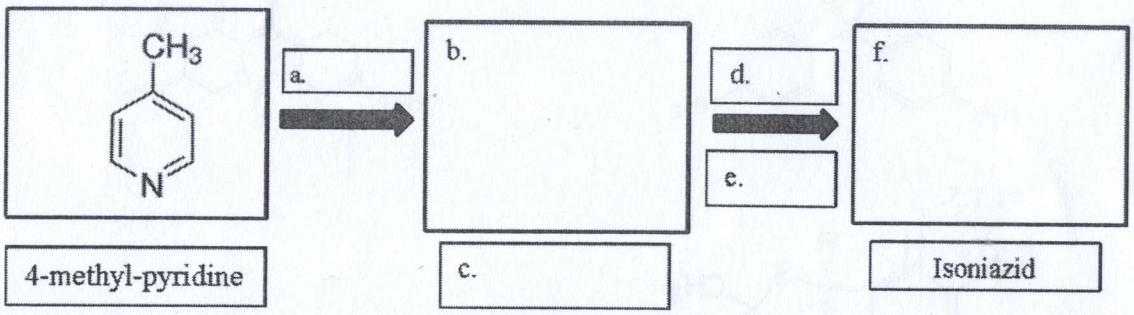


1.2. Complete the synthetic pathway of each medicinal compound given below.

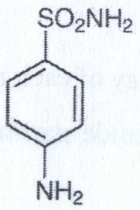
1.2.1. Synthesis of sulphanilamide starting from Benzene. (***12 marks***)



1.2.2. Synthesis of isoniazid starting from 4-methyl-pyridine. ***(08 marks)***



1.3. Discuss the structure activity relationship (SAR) of the sulphanilamide given below. ***(30 marks)***



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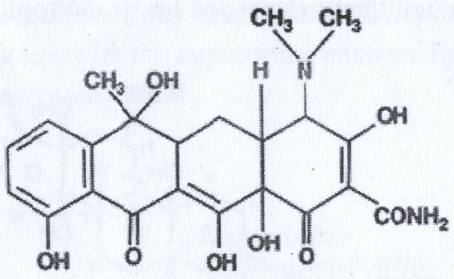
1.4.

1.4.1. Write the generic name of the pharmacophore given below. ***(05 marks)***



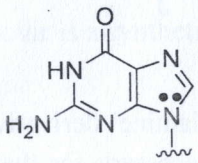
1.4.2. Describe the structure activity relationship (SAR) of the pharmacophore given above. ***(30 marks)***

PART B

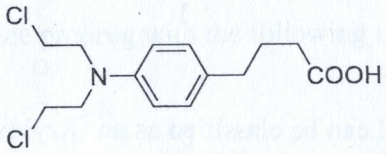
2.

2.1. List the **four** stages of cell cycle and name possible target points for cancer chemotherapy. ***(15 marks)***

2.2. The structure of guanine in DNA is given below. Draw the structure of the product upon addition of Chlorambucil to DNA. ***(15 marks)***

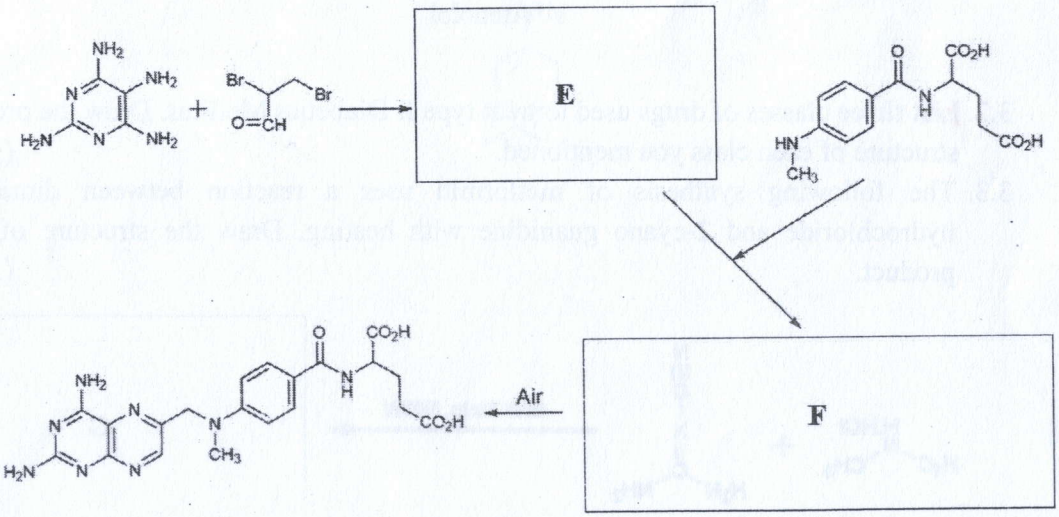


Guanine

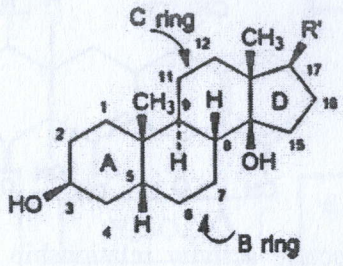


Chlorambucil

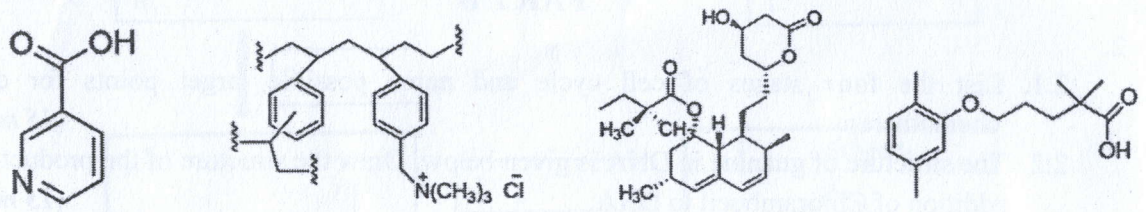
2.3. Complete the following synthesis scheme of methotrexate by drawing the structures (E-F) of intermediates and products. ***(30 marks)***



2.4. The basic molecular structure of cardiac glycosides is given below. List the main important structural features needed for its inotropic effect. (*20 marks*)



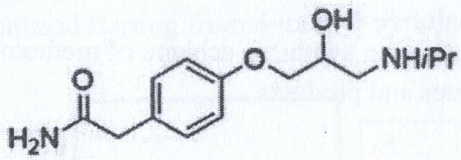
2.5 The following structures represent gemfibrozil, simvastatin, cholestyramine, and nicotinic acid. Match the structures (H-K) with the above drugs. (*20 marks*)



H I J K

3.

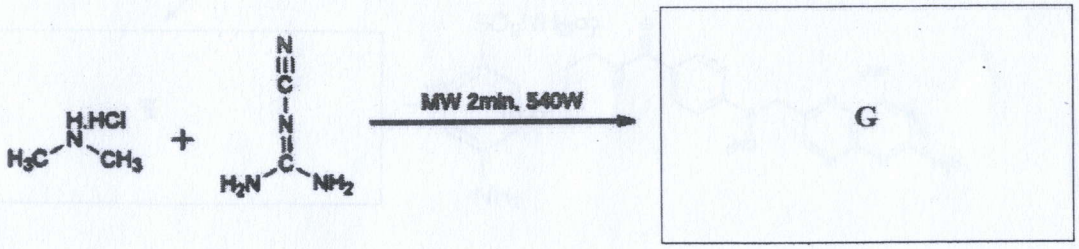
3.1. Atenolol can be classified as an 'Aryloxypropanolamine' derivative. Draw the structures of epichlorohydrin and the starting compounds necessary for the synthesis of atenolol. The structure of atenolol is given below. (*20 marks*)



Atenolol

3.2. List **three** classes of drugs used to treat type II Diabetics Mellitus. Draw the prototype structure of each class you mentioned. (*15 marks*)

3.3. The following synthesis of metformin uses a reaction between dimethylamine hydrochloride and 2-cyano guanidine with heating. Draw the structure of the final product. (*15 marks*)



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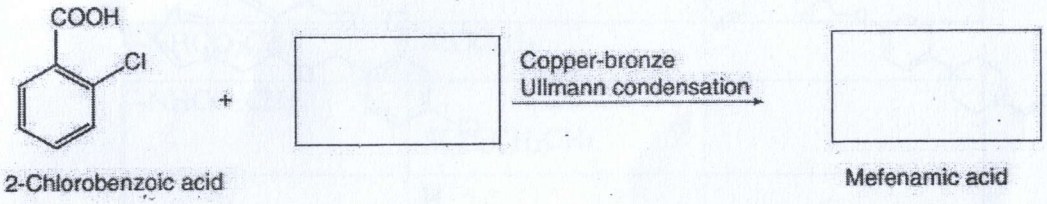
PART C

3.4.

3.4.1. Briefly explain the structure activity relationship (SAR) of salicylates. (***15 marks***)

3.4.2. Complete the blank boxes with the appropriate answers for the reaction given below for the synthesis of mefenamic acid. (***10 marks***)



2-Chlorobenzoic acid

Mefenamic acid

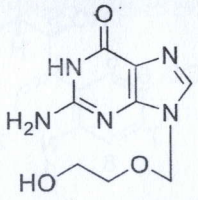
3.4.3. The modification of the histamine structure would act as competitive inhibitor of the H2-receptors. Giving **three** examples of drugs belong to this group, Justify your answer. (***25 marks***)

PART D

4.

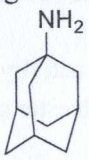
4.1.

4.1.1. Acyclovir is a synthetic nucleoside prodrug with the following structure.



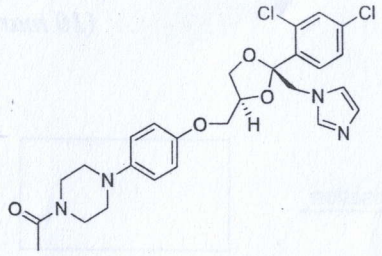
Using a suitable diagram, briefly explain the activation of this drug. (***20 marks***)

4.1.2. Structure of the antiviral drug, amantadine is shown below. Outline the synthesis of amantadine hydrochloride starting from adamantine. (***10 marks***)

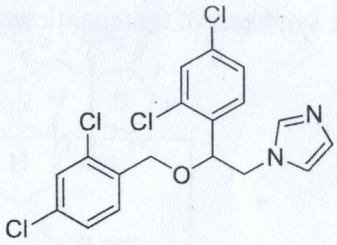


4.2. Name the following antifungal drugs and list their cellular targets. **(*24 marks*)**

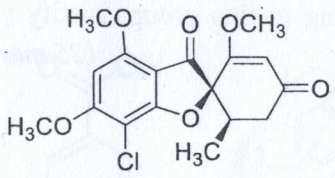
4.2.1.



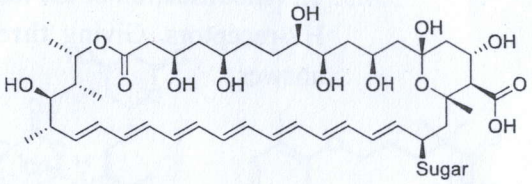
4.2.2.



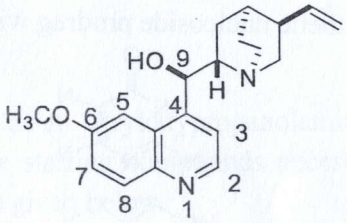
4.2.3.



4.2.4.



4.3. The chemical structure of quinine is given below.



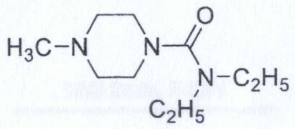
4.3.1. Circle the part of this molecule which is important in forming drug-heme complex? **(*06 marks*)**

4.3.2. Name the optical isomer of quinine. Does it possess antimalarial activity? **(*06 marks*)**

4.3.3. Comment the antimalarial activity of the molecule given in the question 4.3. when hydroxyl group replaced with ester group. **(*06 marks*)**

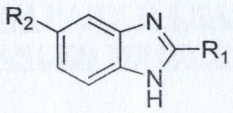
4.4.

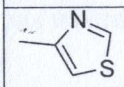
4.4.1. The chemical structure of diethylcarbamazepine which is an anti-filarial drug is shown below. Write down the pathway to synthesis this drug starting from N-methylpiperazine. **(*10 marks*)**



(b)

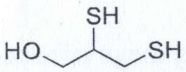
4.4.2. Benzimidazoles have the following basic structure. Give one example for each replacement given below. ***(06 marks)***



R_1	**R_2**	**Example**
$-NHCO_2CH_3$	$-COC_6H_5$	
$-NHCO_2CH_3$	$-SCH_2CH_2CH_3$	
	H	

4.5.

4.5.1. Name the following structure. ***(06 marks)***



4.5.2. List **two** metals where the above molecule could act as an antidote in metal poisoning.

(06 marks)

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