- Original paper -

Index No:.....

UNIVERSITY OF RUHUNA – FACULTY OF ALLIED HEALTH SCIENCES

DEPARTMENT OF PHARMACY

FOURTH BPHARM PART I EXAMINATION – JUNE 2022

PH 4112 ADVANCED MEDICINAL CHEMISTRY I – SEQ

TIME: TWO HOURS

INSTRUCTIONS

- There are three questions in part A, B and C of this 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.

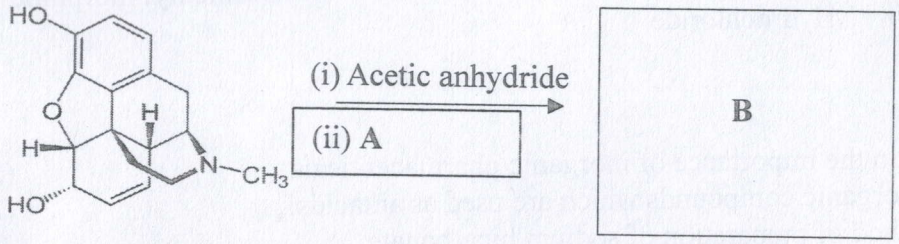
1.1 What are the three structural modifications of morphine related to its Structure Activity Relationship (SAR)? ***(15 marks)***

1.2 Briefly explain the SAR of morphine under one of the structural modifications mentioned above in part 1.1. ***(25 marks)***

1.3 List different types of non-opioid analgesics giving one example for each type. ***(20 marks)***

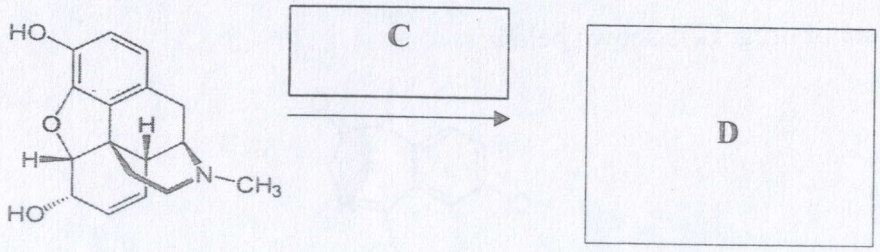
1.4 Fill the missing compounds/reagents **(A to H)** in the following reactions. ***(05x8 marks)***

1.4.1



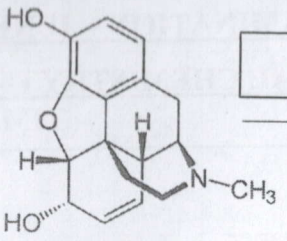
Morphine Diamorphine

1.4.2

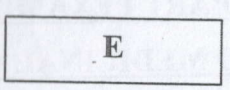


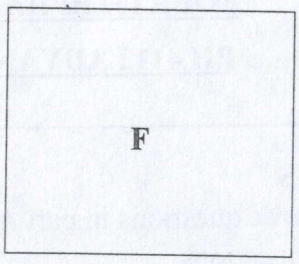
Morphine Codeine

1.4.3



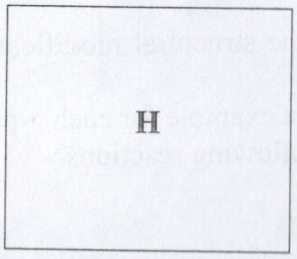
Morphine

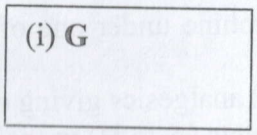




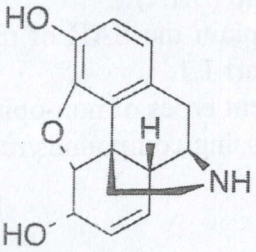
Cyano analogue

Hydrolysis





(ii) HCl



Nalorphine Hydrochloride

Desmethyl morphine

02.

2.1 Briefly explain the importance of inorganic pharmaceuticals. (*20 marks*)

2.2 Give three inorganic compounds which are used as antacids. (*15 marks*)

2.3 State the method of preparation of sodium bicarbonate. (*20 marks*)

2.4 What are pro-vitamins? (*10 marks*)

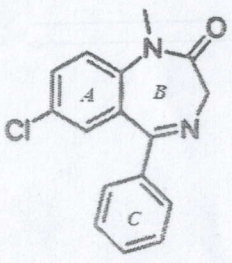
2.5 Give two examples for pro-vitamins. (*10 marks*)

2.6 List out main five steps of synthesis of ascorbic acid (vitamin C) according to the Reichstein Process. (*25 marks*)

PART B

03.

3.1 The structure of drug, **G** is shown below:



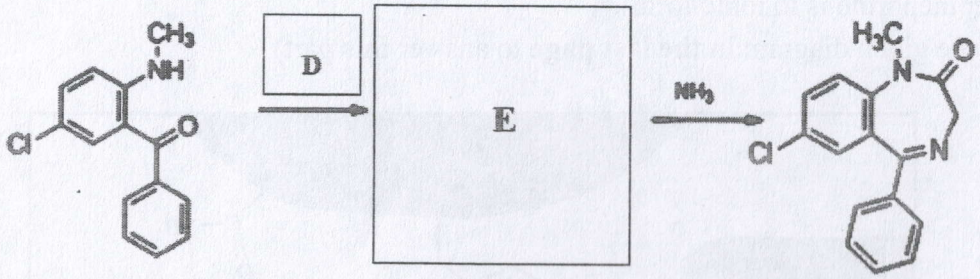
G

3.1.1 Name this drug, **G**. (*05 marks*)

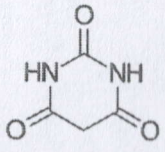
3.1.2 Briefly explain the importance of ring A and B for the activity. (*15 marks*)

3.1.3 Redraw the molecular structure of **G** and show the possible sites of substitution to make a range of useful drugs. (***15 marks***)

3.1.4 Identify the missing reagents and intermediates in the following synthesis of drug, **G**. (***15 marks***)



3.2 Examine the chemical structure, **F** given below and answer the following questions.



F

3.2.1 Name the chemical compound, **F**. (***05 marks***)

3.2.2 List two main drugs in use, which are derivatives of the compound, **F**. (***15 marks***)

3.2.3 Briefly explain five important structure activity relationships at position 5 of the compound **F**, in bringing out its pharmacological activities. (***30 marks***)

PART C

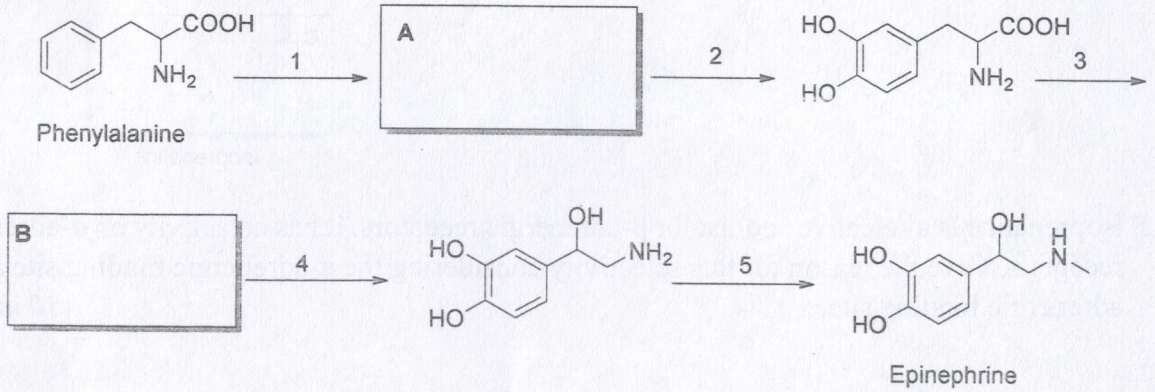
04. Adrenergic drugs also called as sympathomimetic drugs are mostly analogous to the structure of epinephrine and norepinephrine.

4.1 Give five therapeutic uses of adrenergic drugs giving **one** example for each. (***10 marks***)

4.2 Biosynthesis pathway of epinephrine is given below:

4.2.1 Draw the chemical structures of **A and B**. (Hint: **A** is a conditionally essential amino acid in humans). (***06 marks***)

4.2.2 Name the enzymes **2 and 4**. (***04 marks***)



Phenylalanine

Epinephrine

1.Phenylalanine hydroxylase

2. _____

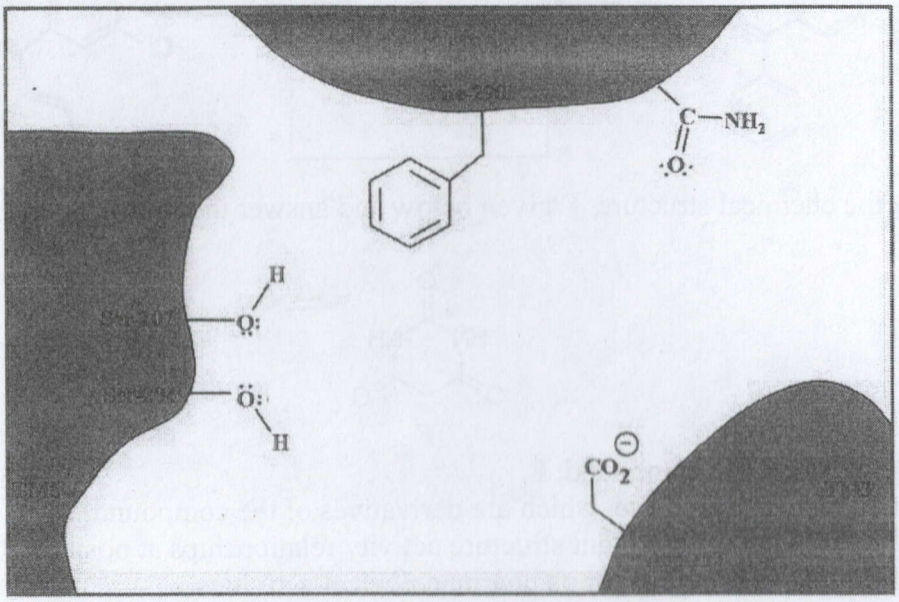
3.Aromatic amino acid decarboxylase

4. _____

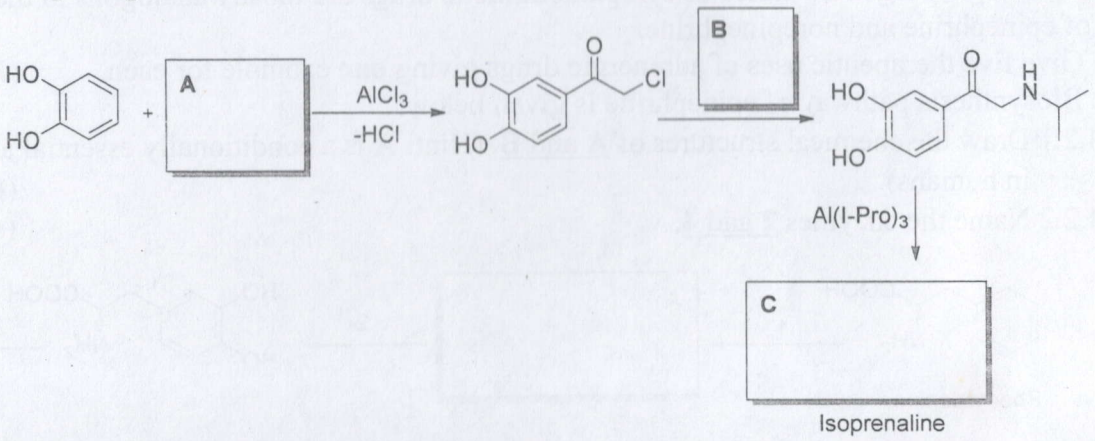
5.Phenylethanolamine N-methyl transferase

4.3 Adrenergic drug binding site is illustrated below. Place epinephrine correctly at the binding site showing five essential binding interactions. Names those binding interactions. (consider that epinephrine is in ionic form). ***(20 marks)***

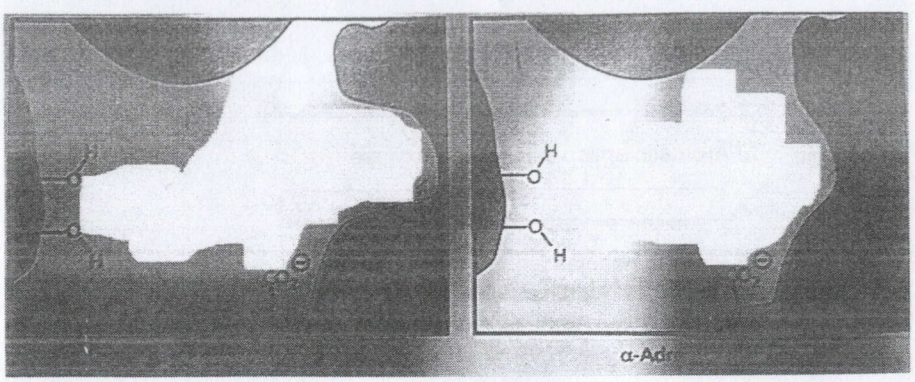
(Use the given diagram in **the last page** to answer this part)



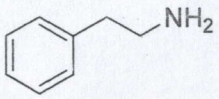
4.4 A possible synthetic pathway of isoprenaline is given below. Draw the structures of the missing compounds **A**, **B** and **C**. ***(20 marks)***



4.5 Isoprenaline is a selective agonist for β-adrenergic receptors. It has no activity on α-adrenergic receptors. Give the reason for this selectivity considering the α-adrenergic binding site and β-adrenergic binding site. ***(10 marks)***



4.6 Phenyl ethanolamine is the core structure of many sympathomimetic drugs. Briefly explain Structure Activity Relationship (SAR) of adrenergic drugs using the structure of phenyl ethanolamine. ***(30 marks)***



Phenyl ethanolamine

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(Use the following diagram to answer the part **4.3** of question **04**)

4.3