



UNIVERSITY OF RUHUNA – FACULTY OF ALLIED HEALTH SCIENCES

DEPARTMENT OF PHARMACY

FIRST BPHARM PART I EXAMINATION -FEBRUARY 2022

PH 1112 PHARMACEUTICAL CHEMISTRY I (SEQ) –REVISED SYLLABUS

TIME: TWO HOURS

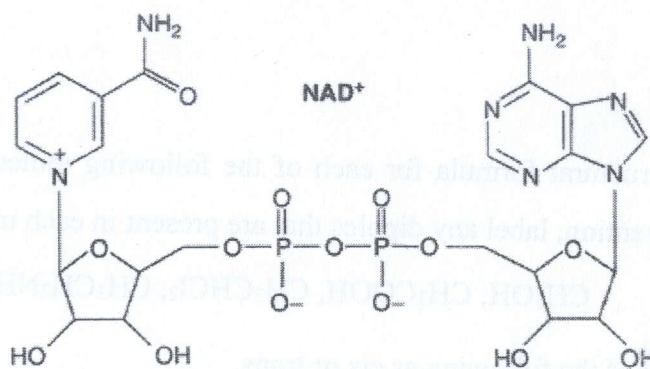
**INSTRUCTIONS**

- There are **four** questions in parts A, B and C in 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 Nicotinamide adenine dinucleotide ( $\text{NAD}^+$ ) occurs naturally in the body and plays a major role in the chemical process that generates energy. Its structure is shown below:



1.1.1 Circle each functional group in the molecule and write the names of them.

(05 marks)

1.1.2 Indicate each of the following:

Names of the sugar and the nitrogen bases.

(10 marks)

chiral centers with an asterisk (\*)

(05 marks)

anomeric carbon atom(s)

(05 marks)

N-glycoside bond(s) specifying whether  $\alpha$  or  $\beta$

(05 marks)

1.1.3 Number the sugar units and the nitrogen bases (10 marks)

1.1.4 Draw the Fisher projection of the open chain form of the sugar unit identified in the molecule and its C-3 epimer. (10 marks)

1.2

1.2.1 The  $\alpha$ -amino acids can be classified into different groups based on their side chains.

Group the following amino acids into acidic, basic, and aromatic amino acids and give their one-letter codes. (15 marks)

Ala, Asp, Cys, Glu, Leu, Lys, Met, Phe, Ser, His

Draw the chemical structures of Asp, Cys, Lys and Phe. (20 marks)

1.3

1.3.1 Draw (S)-stereoisomer of the monoglyceride of linoleic acid (C-18,  $\omega$ -6) (10 marks)

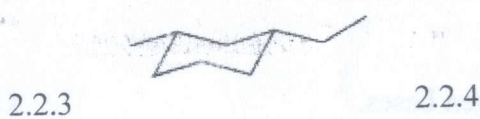
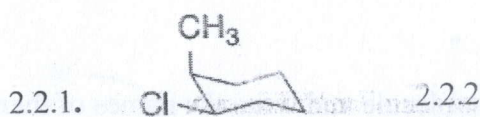
1.3.2 What determines the omega number of a fatty acid? (05 marks)

02.

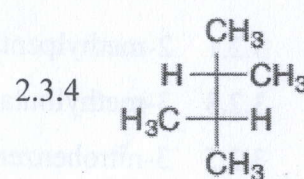
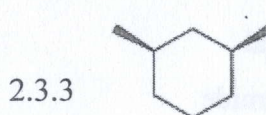
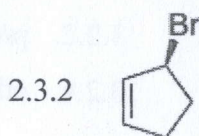
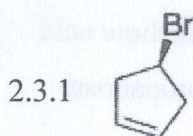
2.1 Draw a structural formula for each of the following molecules and then, using the  $\delta^+/\delta^-$  convention, label any dipoles that are present in each molecule. (20 marks)



2.2 Label each of the following as cis or trans. (20 marks)

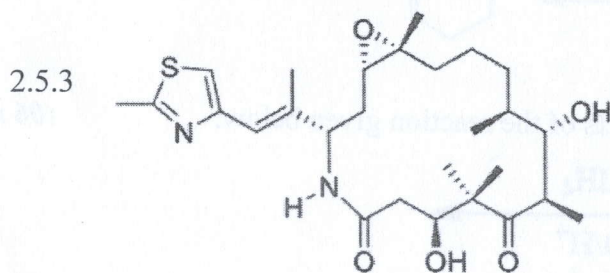
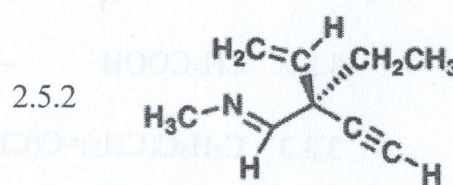
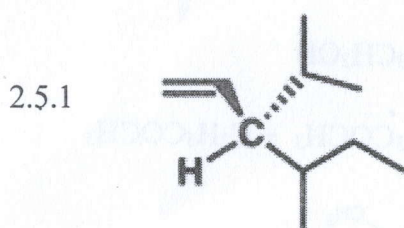


2.3 Label each of the following molecule as chiral, achiral, or meso-achiral. (20 marks)



2.4 A carboxylic acid with a molecular formula  $C_3H_5O_2Br$  is optically active. Draw the structure of the R isomer. (10 marks)

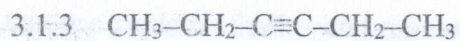
2.5 Assign E/Z or R/S configuration for the following molecules. (30 marks)



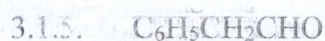
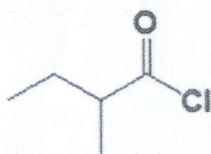
### PART B

03.

3.1. Give the IUPAC names of the following compounds. (30 marks)



3.1.4



3.2. Draw the structures for the following compounds. (40 marks)

3.2.1. 2-methylpentanal

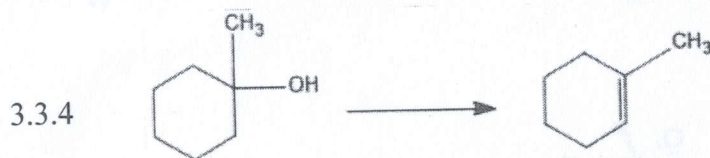
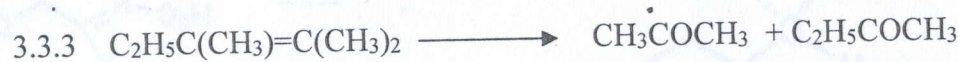
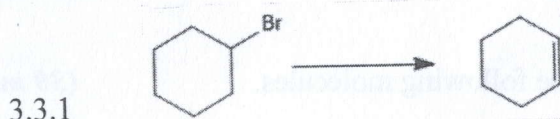
3.2.2. propanedioic acid

3.2.3. 3-methylbutanamide

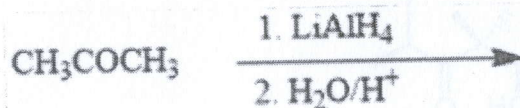
3.2.4. ethylpropanoate

3.2.5. 3-nitrobenzenecarboxylic acid

3.3. Write down the necessary reagents and reaction conditions for the following conversions. (24 marks)



3.4. Write down the possible products of the reaction given below. (06 marks)



### PART C

04.

4.1 The human body consists of about 50 elements.

4.1.1. Define the term "essential element". (04 marks)

4.1.2. Categorize following elements as bulk and trace metals. (16 marks)

Na, Cu, Ca, Mg, Fe, V, K, Mn

4.1.3. Zn is an essential element found in human body. Write a short account on the importance of Zn in biological systems. (25 marks)

4.2 Topical agents are important for human health.

4.2.1. What are "topical agents"? (05 marks)

4.2.2. List the three groups of topical agents. (05 marks)

4.2.3 Categorize the following chemicals (10) according to the groups that you have mentioned in 4.2.2. **(30 marks)**

Alum, Calamine, Chloramines, Hydrogen peroxide, Selenium sulfide, Silver nitrate, Titanium dioxide, Zinc chloride, Zinc stearate, Zinc sulphate.

4.3 Briefly describe functions of body fluids. **(15 marks)**

Your answer should contain the following points.

Fluids dissolve and transport substances

Fluids account for blood volume

Fluids help maintain body temperature

Fluids protect and lubricate body tissues

Aid in the removal of cellular metabolic waste

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