



MASENO UNIVERSITY
UNIVERSITY EXAMINATIONS 2016/2017

**SECOND YEAR FIRST SEMESTER EXAMINATIONS FOR THE
DEGREE OF BACHELOR OF SCIENCE IN MEDICAL
BIOTECHNOLOGY, MEDICAL LABORATORY SCIENCE AND
PHARMACEUTICAL SCIENCE WITH INFORMATION
TECHNOLOGY**

MAIN CAMPUS

PML 221: BASIC BIOCHEMISTRY

Date: 5th December, 2016

Time: 8.30 - 11.30 am

INSTRUCTIONS:

- Answer ALL questions in SECTION A and question ONE in SECTION B and any other ONE.

SECTION A: (Short answer questions)

Answer ALL questions (40 Marks)

1. Explain the following terminologies
 - a. Van der waals forces
 - b. Enzyme unit
 - c. Zwitterions

[6 marks]
2. Explain the biochemical importance of vitamin A

[4 marks]
3. For the reaction:
$$\text{ATP} + \text{Pyruvate} \rightleftharpoons \text{Phosphoenolpyruvate} + \text{ADP}$$

Calculate ΔG^0 and K' eq at 25°C .
[Free energies of hydrolysis: phosphoenol pyruvate = -14.8 kcal/mol; ATP (to ADP) = -7.3 kcal/mol]

[4 marks]
4. Describe the biochemical significance of the Hexose Monophosphate (HMP) shunt

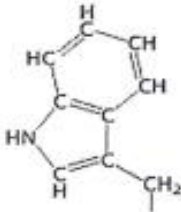
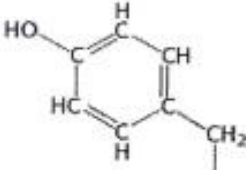
[4 marks]
5. Distinguish between the following terminologies in the inhibition kinetics of enzyme – catalyzed reactions
 - a. Allosteric inhibition and competitive inhibition
 - b. Noncompetitive inhibition and Uncompetitive inhibition

[4 X 2 marks]
6. Predict whether each of the following would have decreased/ increased effect on the pace of glycolysis in liver cells:
 - a. Loss of allosteric site for ATP in phosphofructokinase
 - b. Loss of the phosphatase domain of the bifunctional enzyme that controls the level of fructose 1,6-bisphosphate.
 - c. Loss of binding site for fructose 1,6-bisphosphate in pyruvate kinase
 - d. Loss of the binding site for citrate in phosphofructokinase

[4 marks]

Use the table below to answer the remaining questions in this section

The table depicts the one letter symbol and the corresponding side chain of some amino acids.

Amino acid (one letter symbol)	Side chain
G	H-
K	$\text{H}_2\text{N}-(\text{CH}_2)_4-$
R	$\text{HN}=\text{C}(\text{NH}_2)-\text{NH}-(\text{CH}_2)_3-$
L	$(\text{CH}_2)_2-\text{CH}-\text{CH}_2-$
W	
Y	

- The tripeptide, Arg-Gly-Trp is formed from a condensation reaction with three of the amino acids in the above table. Draw the structure of the tripeptide and label its amino and carboxyl terminals. Indicate the number of water molecules involved in this reaction
[5 marks]
- Identify and draw TWO other distinct tripeptide(s) that can form from the three amino acids Arg, Gly and Trp.
[3 marks]
- Predict the possible structure(s) of the resulting products when thrombin acts on the tripeptide, Arg-Gly-Trp.
[2 marks]

SECTION B: (Long answer questions)

Answer Q10 and any other ONE question from this section

(30 Marks)

10. Discuss the key stages employed by higher organisms to generate energy from foodstuffs, using appropriate illustrations to highlight some of mechanism employed at each of the stages.

[20 marks]

11. The enzyme acetylcholinesterase is also referred to as *EC, 3.1.1.7*

Explain what each the letters and figures mean and discuss why this scheme of enzyme nomenclature was adopted by the International Union of Biochemists (IUB).

[10 marks]

12. One of the reasons for prolonged prothrombin time maybe a dietary deficiency.

i). Explain this condition, identifying the possible predisposing factor(s) and risks

ii). Mention the dietary deficiency associated with the condition and discuss how its addition to the diet would resolve the problem at the structural level of the molecules involved.

[3 + 7 marks]