



MASEÑO UNIVERSITY

UNIVERSITY EXAMINATIONS 2012/2013

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

PML 221: BASIC BIOCHEMISTRY

Date: 2nd August, 2013

Time: 2.00 – 4.00 p.m.

PML 221: BASIC BIOCHEMISTRY YEAR 2, SPECIAL EXAMINATIONS AUGUST 2013

Section 1; Answer ALL questions; 60 marks

1. List four (4) elements whose abundance or availability in the primordial soup was essential to the elemental composition of living organisms (2 marks)
2. Indicate the order in which the following biological molecules may have evolved or synthesized and why; In other words which one came first and which ones followed in order and why? (5 marks)
a) Carbohydrates, b) DNA, c) RNA d) Proteins, e) Amino acids,) Water
3. Show the differences in the basic structures of a named amino acid, carbohydrate and a fatty acid (6 marks)
4. Use a diagram to explain the flow of energy through the biosphere (3 marks)
5. Answer the following questions with "True" or "False". If false explain why (10 marks)
 - a) Only at very low or very high pH does the nonionized form of an amino acid predominate.
 - b) All amino acids have only two dissociation constants, one for the carboxyl group and the other for the amino group
 - c) The isoelectric point of an amino acid or protein is the pH at which it carries no net charge. This factor is important in sodium dodecyl sulphate (SDS) electrophoresis of proteins on polyacrylamide gels
 - d) The equation;
$$\text{pH} = \text{pK}_a + \log \frac{\text{Ionized}}{\text{Non ionized}}$$
 can be used to determine the permeability by passive diffusion of an organic molecule. However this applies only if the molecule behaves as a strong base or a strong acid
 - e) An amide linkage is formed when the carboxyl group of one amino acid combines with the amino group of another amino acid
6. Match the following words in Part A with statements or conditions in Part B which best describes or relates to them. The statements in Part B cannot be used more than once. Repeated use of the statement will attract a penalty point (10 marks)

Part A

- a) Hydrophobic interactions
- v) Phosphoenol pyruvate
- c) Cysteine-Cysteine linkage
- d) Electron transport
- e) Myoglobin
- f) Sigmoid curve
- g) Gluconeogenesis
- h) Pyruvate
- i) Glycogen phosphorylase α

j) Glucose-1-phosphate

Part B

- i) Predicts the Hemoglobin-Oxygen dissociation in erythrocytes
 - ii) Coupled to oxidative phosphorylation
 - iii) A product of 2-Phosphoglycerate
 - iv) Formation of glucose from non-carbohydrate sources
 - v) Fatty acyl chains in cell membranes
 - vi) Its oxidative decarboxylation leads to formation of a major tricarboxylic acid cycle intermediate
 - vii) Comprises of a single polypeptide chain
 - viii) Formation of glycogen in muscle
 - ix) Catabolism of glycogen leading to Glucose-6-phosphate
 - x) Formation of sulfhydryl bonds leading to secondary structure
7. With the aid of diagrams and using one example of named purine and one example of named pyrimidine briefly explain the differences between a base, nucleoside and nucleotide (6 marks)
8. Use the biochemistry of HIV-1 Reverse transcriptase to account for a more rapid development of resistance to Antiviral drugs? (5 marks)
9. Use graphical representations to explain Michaelis-Menten kinetics as it relates to Enzyme-substrate reactions in the absence and presence of inhibitors (7 marks)
10. Drinking methanol can be fatal. The methanol itself is not harmful, but it is converted rapidly via alcohol dehydrogenase reaction to formaldehyde, which is toxic. Surprisingly, one treatment for methanol poisoning is to get the patient drunk. Suggest an explanation for why this treatment is effective.(6 marks)

Section II; 40 marks

Answer Question 11 and either Question 12 or Question 13

- 11. Discuss information flow from gene transcription to protein synthesis (20 marks)
- 12. Discuss the pathway and processes involved in generation of energy in the mitochondria (20 marks)

OR

- 13. Discuss the pathways involved in entry of galactose, glycogen , proteins and fatty acids in to the glycolytic pathway (20 marks)