

UNIVERSITY OF SWAZILAND
RESIT EXAMINATION PAPER: JULY 2018

TITLE OF PAPER: BIOCHEMISTRY & CELL BIOLOGY

COURSE CODE: BIO 352

TIME ALLOWED: THREE HOURS

INSTRUCTIONS:

1. ANSWER QUESTION 1 (COMPULSORY) IN SECTION A AND ANY TWO OTHER QUESTIONS IN SECTION B.
2. ANSWER A TOTAL OF 4 (FOUR) QUESTIONS
3. ALL QUESTIONS CARRY TWENTY FIVE (25) MARKS
4. ILLUSTRATE YOUR ANSWERS WITH LARGE AND CLEARLY LABELLED DIAGRAMS WHERE APPROPRIATE

SPECIAL REQUIREMENTS: NONE

THIS PAPER SHOULD NOT BE OPENED UNTIL PERMISSION HAS BEEN GRANTED BY THE INVIGILATORS

[PLEASE TURN OVER]

Section A: Compulsory (Answer all questions in this section)

Question 1

- (a) Explain the differences between the following:
- (i). Isoelectric point and pKa, (1 mark)
 - (ii). Competitive inhibition and non-competitive inhibition, (1 mark)
 - (iii). Coenzyme and prosthetic group, (1 mark)
 - (iv). Zwitterion and an acidic amino acid, (1 mark)
 - (v). Hydropathy and hydrophobicity, (1 mark)
 - (vi). Apoenzyme and holoenzyme, (1 mark)
 - (vii). Anabolism and catabolism. (1 mark)
- (b) State & briefly explain why the following statements are true/false (T/F).
- (i). Gluconeogenesis consists entirely of the reactions of glycolysis, operating in the reverse direction. (2 marks)
 - (ii). The pentose phosphate pathway provides precursors for the synthesis of nucleotides. (2 marks)
- (c) Explain how and why proteins fold. (4 marks)
- (d) Explain, using examples, the difference between glucogenic and ketogenic amino acids. (10 marks)

[Total Marks = 25]

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Section B: (Answer any three questions in this section)**Question 2**

(a) Briefly explain the use of each of the following reagents in the analysis of primary structure of a protein:

- (i) Phenylisothiocyanate, (2 marks)
- (ii) Chymotrypsin, (2 marks)
- (iii) β -mercaptoethanol, (2 marks)
- (iv) Carboxypeptidase. (2 marks)

(b) A biochemist wishes to determine the sequence of a protein that contains 173 amino acid residues. After treatment with β -mercaptoethanol and cyanogen bromide (CNBr), it is anticipated that less than ten conveniently sized peptides will be obtained in the resulting solution. You are then tasked to take over and complete the remaining amino acid analysis steps. Outline and explain the steps you would take to determine, unambiguously, the sequence of amino acid residues in the original protein. (17 marks)

Question 3

Discuss how excess nitrogen is disposed of, indicating organ(s) and/or cellular compartment(s) where this occurs in an animal biological system. (25 marks)

Question 4

With reference to palmitic acid (C16:0), discuss the process of fatty acid β -oxidation. (25 marks)

Question 5

Critique the assertion that "knowledge of nutrients and human nutrition is essential to mankind". (25 marks)

END OF QUESTION PAPER