

**BOWEN UNIVERSITY, IWO, OSUN STATE**  
**BIOCHEMISTRY PROGRAMME**  
**COLLEGE OF AGRICULTURE, ENGINEERING AND SCIENCE**  
**2022/2023 SESSION**  
**SECOND SEMESTER EXAMINATION**  
**300 LEVEL**

**COURSE CODE: BCH 304**  
**CREDITS: 2**

**COURSE TITLE: PROTEIN METABOLISM**  
**TIME: 2 HOURS**

**INSTRUCTIONS: QUESTION ONE IS COMPULSORY AND**  
**ANSWER ONE QUESTION EACH FROM SECTION B AND C**  
**SECTION A**

**QUESTION ONE:**

- (a) i. Describe the mechanism of transamination reaction (5 marks)
- ii. State five salient features of transamination reactions (5 marks)
- (b) Discuss the biosynthesis of glycine from 3-phosphoglycerate (10 marks)

**SECTION B**

**QUESTION TWO:**

- (a) Describe the urea cycle (10 marks)
- (b) Describe ammonia metabolism in the liver (5 marks)
- (c) Draw the following structures
  - i. Valine (1 mark)
  - ii. Leucine (1 mark)
  - iii. Arginine (1 mark)
  - iv. Serine (1 mark)
  - v. Threonine (1 mark)

**QUESTION THREE:**

- (a) i. Draw the structures of two amino acids that are both glucogenic and ketogenic (3 marks)
- (b) i. Write the equation for the transamination reaction between alanine and oxaloacetate. (3 marks)
- ii. Name the two products that are formed (2 marks)
- (c) i. State the three ways in which nitrogen is removed from amino acids? (1.5 marks)
- ii. State the amino acid involved in (ci) (1.5 marks)
- iii. State the enzyme, coenzyme, and vitamin that are required for transamination (3 marks)
- (d) What are the 3 functions of glutamate in the urea cycle? (3 marks)
- (e) Indicate whether the following amino acids are glucogenic, ketogenic, or both.
  - i. asparagines
  - ii. tyrosine
  - iii. valine(3 marks)

**SECTION B**

**QUESTION FOUR:**

- (a) What is heme? (2 marks)
- (b) Draw the structure of heme? (4 marks)
- (c) State the major tissues that synthesize heme in humans (2 marks)
- (d) What are the precursors of heme synthesis and their sources? (2 marks)
- (e) Give an account of the last three reactions in heme synthesis (10 marks)

**QUESTION FIVE:**

- (a) List five (5) one-carbon units involved in carbon metabolism
- (b) Discuss the transfer of methyl group by S-Adenosyl methionine
- (c) State five (5) acceptors of methyl group from SAM and their product

**(5 marks)**

**(10 marks)**

**(5 marks)**