



# MERU UNIVERSITY OF SCIENCE AND TECHNOLOGY

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## University Examinations 2023/2024

THIRD YEAR SECOND SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR  
OF SCIENCE IN CHEMISTRY

### SCH 3356: CHEMISTRY OF CARBOHYDRATES AND PROTEINS

DATE: APRIL 2024

TIME: 2 HOURS

INSTRUCTIONS: Answer question *one* and any other *two* questions

#### QUESTION ONE (30 MARKS)

- a) Define the following terms
- i) Monosaccharides
  - ii) Peptide linkage
  - iii) Denaturation
  - iv) Mutarotation (4 Marks)
- b) What are the products of hydrolysis of
- i) lactose
  - ii) sucrose
  - iii) inulin
  - iv) maltose (4 Marks)
- c) State two properties and uses of proteins (4 Marks)
- d) Using chemical equation illustrate the observation “Amino acids are amphoteric”. (3 Marks)

- e) Distinguish between simple and derived proteins. (2 Marks)
- f) Outline the main steps involved in the process of manufacture of cane-sugar.(3 Marks)
- g) Explain the following observations
  - i) Carbohydrates are generally optically active (2 Marks)
  - ii) Cellulose are not digested in human body (2 Marks)
- h) Write the products of oxidation of glucose with
  - i) bromine water (2 Marks)
  - ii) Nitric acid (2 Marks)
  - iii) Hydrogen iodide (2 Marks)

**QUESTION TWO (20 MARKS)**

- a) i) What is native state of proteins (2 Marks)
- ii) Describe the Biuret test for proteins (3 Marks)
- b) State three functions of carbohydrates (3 Marks)
- c) Discuss the constitution of glucose. (12 Marks)

**QUESTION THREE (20 MARKS)**

- a) Distinguish between globular and fibrous proteins, give example in each (4 Marks)
- b) i) Why is sucrose called invert sugars? (2 Marks)
- c) What are prosthetic groups (1 Marks)
- d) i) How are proteins classified on the basis of prosthetic group (4 Marks)
- e) The primary difference among the blood groups/types A, B, O and AB involve antigenic carbohydrates on the surface of the red blood cells. Explain this observation (6 Marks)
- a) State the reactions of glucose which cannot be explained by its open chain structure (3 Marks)

**QUESTION FOUR (20 MARKS)**

- a) Define the following terms
  - i) Anomers
  - ii) Glucosidic linkage
  - iii) Mercerizing
  - iv) Coagulation (4 Marks)
- b) Describe the isolation of proteins (4 Marks)

- c) Write the Fischer and Haworth structures of fructose (4 Marks)
- d) Compare and contrast properties of glucose and fructose (8 Marks)