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**UNIVERSITY EXAMINATIONS
2022/2023 ACADEMIC YEAR**

**THIRD YEAR SECOND SEMESTER
MAIN EXAMINATIONS**

FOR THE DEGREE OF BACHELOR OF CHEMISTRY

COURSE CODE: SCH 326

COURSE TITLE: SOFT MATTER CHEMISTRY

DURATION: 2 HOURS

DATE: 19/04/2023 **TIME:** 9:00-11:00AM

INSTRUCTIONS TO CANDIDATES

- Answer **QUESTION ONE** (Compulsory) and any other two (2) Questions.
- Indicate **answered questions** on the front cover.
- Start every question on a new page and make sure question's number is written on each page.

QUESTION ONE.COMPULSORY (30 MARKS)

- a) Define three characteristics of soft matter systems (3mks)
- b) Explain using examples any five technological applications of soft matter (5mks)
- c) Name three reasons why the study of crystalline solids is important (3mks)
- d) State three symbol crystal structures found in most common solids (3mks)
- e) List three uses of rubber (3mrks)
- f) The interaction between two adsorbed atoms or molecules on the surface may be attractive or repulsive, explain using examples (4mrks)
- g) What are some of the polymers that you encounter every day? Describe their physical properties (4mrks)
- h) Explain why the glass transition temperature is strain – rate dependent (3mrks)
- i) Differentiate between physisorption and chemisorption (2mrks)

QUESTION TWO (20 MARKS)

- a) Explain how the following factors affect the strength of polymers
 - (i) Molecular weight (3mrks)
 - (ii) Cross- linking (3mrks)
 - (iii) Crystallinity (3mrks)
- b) List one applications of polymers (1mrk)
- c) Define the term “unit cell” (1mrk)
- d) Using examples, discuss the simple crystal structures found in common metals under the following headings
 - (i) Face centered cubic (3mrks)
 - (ii) Body centered cubic (3mrks)
 - (iii) Hexagonal close – packed (3mks)

QUESTION THREE (20MARKS)

- a) Discuss the practical applications of glass transition temperature (6mrks)
- b) What role does the surface of an adsorbent have in adsorption process (2mrks)
- c) Describe the method of adsorption and its characteristics (3mks)
- d) Discuss the draw backs of natural rubber and hence deduce the main purpose of vulcanization (9mrks)

QUESTION FOUR (20MRKS)

- a) Synthetic polymers are produced in different types of reactions. Discuss using appropriate examples (10mrks)

- b) Discuss the classification of basic constituent molecules of soft matter under the following sub headings (10mrks)
- (i) Colloidal suspensions
 - (ii) Polymers
 - (iii) Ampiphilic molecules

QUESTION FIVE (20MRKS)

- a) Using examples, discuss the physical properties of a polymers that affect their strength and flexibility under the following subheadings: (10mrks)
- (i) Chain length
 - (ii) Side groups
 - (iii) Branching
 - (iv) Cross linking
- b) Define the term polymer and differentiate between organic and inorganic polymers (4mks)
- c) Describe the process of vulcanization of rubber and state any three advantages of the process (5mrks)
- d) List two practical applications of glass transition temperature (2mrks)