

**BOWEN UNIVERSITY, IWO, OSUN STATE**  
**COLLEGE OF AGRICULTURE, ENGINEERING AND SCIENCE**  
**INDUSTRIAL CHEMISTRY PROGRAMME**  
**2022/2023 B.SC DEGREE FIRST SEMESTER EXAMINATION**

**Course Code:** ICH 311

**Course Title:** Polymer Chemistry

**Credit Unit:** 3

**Date:** Friday, 17/02/2023

**Time Allowed:** 2½ hours

---

**INSTRUCTIONS:** Answer any **FOUR** questions in all.  
Each question carries **equal marks**  
Answer each **MAIN** question on a fresh page

---

**Question 1**

- a. Give examples of naturally occurring polymers that are important for life? **5 marks**
- b. Give the structure of the monomer of polyvinyl chloride **5 marks**
- c. How are polymers made **5 marks**
- d. With examples, describe the differences between condensation polymerisation and addition polymerisation. **5 marks**

**Question 2**

- a. Define the term polymer degradation **2 marks**
- b. Discuss the types of polymer degradation with the aid of equations **6 marks**
- c. What is a rubber? Discuss rubber elasticity **5 marks**
- d. Define the following
  - i. Elasticity
  - ii. Stretchiness **2 marks**
- e. Give five mechanical properties of polymer **5 marks**

**Question 3**

- a. Discuss the following physical properties of polymers;
  - i. Polymer Crystallinity
  - ii. Degree of polymerization
  - iii. Molecular weight
  - iv. Polydispersity index **15 marks**
- b. Differentiate between thermoplastic and thermoset polymers **5 marks**

#### Question 4

- a. What are the factors that influence the degree of crystallinity **5 marks**
- b. What are elastomers? Give examples **5 marks**
- c. Discuss the mechanical properties of polymers **10 marks**

#### Question 5

- a. How does a polymer dissolve? **2 marks**
- b. What do you understand by polymerization? **6 marks**
- c. Outline the sources of raw materials for polymers. **3 marks**
- d. Explain the significance of polymer nomenclature. **3 marks**
- e. Discuss condensation polymerization with suitable examples. **6 marks**

#### Question 6

- a. What is glass transition temperature? **2 marks**
- b. State the major routes for polymerization. **2 marks**
- c. Write the structure of the monomer and the polymer of the following:
  - i. Polyethylene
  - ii. Polystyrene
  - iii. Polyvinyl chloride. **6 marks**
- d.
  - i. State the full meaning of LCST and UCST. **3 marks**
  - ii. Sketch a plot of typical polymer binary solution phase behaviour indicating both LCST and UCST on the curve. **7 marks**