



**NATIONAL OPEN UNIVERSITY OF NIGERIA**  
**UNIVERSITY VILLAGE, PLOT 91 CADASTRAL ZONE, NNAMDI AZIKIWE EXPRESS WAY, JABI - ABUJA.**  
**FACULTY OF SCIENCES**  
**DEPARTMENT OF PURE AND APPLIED SCIENCE**  
**OCTOBER/NOVEMBER 2019 SECOND SEMESTER EXAMINATION**

**COURSE CODE:** CHM 302  
**COURSE TITLE:** POLYMER CHEMISTRY 1  
**COURSE UNIT:** 2  
**TIME:** 2 HOURS  
**INSTRUCTION:** Answer question one and any other three questions.

**QUESTION ONE**

- 1a. Base on their structure, present the three classes of polymer. Give one example for each class. (6 marks)
- 1b. Using two (2) examples each, explain the basic steps involved in the following;
- i. addition polymerisation ( 3 marks)      ii. condensation polymerisation (3 marks)
- 1c. Explain briefly the term “vulcanisation” (4 marks)
- 1d. What is crystallinity in polymers? (4<sup>1</sup>/<sub>2</sub> marks)
- 1f. Complete the table given below

Monomer	Polymer name (½ mark each)	Applications (1 mark)
Vinyl acetate		
Tetrafluoroethylene		
Vinyl alcohol		

**QUESTION TWO**

- 2a. Using diagrams ONLY show the following polymer tacticities:

i. isotactic ii. syndiotactic iii. atactic (3 marks)

2b. Write short note on the following:

- i. Homopolymers (2 marks)
- ii. Bifunctional (2 marks)
- iii. Copolymers (3 marks)
- iv. Terpolymers (3 marks)

2c. List four (4) different techniques for the determination of molecular weight of polymers (2 marks)

### QUESTION THREE

3a. Write the names of the monomers needed for the synthesis of the following polymers:

- i. neoprene ii. dacron iii. Glyptal (3 marks)

3b. Enumerate the effect of chain length on the physical properties of polymers. (7 marks)

3c. Draw the chemical structure of the monomers associated with the following polymers:

- i. poly(vinyl chloride) ii. nylon-6 iii. Polyurethane (5 marks)

### QUESTION FOUR

4a. Outline one (1) established method for the synthesis of polyethylene. (2 marks)

4b. List four (4) patterns of reactions in which addition polymerisation can occur.(2marks)

4c. What is the effect of the under listed factors on the solubility of polymers.

- i. Temperature (2 marks)
- ii. Pressure (2 marks)
- iii. Polarity (2 marks)
- iv. Surface area (2 marks)

4d. Differentiate between polymers, monomers and polymerization. (3 marks)

### QUESTION FIVE

5a. State three (3) conditions that will lead to termination of each of the following mechanisms;

- i. radical ii. cationic iii. Anionic (9 marks)

5b. State the main source of raw materials for the production of polymers. (2 marks)

5c. Write the reaction showing the formation of Polyethylene. (4 marks)