

**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**

**APRIL/MAY, 2019 FIRST SEMESTER EXAMINATION**

**COURSE CODE: CHM 302**

**COURSE TITLE: POLYMER CHEMISTRY 1**

**COURSE UNIT: 2**

**TIME: 2HOURS**

**INSTRUCTION: Answer question one and any other three questions.**

**QUESTION ONE**

1a. Define the following terms:

i. monomer ii. polymer iii. polymerisation iv. homopolymer v. copolymer 5 marks

bi. What are biopolymers? Give at least one example. 11/2 marks

bii List any two (2) naturally-occurring polymers. 1 mark

c. Mention one (1) product in human’s daily lives where the following polymers are used in their manufacture:

i. polyurethane ii. polyester iii. polythene iv. polystyrene v. polyamide 21/2 marks

di. Using two (2) examples each, explain the following:

1. addition polymerisation 4 marks
2. condensation polymerisation 3 marks

dii. Name three (3) types of mechanisms found in addition polymerisation 11/2 marks

diii. Name three (3) common stages found in the mechanism of addition polymerisation

 11/2 marks

e. State the main source of raw materials for the production of polymers. 1 mark

f. Explain biodegradations in polymers. 4 marks

**QUESTION TWO**

2a With the aid of schematic diagrams, explain four (4) types of architecture found in copolymers.

 21/2 marks each = 10 marks

2b Name the following bifunctional monomers:



5 marks

**QUESTION THREE**

1. Write short notes on the following:
2. Elastomers 4 marks
3. Fibers 3 marks
4. Resins 21/2 marks
5. Thermosetting 21/2 marks
6. Thermoplastics 3 marks

**QUESTION FOUR**

4a. With the aid of thermograms, briefly explain the following:

i. glass transition temperature (*T*g)

ii. crystalline melting temperature (*T*m)

iii. crystallisation temperature (*T*c)

 8 marks

4b. Define the following terms in radical polymerisation:

1. initiation ii. propagation iii. termination iv. Initiator v. radical 5 marks

4c. Draw the chemical structure of Nylon-6,6. 2 marks

**QUESTION FIVE**

5a. Explain briefly the following:

1. cross-linked polymers 5 marks
2. tacticity 4 marks

5b. Mention two (2) conditions each for termination to occur in the following mechanisms:

1. radical ii. cationic iii. Anionic 6 marks