



# KIBABII UNIVERSITY

**UNIVERSITY EXAMINATIONS  
2021/2020 ACADEMIC YEAR**

**FOUR YEAR SECOND SEMESTER  
SPECIAL/SUPPLEMENTARY EXAMINATIONS**

**FOR THE DEGREE OF BED (SCIENCE)**

**COURSE CODE:** SCH 432

**COURSE TITLE:** POLYMER CHEMISTRY

**DURATION:** 2 HOURS

**DATE:** 13 - 01 - 2022

**TIME:** 11 - 1 PM

**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.

This paper consists of **3** printed pages. Please Turn Over



KIBU observes ZERO tolerance to examination cheating

### QUESTION ONE (30 Marks)

1).a) Distinguish between the following terms as used in polymer chemistry

i). Homopolymer and Copolymer (3marks)

ii). Thermoplastic and thermosetting (3marks)

iii). Isotactic and Syndiotactic (2marks)

b) Explain what is a biopolymer three examples of biopolymers (3marks)

c) What is Polydispersity (2marks)

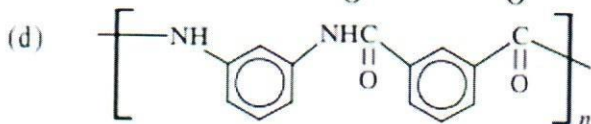
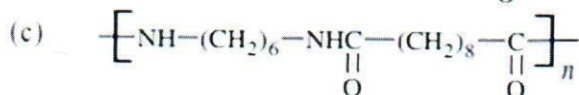
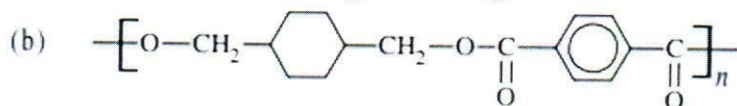
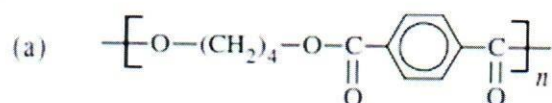
d) Explain the characteristic of the following three kinds of polymers (6marks)

i). Linear polymers

ii). Cross-linked polymers

iii). Branched polymers

e) Name the following condensation polymers according to the common nomenclature. (4marks)



f) Give the four methods used in determining the molecular weight of a polymer (4marks)

g) Giving examples explain what is meant by inorganic polymers (3marks)

### QUESTION TWO (20 Marks)

a). Giving examples in each case, explain the difference between addition and condensation polymerization. (10marks)

b). Explain the monomer arrangement in the co-polymer. (10marks)



### QUESTION THREE (20 Marks)

- a). While giving the properties, explain how Nylon 6,6 is produced through condensation polymerization. (8marks)
- b). What is the role of potassium hydroxide in preparation of Nylon 6,10 by interfacial polymerization? (2marks)
- c). Poly ethylene Terephthalate (PET) is polyester explain how it is formed by two ester interchange reaction and state the application of polyester. (10marks)

### QUESTION FOUR (20Marks)

- a). Distinguish between number average and mass-average molecular mass. (3marks)
- b). Show that  $M_n = \frac{\sum NiMi}{\sum Ni}$  and explain the conditions under which  $M_n = M_w$ . (7marks)
- c). Equal number of molecules with  $M_1=10000$  and  $M_2=100000$  are mixed. Calculate the number-average and mass-average molecular mass of the polymer. Also, calculate the polydispersity of the polymer sample. (10marks)

### QUESTION FIVE (20Marks)

- a). State the comparison between stepwise and chain wise polymerizations. (8marks)
- b). i). Explain what is meant by glass transition temperature. (2marks)
- ii). What thermal instrumental technique would you use to determine  $T_g$ ? (2marks)
- c). Explain polymer properties and characterization as used in polymer chemistry. (6marks)
- d) Explain the process of vulcanization in polymerization. (2marks)