



# KIBABII UNIVERSITY

UNIVERSITY EXAMINATIONS  
2021/2022 ACADEMIC YEAR

FOUR YEAR SECOND SEMESTER  
MAIN EXAMINATIONS

FOR THE DEGREE OF BED (SCIENCE)

**COURSE CODE:** SCH 413

**COURSE TITLE:** POLYMER CHEMISTRY

**DURATION:** 2 HOURS

**DATE:** 18/05/2022

**TIME:** 2:00PM-4:00PM

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## 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) Define the following terms as used in polymer chemistry (4 marks)

- i). Homopolymer.
- ii). Elastomers
- iii). dendrimers,
- iv). Co-polymer

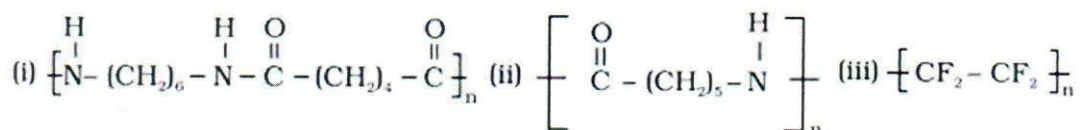
b) Explain polymer properties and characterization as used in polymer chemistry (3marks)

c). Poly (hexamethylene adipamide) (Nylon-6,6) was synthesized by condensation polymerization of hexamethylenediamine and adipic acid in 1:1 mole ratio. Calculate the acid equivalent of the polymer whose average DP is 440. (3marks)

d). Explain the differences between thermosetting and thermoplastic polymers (4marks)

e). Explain what is meant by glass transition temperature. (2marks)

f). Write the names of monomers of the following polymers (4 marks)



g) What is functionality of the polymer (2marks)

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

g) Giving types explain what is meant by polymer Tacticity (4marks)

### QUESTION TWO (20 Marks)

a). Poly ethylene Terephthalate (PET) is polyester explain how it is formed and state its properties and application of PET (10 marks)

b). Explain how Nylon 6,6 is produced through condensation polymerization. (10 marks)

**QUESTION THREE (20 Marks)**

- a). Co-polymer are classified into four types explain them on basis of the relative arrangement of the monomers units with respect to each other (10 marks)
- b). Explain the three different types of mechanisms involved in addition polymerization as chain reaction. 10 marks

**QUESTION FOUR (20Marks)**

- a). Distinguish between number average and mass-average molecular mass. (3marks)
- b). Show that  $M_n = \frac{\sum N_i M_i}{\sum N_i}$  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 biodegradable and non-biodegradable polymer. (3 marks)
- b). Explain the comparison between step-growth and chain growth polymerizations. (8 marks)
- c). State significance of Coordination Polymerization (3 marks)
- d). Give six applications of Conducting Polymers (6marks)