



KIBABII UNIVERSITY

UNIVERSITY EXAMINATIONS
2019/2020 ACADEMIC YEAR

FOURTH YEAR FIRST SEMESTER
SUPPLEMENTARY EXAMINATIONS

FOR THE DEGREE OF BSC (PHYSICS) AND B.ED (SCIENCE)

COURSE CODE: SPH 421:

COURSE TITLE: POLYMER I

DURATION: 2 HOURS

DATE: 3/02/2021

TIME: 8:00-10:00 Am

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 4 printed pages. Please Turn Over



KIBU observes ZERO tolerance to examination cheating

Answer question one and any other two questions

Question One (30 marks)

- a) What is a polymer? (1 mark)
- b) What is stress relaxation modulus (1 mark)
- c) Name any three general properties of plastics? (3 marks)
- d) Explain the term Elastic deformation. (2 marks)
- e) What are saturated hydrocarbons? Describe any one example (3 marks)
- f) Discuss radical polymerization of chain growth polymers. (3 marks)
- f) Differentiate between amorphous and semi crystalline polymers. (3 marks)
- g) Explain "Termination degradation". (2 marks)
- h) Describe any type of polymers. (3 marks)
- i) Name any three properties of liquid crystalline properties? (3 marks)
- j) By use of a diagram, describe cross linked polymer structure. Give examples. (3 marks)
- k) The average number of molecular weight and molecular mass of a hydrocarbon is 100,000 and 1000 units respectively. Find the degree of polymerization. (3 marks)

Question Two (20 marks)

- a) Differentiate between amorphous and semi crystalline polymers. (10 marks)
- b) Explain the following terms as used in polymer deformation; (2 marks)
- I) Plastic deformation. (2 marks)
- II) Viscoelasticity. (2 marks)
- III) Creep compliance. (4 marks)
- c) What is a copolymer? Differentiate between linear and branched copolymers. (4 marks)

Question Three (20 marks)

- a) What is de polymerization? (2 marks)
- b) Differentiate between thermosets and thermoplastics. (4 marks)
- c) Discuss polymer polymerization. (10 marks)
- I) Step polymerization
- II) Addition (chain) polymerization
- d) Explain the following mechanisms of thermal degradation; (2 marks)
- I) Initiation. (2 marks)
- II) Propagation.

Question Four (20 marks)

- a) By use of diagrams describe any two polymer structures. Give examples. (6 marks)
- b) Describe the three general types of polymers. (6 marks)
- c) With examples, describe the unsaturated hydrocarbons. (8 marks)

Question Five (20 marks)

- a) Differentiate between crystalline melting temperature and glass temperature. (2 marks)
- b) What are hydrocarbons? (2 marks)
- c) What is the molecular weight of the polymer? (2 marks)
- d) Explain the term 'Creep modulus' (2 marks)
- e) Name any three examples of polymeric materials and state their uses. (6 marks)
- f) What are the properties of liquid crystalline properties? (6 marks)