



18

**KIBABII UNIVERSITY
(KIBU)**

**UNIVERSITY EXAMINATIONS
2019/2020 ACADEMIC YEAR**

**FIRST YEAR FIRST SEMESTER
SPECIAL/SUPPLEMENTARY EXAMINATIONS**

**FOR THE DEGREE
OF
BACHELOR OF EDUCATION SCIENCE**

COURSE CODE: SPH 426E

**COURSE TITLE: MATERIAL SCIENCE AND POLYMER
PHYSICS**

DATE: 9/02/2021

TIME: 11:00 - 1:00 PM

INSTRUCTIONS TO CANDIDATES

TIME: 2 Hours

Answer question ONE and any TWO of the remaining.
Symbols used bear the usual meaning.

KIBU observes ZERO tolerance to examination cheating

This Paper Consists of 2 Printed Pages. Please Turn Over. ▶

Question One (30 marks)

- a) Discuss the conducting phenomena in polymers. (5 marks)
- b) What is the role of (i) lime stone in iron extraction and (ii) cryolite in aluminium extraction.? (2 marks)
- c) Give the principle of froth floatation process. How can we separate ZnS and PbS present in an ore using froth floatation process? (3 marks)
- d) Discuss the macroscopic deformation in polymers. (4 marks)
- e) Give the principles involved in (i) zone refining (ii) liquation (2 marks)
- f) Describe the crystallization, melting and glass transition phenomena in polymers. (6 marks)
- g) How do you refine nickel by Mond's process? (4 marks)
- h) Describe addition and condensation polymerization. (4marks)

Question Two (20 marks)

- 2a) How do you extract iron from haematite ore. Explain with a well labeled diagram the detailed step by step process. (20 marks)

Question Three (20 marks)

- 3a) Discuss the chemistry of polymer molecules. (14marks)
- 3b) Discuss the process of vulcanization in elastomers. (6 marks)

Question Four (20 marks)

- 4a) A reinforced concrete column 200mm in diameter is designed to carry an axial compressive load of 300KN. Determine the required area of the reinforcing steel if the allowable stresses are 6MPa and 120MPa for concrete and steel respectively. Use $E_{concrete} = 14GPa$ and $E_{steel} = 200GPa$ (14 marks)
- 4b) Discuss how thermal conductivity is improved in concrete structures a case study of Bridge structures (6 marks)

Question Five (20 marks)

- 5a) Explain the concentration of bauxite ore. (6 marks)
- 5b) How do you extract Aluminium from bauxite ore? Explain with a well labeled diagram (10 marks)
- 5c) Give the chemical reactions involved in Copper extraction (4 marks)