



# MERU UNIVERSITY OF SCIENCE AND TECHNOLOGY

P.O. Box 972-60200 – Meru-Kenya.  
Tel: +254(0) 799 529 958, +254(0) 799 529 959, +254 (0)712 524 293  
Website: [www.must.ac.ke](http://www.must.ac.ke) Email: [info@mucst.ac.ke](mailto:info@mucst.ac.ke)

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## UNIVERSITY EXAMINATIONS 2023/2024

FOURTH YEAR, SECOND SEMESTER EXAMINATION FOR THE DEGREE OF  
BACHELOR OF SCIENCE IN PHYSICS (SC206), (SC209) AND BACHELOR OF SCIENCE  
IN PHYSICS AND MATHEMATICS (SC201)

### SPH 3453: POLYMER PHYSICS

DATE: APRIL 2024

TIME: 2 HOURS

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**INSTRUCTIONS: Answer Question ONE and any other TWO questions.**

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#### QUESTION ONE (30 MARKS)

- What are monomers and polymers? Give suitable examples. (4 Marks)
- How are polymers are classified on the basis of their structure? (6 Marks)
- What do you mean by copolymer and give two examples? (2 Marks)
- Write name of monomers of the following polymers and classify them as addition or condensation polymers Teflon, Bakelite, Natural rubber (3 Marks)
- What are LDPE and HDPE? How they are prepared? (4 Marks)
- Briefly describe the addition polymerization and condensation polymerization. (4 Marks)
- Write down the characteristic property of a good plasticizer. Give examples of good plasticizer. (5 Marks)
- Why is bakelite a thermosetting polymer? (2 Marks)



MUST is ISO 9001:2015 and



ISO/IEC 27001:2013 CERTIFIED

## QUESTION TWO (20 MARKS)

- a) What is vulcanization? How it is done? (4 Marks)
- b) What are thermosetting and thermoplastic polymers? Give examples for each. (6 Marks)
- c) Clearly explain what is meant by synthetic metal? Explain with examples. (10 Marks)

## QUESTION THREE (20 MARKS)

- a) What do you mean by Engineering plastics? Give examples. (5 Marks)
- b) Explain the following terms in relation to polymer structure
- i. tangent vector
  - ii. end to end vector
  - iii. Radius of gyration
  - iv. angle interaction
  - v. bonded interaction (15 Marks)

## QUESTION FOUR (20 MARKS)

- a) Using an example, explain what is meant by
- i. molar mass and
  - ii. Degree of polymerization in polymers (4 Marks)
- b) Determine the following methods used in determining the molar mass of polymers
- i. Osmotic pressure
  - ii. Scattering
  - iii. Intrinsic viscosity
  - iv. Size exclusion chromatography (16 Marks)

