



DEDAN KIMATHI UNIVERSITY OF TECHNOLOGY

UNIVERSITY EXAMINATIONS 2021/2022

**YEAR ONE SEMESTER TWO EXAMINATIONS FOR THE DEGREE OF MASTER OF
SCIENCE IN CHEMISTRY**

SCH 6108: ADVANCED POLYMER SYNTHESIS AND APPLICATION

DATE: FEBRUARY 2022

TIME: 3 HOURS

INSTRUCTION: Answer ALL questions

QUESTION ONE [15 MARKS]

- a) Define the following terms: **[4 Marks]**
- i) Extrusion
 - ii) Lamination
 - iii) Adhesive bonding
 - iv) Smart polymer
- b) Briefly state the major contributions made by the following scientists in the field of polymers: **[3 Marks]**
- i. Alexander Parkes:
 - ii. Leo H. Baekeland:
 - iii. Wallace H. Carothers:
- c) What do the following acronyms stand for in polymer chemistry? **[3 Marks]**
- i. PET:
 - ii. PVA:
 - iii. PMAA:
- d) Briefly highlight the changes in the environment that trigger a response in the smart polymers **[5 Marks]**

QUESTION TWO: [15 MARKS]

- a) Give the six plastic processing techniques. **[3 Marks]**
- b) Polymeric membranes can be used in filtration of particulate matter from liquid suspension, air and industrial flue gas. Briefly give examples of the following industries on how they use polymeric membranes. **[6 Marks]**
- Biotechnology, Electrocoating, Food, Pharmaceutical, Semiconductors and Waste management
- c) Draw a well-labelled diagram on liquid separation polymeric membrane pervaporation process and explain the process involved. **[6 Marks]**

QUESTION THREE: [15 MARKS]

- a) Explain with the use of diagrams how polymeric materials have been used in drug delivery process in medicine. **[5 Marks]**
- b) Explain at length the application of smart material in drug delivery systems. **[5 Marks]**
- c) Explain how evaporation-based film is formed. **[5 Marks]**

QUESTION FOUR: [15 MARKS]

- a) The polymeric company you work for in the R&D department is exploring using synthetic polymers as textile materials. As a user department, procurement officer has asked you to give the specifications for the material you want. Indicate the kind of property material will you want purchased. **[4 Marks]**
- b) You have been invited by a polymer company to give a talk on spinning technique. The management specifically want you to speak about dry spinning technique. Indicate your talking points to help the employees understand the concept and use it for processing. **[7 Marks]**
- c) Draw a well-labelled diagram representing the wet spinning technique. **[4 Marks]**