

Uva Wellassa University of Sri Lanka  
Faculty of Science and Technology  
Department of Science and Technology  
300 Level 2<sup>nd</sup> Semester Examination – Jan./Feb. 2016  
SCT 443-2 Polymer Technology (Repeat Examination)



Instructions to candidates

Duration: 02 hours

Number of questions: Four

Answer all questions.

Mark allocation: 400 (All questions carry equal marks)



1.
  - a. Briefly explain the meaning of homopolymers and copolymers (30 Marks)
  - b. Give the respective monomer structures and repeating unit structures of the following polymers
    - i. Polystyrene
    - ii. Polycarbonate
    - iii. Nylon 6
    - iv. Nylon6:10 (20 Marks)
  - c. A polymer chain with three different kind of repeat units is commonly known as a "terpolymer". Such a terpolymer is prepared from vinyl monomers A, B, and C. Each monomer contributes two carbon atoms to the polymer backbone with the associated extended length of 0.252 nm per repeat unit. The molecular weights of the repeat units are 104, 184, and 128, respectively. A particular polymerization procedure yields a product with the empirical formula  $A_{3.55}B_{2.20}C_{1.00}$ . It is found that this terpolymer has an average unit weight of 134 and the average weight angstrom of 53.5. Please verify these findings. (50 marks)
2.
  - a. Discuss the advantages and disadvantages of thermoset polymers over thermoplastic polymers in product manufacturing industry (20 Marks)
  - b. Briefly explain the meaning of amorphous polymers and semi-crystalline polymers. Use schematics if necessary (20 Marks)
  - c. Briefly explain the meaning of glass transition temperature and melting temperature of a polymer. Name a technique that can be used to determine above mentioned temperatures. (20 Marks)
  - d. Compare and contrast the followings
    - i. Compression molding and Injection molding
    - ii. Shear thinning and shear thickening of polymer melts (40 Marks)
3.
  - a. Draw the monomer unit of the natural rubber (20 Marks)
  - b. Explain the term "latex" as applied in natural rubber industry (20 Marks)
  - c. Discuss the advantages of the use of fillers in polymer product manufacturing industry (30 Marks)

4. d. What is vulcanization? How it is done? (30 Marks)
- a. What do you understand by "Engineering plastics"? Give examples. (30 Marks)
- b. Why plasticizer is used during moulding of most plastics? (20 Marks)
- c. Write down the characteristic property of a good plasticizer. Give examples of good plasticizer (20 Marks)
- d. Explain the following terms. Use mathematical equation whenever necessary
- i. Number average molecular weight
  - ii. Weight average molecular weight
  - iii. Polydispersity index (30 Marks)