



UNIVERSITY OF RUHUNA

Faculty of Engineering

End-Semester 7 Examination in Engineering: March 2021

Module Number: ME7314

Module Name: Polymer Engineering

[Three Hours]

[Answer all questions, each question carries 12 marks]

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- Q1. a) Discuss on how does the polymer structure account for different behaviour and nature, hence discuss the use of polymer with suitable examples? [4.0 Marks]
- b) Recognize which of the following polymers (Bakelite, Urea formaldehyde, Polyethylene, Polyvinylchloride, Polystyrene) soften on heating and harden on cooling? Write down the term used to call polymers with this property? [4.0 Marks]
- c) Identify the type of polymer.
- i) -A-A-A-A-A-A-A-
 - ii) -A-B-A-A-A-B-A-B-
 - iii) -A-B-A-B-A-B-A-B-
 - iv) -A-A-A-A-B-B-B-B-
- [2.0 Marks]
- d) How polymers can be categorized based on mode of polymerization. Give examples for each category. [2.0 Marks]
- Q2. a) Select suitable polymer from given list to manufacture following items in section i), ii), iii) and iv). (Polyethylene, polyvinylchloride, polyurethane, phenol formaldehyde, melamine, polystyrene and Teflon)
- i) Shampoo bottles
 - ii) Test tubes
 - iii) Unbreakable crockeries
 - iv) Flexible foam (for mattresses)
- [4.0 Marks]
- b) Explain thermal transition of polymers? What is glass transition temperature and how it affects to the application of polymers? [4.0 Marks]
- c) Suggest the suitable polymer processing methods to produce each of the following products.
- i) Soft drink bottles
 - ii) Packaging films
 - iii) Biscuit trays
 - iv) Rubber seals
- [4.0 Marks]

- Q3. a) Explain vacuum thermoforming and pressure thermoforming processes with suitable sketches. What are the advantages of pressure thermoforming over vacuum thermoforming? [4.0 Marks]
- b) Briefly explain the function of extruder while identifying the major components of extruder by presenting a sketch. [4.0 Marks]
- c) Discuss the processing problems associated with extrusion Process. [4.0 Marks]
- Q4. a) What is resin identification code? How is it useful for consumer? Identify following resin identification codes.



- [4.0 Marks]
- b) Identify Environmental issues which are arising from the manufacturing of plastics. [4.0 Marks]
- c) Discuss on how you can contribute to reduce pollution by plastic as an individual person. [4.0 Marks]
- Q5 Plastic injection moulding is a manufacturing process for producing parts by injecting molten material into a mould.
- a) State and briefly describe four operating parameters of the plastic injection moulding process. [4.0 Marks]
- b) List six factors to be considered when selecting a suitable injection moulding machine to produce a plastic part and explain four factors. [4.0 Marks]
- c) Discuss one of the direct causes of the following injection moulding part defects and propose a suitable solution.
- i) Warpage
 - ii) Short shot
 - iii) Flashes
 - iv) Shrinkage
- [4.0 Marks]