

The Open University of Sri Lanka
Faculty of Engineering Technology
Department of Textile and Apparel Technology



Study Programme : Bachelor of Science Honours in Engineering/Bachelor of Industrial Studies Honours
Name of the Examination : Final Examination
Course Code and Title : TAX3458 Fibre Science and Technology
Academic Year : 2024/25
Date : 27th February 2026
Time : 0930-1230hours
Duration : 3 hours

General instructions

1. Read all instructions carefully before answering the questions.
2. This question paper consists of **Six (06)** questions in **Three (3)** pages.
3. Answer **only five (05)** questions.
4. All questions carry equal marks.
5. The Answer for each question should commence on a new page.
6. This is a Closed Book Test (CBT).

Question 01

- a. With examples, briefly explain how do you classify Textile fibres according to their **fibre length**. (3 marks)
- b. (i) With giving examples, briefly explain how do you classify the Vegetable fibres, according to the textile fibre classification chart. (6 marks)
- (ii) Give two(02) examples for Mineral fibres important for textile industry and state any two (02) important properties of Mineral fibres, which are important for textile applications. (4 marks)
- c. (i) Differentiate Regenerate fibre manufacturing and Synthetic fibre manufacturing methods. You may draw a diagram to show this difference. (4 marks)
- (ii) Give two (02) examples for **each of** Polyacrylonitrille and Polyolefine Synthetic fibre types. (3 marks)

Question 02

- a. Briefly explain what is Polymerization and describe main two (2) methods of polymerization. (5 marks)
- b. (i) Co-polymers can have several configurations. Using suitable diagrams, briefly explain any two(2) of these configurations. (4 marks)

- (ii) Using suitable diagrams, differentiate three (3) types of Stereoisomerism or tacticity of polymer configurations. (3 marks)
- c. (i) Using suitable diagrams, explain the Crystalline structures, Amorphous structures and fibre orientation concepts. (6 marks)
- (ii) Briefly explain how the glass transition temp(T_g) and melting temperature (T_m) of a material is used in textile industry. (2 marks)

Question 03

- a. With giving reasons, explain the Strength at dry and wet states, Moisture & water absorption and Thermal properties of Cotton fibres. (6 marks)
- b. (i) With giving reasons, explain behaviour of Strength at Dry and Wet states and Thermal properties of Flax fibres. (4 marks)
- (ii) Draw diagrams to illustrate the microscopic appearance of Sisal fibers and give their features. (4 marks)
- c. (i) With giving reasons, explain why Wool has poor strength at dry & wet states and poor thermal behaviour compared to cotton? (4 marks)
- (ii) Briefly explain why Silk materials have bright and lustrous (shiny/glossy) appearance. You may refer their microscopic appearances that you observed during laboratory sessions. (2 marks)

Question 4

- a. With giving reasons, explain why Viscose show poor strength in dry and wet states and poor dimensionally stable properties compared to Cotton. (4 marks)
- b. (i) Briefly explain why viscose show higher levels of shrinkage after washing, where as Modal does not show shrinkages. (4 marks)
- (ii) Draw diagrams and give their features of the microscopic appearances of Acetate and Triacetate fibres. (8 marks)
- c. (i) With giving reasons, explain why Bamboo shows much higher Moisture regain as 13.3%, compared to Cotton having the moisture regain as 7-8.5% at 65% Relative humidity. (2 marks)
- (ii) State any two (2) reasons, why today Bamboo materials are heavily used for making Baby diapers and female sanitary products. (2 marks)

Question 5

- a. Briefly explain why does Nylon 6.6 is highly stretchable, compared to Nylon 6? (2 marks)

- b. (i) With giving reasons, explain the Hygroscopic nature and thermal properties of Nylon fibres. (4 marks)
- (ii) With giving reasons, explain why does Nylon has higher strength compared to Polyester fibres, when both have the same fibre tenacity (g/tex). (6 marks)
- c. (i) Why do the Polypropylene is widely used in making sacks for food packing today than traditional Jute sacks? (4 marks)
- (ii) Why textured Acrylics are used to make warm cloths? (4 marks)

Question 6

- a. Briefly explain why Spandex shows extremely higher Stretch and recovery properties. (4 marks)
- b. (i) Differentiate the Solution spinning and Melt spinning synthetic filament production methods. (4 marks)
- (ii) Differentiate Dry spinning technique and Wet spinning technique. (4 marks)
- c. (i) Draw the microscopic appearances of Cotton, Wool, Silk and Flax fibres. (4 marks)
- (ii) Draw microscopic appearances of Viscose, Polyester, Nylon and Acrylic fibres. (4 marks)

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