

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



Study Programme	: Bachelor of Technology Honours in Engineering/ Bachelor of Industrial Studies (Textile Manufacture)
Name of the Examination	: Final Examination
Course Code and Title	: <b>TAX3458 Fibre Science and Technology</b>
Academic Year	: 2021/22
Date	: 20 <sup>th</sup> February 2023
Time	: 0930-1230hrs

### General Instructions

1. Read all instructions carefully before answering the questions.
2. This is a Closed Book Test (CBT).
3. Write down your Index Number in all the pages of answer scripts.
4. This question paper consists of Six (06) questions in four (04) pages.
5. Answer Five (05) questions only. Each question carries 20 marks
6. Do not write answers to the additional questions.
7. Answers for each question should commence from a new page. If a question has many parts, all the parts should be answered in the chronological order under the same question.
8. Write down the answered question numbers in the cover page of the answer book.
9. Answers should be in clear handwriting.
10. Do not use red colour pens to write the answers.

(Q1) (a) (i) "Natural fibres can be obtained from different sources". With giving suitable examples, briefly describe this statement. (06 marks)

(ii) Natural fibres can be divided into two groups based on their fibre length. Briefly explain these two (02) types with giving suitable examples. (02 marks)

(b) (i) Briefly explain the difference in production method of regenerated fibres and synthetic fibres. (04 marks)

(ii) With giving suitable examples, explain how do you classify the various regenerated fibres. (02 marks)

(c) "Under the textile fibre classification, different synthetic fibres are available". With giving suitable examples, clarify the above statement. (06 marks)

(Q2) (a) (i) Differentiate Homo-polymers and Co-polymers used in fibre manufacturing. (02 marks)

(ii) Co-polymers have six different types. Using suitable diagrams, briefly explain how the polymer chain of each type is arranged. (06 marks)

(b) Using a suitable diagram, explain the difference between crystalline and amorphous structures alternatively available in a textile fibre and the variations of the free space distribution of each of these structures. (06 marks)

(c) Briefly describe the importance of considering following factors and processes for manufacturing and applications of textiles & garments .

(i) Heat setting

(ii) Moisture & water absorbency

(iii) Swelling of certain textile fibres after absorption of water (06 marks)

(Q3) (a) (i) Cotton fibres have own specific features in their longitudinal view and cross sectional view. Briefly explain the advantages that can be gained by cotton materials due to these special features. (04 marks)

(ii) Briefly describe the three (03) important chemical groups available in the cotton polymer and the importance of each of them for the properties of cotton fibres. (06 marks)

(b) With giving reasons, briefly explain the strength at dry and wet states and the hygroscopic behavior of cotton fibres. (06 marks)

(c) Briefly describe why,

(i) it is not recommended to treat cotton materials with concentrated /hot or warm mineral acids. (02 marks)

(ii) cotton materials can be mercerized. (02 marks)

(Q4) (a) Briefly explain the reasons for the following behaviors of flax fibres.

(i) Flax fibres have higher strength than cotton fibres.

(ii) Fabrics made from flax show stiffness in handle. (04 marks)

(b) Explain why wool fibre gets spiral configuration at relax state and after stretching, it becomes straight configuration. (06 marks)

(c) (i) Why silk materials have bright and lustrous in appearance? (04 marks)

(ii) Briefly explain the important properties of silk fibres such as strength at dry and wet states, hygroscopic nature and effect of alkalis. (06 marks)

(Q5) (a) Compare strength, shrinkage after laundering and durability of modal fabrics with viscose fabrics. (06 marks)

(b) (i) Briefly explain why nylon 6.6 has higher stretchability and recovery compared to nylon 6 and draw suitable diagrams to show this behavior. (04 marks)

(ii) Briefly explain the strength at dry and wet states and hygroscopic nature of nylon fibres. (04 marks)

(c) (i) Briefly describe the strength at dry and wet states of polyester fibres, compared to nylon fibres. (04 marks)

(ii) Compare the strength of Low density and high density polyethylene fibres. (02 marks)

- Q6. (a) Why textured acrylics are suitable for manufacturing apparels used in cold climates? (04 marks)
- (b) Briefly explain why spandex materials show extremely higher stretch and recovery properties than other textile materials. (04 marks)
- (c) (i) Briefly describe various spinning techniques available to manufacture synthetic filaments. (06 marks)
- (ii) Draw the diagrams and give specific features of the longitudinal and cross sectional views of following textile fibres, cotton, wool and polyester (06 marks)