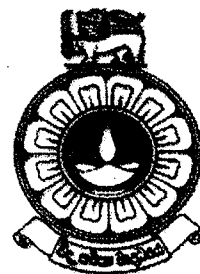


The Open University of Sri Lanka

Faculty of Engineering Technology

Department of Textile and Apparel Technology



Study Programme	: Bachelor of Science in Engineering Honours Bachelor of Industrial Studies Honours
Name of the Examination	: Final Examination
Course Code and Title	: TAX6454 Technical Textiles
Academic Year	: 2024/2025
Date	: 20 th February 2026
Time	: 1400 – 1700 Hours

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 on all the pages of the answer scripts.
 4. This question paper consists of eight (08) questions in four (04) pages.
 5. Answer only five (05) questions. Each question carries 20 marks.
 6. Do not write answers to additional questions.
 7. Answers for each question should commence on a new page. If a question has many parts, all the parts should be answered in chronological order under the same question.
 8. Write the question numbers for the answers on the cover page of the answer book.
 9. Answers should be in clear handwriting.
 10. Do not use red-coloured pens to write the answers.
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- Q1. (a) Protech is a group of technical textiles used for protecting persons or property. Give three examples of Protech applications, with at least one example in property protection. (03 marks)
- (b) One of the largest sectors of Technical Textiles is Industrial Textiles. Giving examples, describe three areas where technical textiles are used as Industrial Textiles. _____ (06 marks)
- (c) There are plenty of opportunities for the use of technical textiles throughout the sports and leisure market. Discuss the applications of technical textiles in the sports arena. (08 marks)
- (d) Textiles are employed in many ways in the construction of buildings. State the type of fibre or fabric used in the following technical applications. (03 marks)
Roofing applications, Sound and Thermal insulation, Safety netting.
- Q2. (a) Textile Structural Composites are used in many applications over conventional materials due to the two superior properties they possess over conventional materials. What are these two properties? (02 marks)
- (b) State and briefly describe three things or constituents that need to be considered when one contemplates using Textile Composites. (09 marks)
- (c) One of the important properties of a resin used in Technical Textiles is good adhesion. Briefly discuss why this property is critical for the formation of a textile composite. (03 marks)
- (d) Briefly explain how thermoset composites are formed. (03 marks)
- (e) Filler materials are used extensively with polyester resins for a variety of reasons. State three such reasons. (03 marks)
- Q3. (a) With the help of a simple diagram, explain the process of producing textile composites using the **pultrusion method**. (08 marks)
- (b) State at least three advantages and three disadvantages of the **filament winding process**. (06 marks)
- (c) State three advantages and three disadvantages of the **spray lay-up process** and name two applications of composites produced by this process. (06 marks)

- Q4. (a) Geosynthetics possess several intrinsic characteristics that make them ideal for soil reinforcement applications. State three such characteristics and the consequences of these characteristics. (06 marks)
- (b) The geotextile performs the reinforcement function by absorbing tensile stress. The main areas of reinforcement performed by geotextiles are Wall Reinforcement, Slope Reinforcement and Foundation Stabilisation. With the help of simple diagrams, illustrate how geotextiles are placed in the soil structure to perform their reinforcement function in each of these three instances. (09 marks)
- (c) Filtration is one of the functions that is most widely performed by geotextiles. The filtration function has two concurrent objectives: to retain the particles of the filtered soil while permitting water to pass through the plane of the geotextile from the filtered soil. With the help of a simple diagram, briefly illustrate how a geotextile performs the filtration function. (05 marks)
- Q5. (a) Geotextiles are commonly used for separation when used beneath roadway pavement sections. With the help of a suitable diagram, explain how a road behaves with and without geotextiles at the sub-base sub-grade interface. (08 marks)
- (b) Discuss the advantages of using geotextiles in wind erosion control. (08 marks)
- (c) In many countries, natural geotextiles such as those made from Jute and Coir are used for riverbank protection, where these permeable multi-layer fabrics are overlaid on the eroded surface with armours on top. In this application, what are the four technical functions performed by these natural geotextiles? (04 marks)
- Q6. (a) Cabin air filters are very important to keep the quality of internal air in the vehicle cabin. Cabin filters that have been developed using textiles work in three basic ways. Briefly explain the working of these cabin air filters. (06 marks)
- (b) In the automobile industry, tyres are an important component that uses high-performance fibres. However, many of these fibres have certain limitations. List the limitations of using the following fibres in tyres: Rayon, Nylon, Polyester, and Steel cord. (04 marks)

- (c) Fibre Reinforced Composites (FRCs) have now almost replaced traditional materials in aircraft manufacture. Discuss major reasons for the use of FRCs over traditional materials in aircraft. (06 marks)
- (d) Tarpaulins used in heavy goods vehicles are typically made from PVC plastisol-coated high tenacity woven nylon and polyester fabrics. What are the reasons for coating nylon and polyester fabrics with PVC, and what is the main concern about the PVC? (04 marks)
- Q7. (a) Today, many high-temperature-resistant fibres have been developed for heat protective clothing. Briefly explain the major tests that must be done on heat protective clothing to determine its performance characteristics. (06 marks)
- (b) Acute exposure to pesticides will lead to systemic or local disease. These pesticide chemicals deposit on apparel in several ways. Briefly explain the mechanisms behind the soiling of pesticides on apparel fabrics. (06 marks)
- (c) It has been established that there are four relevant features or parameters of adhesion of substrates when it comes to microbiology of the skin-clothing interface. With the help of suitable diagrams, explain these features. (08 marks)
- Q8. Write short notes on any **four (04)** of the following: (4 x 05 marks)
- (a) Chemical structures, properties and applications of Kevlar and Nomex fibres
 - (b) Applications and characteristics of carbon fibres
 - (c) Use of Ceramic fibres
 - (d) Manufacturing process of glass fibres or glass wool
 - (e) Spinning of High-Performance Polyethylene fibres