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	**: TAX5349 Nonwoven Textiles**
Academic Year	: 2023/24
Date	: 06th March 2025
Time	: 0930-1230hrs
Duration	: **3 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 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) Briefly explain the tasks involved with the main two stages of the non-woven fabric manufacturing. (04 marks)

(b) (i) With giving examples, briefly explain why nonwoven **interlinings** are used in clothing. You may give three reasons. (06 marks)

(ii) Briefly explain any two (02) reasons why nonwovens are heavily used in foot wear industry. (04 marks)

(c) Briefly explain why nonwovens are used in following applications and give two (02) examples for each of these applications.

(i) Used in the applications in aircrafts.

(ii) Vehicle filters (06 marks)

(Q2) (a) Differentiate following filtration techniques. (06 marks)

(i) Dry filtration and liquid filtration

(ii)Surface filtration and deep/depth filtration

(b) Briefly explain how would you use geo synthetic non-wovens for following functions and requirements in the geo technical applications and building industry with **using suitable diagrams**.

(i) Filtration (ii) Protection and drainage (06 marks)

(c) (i) Briefly explain how nonwovens are served for crop covers and weed control applications in the agriculture industry. (04 marks)

(ii) Give suitable two (02) examples for **each** of the followings;

hygienic products, health care products, wet & damp cleaning products and dry & damp cleaning products. (04 marks)

(Q3) (a) Draw a schematic diagram and briefly explain the tasks involved in bale opening machine used in nonwoven manufacturing. (04 marks)

(b) To prepare a fibre web/batt, carded webs laid in several ways to reach the desired weight and web structure. Differentiate these three (03) layering methods with giving heir advantages. (06 marks)

(c) (i) Using a suitable diagram, briefly explain the principle of aero dynamic/ air laid process in nonwoven manufacturing (04 marks)

(ii) Using a suitable diagram, briefly explain the principle of wet laid technique and give two (02) disadvantages of this technique. (06 marks)

(Q4) (a) Draw two (02) labeled diagrams to illustrate the "Spun bond technique" and "Melt blown technique" used in extruded nonwoven manufacturing. (06 marks)

(b) (i) Briefly explain how "Needle punching" technique helps to consolidate the nonwoven fibrous web. (04 marks)

(ii) Briefly explain any two (02) types of looms that are used for nonwoven web consolidation and give the application areas of each of them. (04 marks)

(c) Explain the differences in "Kunit technique" and "Multi kunit technique" techniques used in consolidation of nonwovens. (06 marks)

(Q5) (a) Using a suitable diagram, briefly explain how "Hydro entanglement" technique helps to consolidate the nonwoven fibrous web. (06 marks)

(b) (i) "Hot calendaring" under thermal bonding of nonwovens can be done by three methods. Differentiate each of them. (06 marks)

(ii) Briefly explain the "Radiant heat bonding" technique under thermal bonding of nonwoven web using a diagram. (04 marks)

(c) Briefly explain the "Powder bonding" technique used in chemical bonding of nonwoven web using a diagram (04 marks)

(Q6) (a) Briefly explain the purpose of following dry finishing treatments on nonwovens.
(i) Shrinking (ii) Wrenching (iii) Creeping
(06 marks)

(b)(i) Briefly explain the purpose of following dry finishing treatments on nonwovens.
(i) Splitting (ii) Grinding and velouring (iii) Singeing (06 marks)

(ii) Briefly explain the purpose of using following chemical finishes on nonwoven textiles.

(i)Lubricants (ii) Rewetters (04 marks)

(c) Briefly explain "Laminating" and "Flocking" coating finishes applied nonwovens. (04 marks)