

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 Honours
Name of the Examination	: Final Examination
Course Code and Title	: TAX5349/ TAX6564 Nonwoven Textiles
Academic Year	: 2020/21
Date	: 12 <sup>th</sup> February 2022
Time	: 1400-1700hrs

### 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 how nonwoven fabrics differ from woven and knitted fabrics.  
You may refer construction of Nonwoven, Knitted and woven fabrics. (04 marks)
- (b) Briefly explain where the nonwovens are used in following apparels and the purpose of using nonwovens at those places of each apparel.
- (i) Ladies frock
  - (ii) Winter jacket
  - (iii) Chemical protective clothing
- (06 marks)
- (c) Briefly explain why nonwovens are heavily used in car manufacturing industry.  
You may explain any four (04) reasons. (04 marks)
- (d) Differentiate dry filtration and liquid filtration using nonwovens and draw suitable diagrams to illustrate the difference between surface filtration and depth filtration types available with liquid filtration. (06 marks)
- (Q2) (a) Using suitable diagrams, briefly explain how geo-synthetic nonwovens are used in civil engineering applications to fulfil their main functions.
- (i) Separation
  - (ii) Filtration
  - (iii) Reinforcement
- (06 marks)
- (b) Mostly the agricultural nonwoven fabrics are made with polypropylene (PP). Briefly explain the reasons for using PP as agriculture nonwovens and give an example with reasons. (04 marks)
- (c) Bamboo fibre is used today in baby diapers and feminine hygiene products as a new development. Briefly explain four (04) reasons for this application. (04 marks)
- (d) Using a suitable diagram, explain how nonwoven materials are used in a upholstery with a spring core. (06 marks)

- (Q3) (a) With referring the operations, differentiate the two types of dry laid techniques used to produce web or batt in the nonwoven industry. (04 marks)
- (b) Draw a suitable diagram and explain the operations of wet laid nonwoven web formation technique. (06 marks)
- (c) With reference to the working principles, distinguish two types of spun lay (extruded) web formation in nonwoven manufacturing. (04 marks)
- (d) Briefly describe how nano fibres are produced using electrostatic spinning technique for nonwovens and why nano fibre nonwovens are important in filtration industry. (06 marks)
- (Q4) (a) (i) What is "needle punched nonwovens"? (02 marks)
- (ii) Briefly explain three (03) types of looms that are used for nonwoven web consolidation and give the application areas of each of them. (06 marks)
- (b) Using a suitable diagram, briefly explain how nonwovens are consolidated using maliwatt technique. (04 marks)
- (c) With reference to the working principles, differentiate malivlies and malimo web consolidation techniques. (04 marks)
- (d) Draw two diagrams to illustrate the difference between kunit and multikunit nonwovens. (04 marks)
- (Q5) (a) Briefly explain how nonwovens are consolidated using hydro entangling by water jets in spun laced technology. You may use suitable diagrams to explain this. (04 marks)
- (b) (i) Briefly explain the principle of thermal bonding used in consolidation of nonwovens. (02 marks)
- (ii) Hot calendaring thermal bonding process is done using three types in the industry. Briefly explain how each of these types works. (06 marks)

- (c) Differentiate the working principles of "ultrasonic bonding" and "radiant heat bonding" used in nonwoven consolidation. (04 marks)
- (d) Differentiate saturation bonding and foam bonding used in thermal bonding of nonwovens. (04 marks)
- (Q6) (a) Briefly describe the purpose and method of doing following dry finishing treatments on nonwovens.  
(i) Shrinkage      (ii) Wrenching      (iii) Creeping by Micrex micro creeper  
(06 marks)
- (b) Briefly explain why perforating and slitting are done on nonwovens as finishing treatments. (02 marks)
- (c) Briefly explain the purposes of using following dry finishing treatments in the industry.  
(i) Singeing      (ii) Shearing      (iii) Splitting  
(06 marks)
- (d) Briefly explain how following chemical finishes done on nonwoven textiles.  
(i) Coating      (ii) Laminating      (iii) Flocking  
(06 marks)