

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	: <b>TTI3236 /TAI3536 Fabric Structure and Analysis</b>
Academic Year	: 2017/18
Date	: 28 <sup>th</sup> January 2019
Time	: 0930 – 1230 Hours
Duration	: <b>3 hours</b>

### General Instructions

1. Read all instructions carefully before answering the questions.
2. This question paper consists of **Nine (9)** questions in **four (4)** pages.
3. Answer any **Six (6)** questions only including Question 1.
4. **Question 1** which is **compulsory** carries twenty-five (25) marks and all other questions carry fifteen (15) marks each.
5. Answer 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.
6. Write down the answered question numbers in the front page of the answer book.
7. This is a Closed Book Test (CBT).
8. Answers should be in clear hand writing.
9. Do not use Red colour ink anywhere in your answer script.

1. (a) Plain woven fabrics may be classified as light-weight, medium-weight and heavy-weight fabrics. State the parameters that are used to classify the plain weaves into these groups. (4 marks)
  - (b) Combine any two weaves of your choice to develop a new weave design. (4 marks)
  - (c) What are the possible move numbers for 10 end sateen weave? Explain how you obtained the answer. Why is it not desirable to weave fabrics using 10 end sateen weaves? (3 marks)
  - (d) Briefly explain the classification of twill weaves as 'balanced', 'warp faced' and 'weft faced'. (4 marks)
  - (e) 'In mock leno weaves, thread grouping is encouraged, and in huckaback weaves, thread grouping is avoided'. What do you understand by this statement? (4 marks)
  - (f) What are the conditions that need to be taken into account when designing motifs for extra warp figuring. (4 marks)
  - (g) How is a bearded needle different to that of a latch needle? (2 marks)
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2. (a). Draw the weave design, drawing in plan and lifting plan of the following twill weaves.
    - i.  $4/3$  S twill
    - ii.  $3/4$  Z twill(8 marks)
  - (b). Draw a  $4/4$  matt weave and a  $4/4$  modified matt weave. What is the difference between these two weaves and why is it necessary to modify a  $4/4$  matt weave? (7 marks)
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3. (a). Using a  $2/3$  twill as a basis develop a horizontal herringbone twill weave. You should provide all construction steps. Draw the drawing in plan and lifting plan for this design. (8 marks)
  - (b) Draw the barleycorn weave and give its drawing-in plan and lifting plan. (7 marks)

4. (a). Construct a crepe design on a suitable sateen base using the following twill weave.

$$\begin{array}{ccc} 3 & 1 & 1 \\ \hline 1 & 2 & 1 \end{array}$$

All steps of development must be clearly shown. (5 marks)

(b) Describe the method of obtaining horizontal stripes on a matt weave fabric using coloured yarns. You should provide all construction steps. (5 marks)

(c). Describe the development method of crow's foot design. (5 marks)

5. (a). Briefly explain what do you understand by centre stitched double fabrics.

(5 marks)

(b). Develop a double weave fabric with 2/2 twill weave in the face fabric and Matt weave in the back fabric with no stitching. (10 marks)

6. (a). Draw the design pattern for a terry pile weave having piles only on the face of the fabric with a 3/1 warp arrangement (3 ground ends for 1 pile end). You should provide all construction steps. (7 marks)

(b). What is the difference between velvet structures and plush structures? (4 marks)

(c). What are the different ways by which leno structures are produced? (4 marks)

7. (a). Explain the difference between single jersey structures and double jersey structures.

(5 marks)

(b). With the help of diagrams explain the difference between the rib gating and interlock gating. (5 marks)

(c). Compare a Tricot knitting machines with that of the Raschel knitting machines and give the main differences between the two machines. (5 marks)

8. (a). Calculate the tex count of a spun yarn of 2000 metres long weighing 600 grams. (3 marks)
- (b). Calculate the tex count of a yarn with cotton count  $36^s$ . (3 marks)
- (c). Draw the lapping diagrams for the following guide bar movements represented by the given chain notations. (9 marks)
- i. Front bar: 3 - 4 / 1 - 0    ii. Front bar: 2 - 0 / 0 - 2    iii. Front bar: 3 - 4 / 1 - 0  
 Back bar: 1 - 0 / 1 - 2    Back bar: 2 - 4 / 2 - 0    Middle bar: 4 - 4 / 0 - 0  
 Back bar: 1 - 0 / 1 - 2
9. A grey fabric of 90 inches wide has 60 ends/inch and 54 picks / inch. The warp and weft yarn counts are 32s and 40s respectively. The crimp in the warp is calculated as 4% while on the weft is 6%. On either side of the fabric, 30 additional ends are added for selvages. The count of the selvedge yarn is same as that of the warp yarn. The length of the fabric required is 5000 yards. Allowance for waste is 4% for the warp and 2% for the weft. Calculate the areal density of the fabric and the amount of yarn required for the main fabric (warp and weft separately) and the selvages. (15 marks)