

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	: TAX5648/TAI3536 Fabric Structure and Analysis
Academic Year	: 2020/21
Date	: 21 st January 2022
Time	: 0930 – 1230 Hours
Duration	: 3 hours

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 handwriting.
9. Do not use Red colour ink anywhere in your answer script.

1. (a) What is the difference between a S-twill design and a Z-twill design? (4 marks)
- (b) Combine any two basic weaves or their extensions of your choice to develop a new weave design. (4 marks)
- (c) What are the possible move numbers for 12 end sateen weave? Explain how you obtained the answer. Why is not desirable to weave fabrics using 12 end sateen weaves? (3 marks)
- (d) What is the difference between a straight draft and skip draft while weaving plain weaves? (4 marks)
- (e) Briefly explain the difference between a horizontal waved twill and herring bone twill. (4 marks)
- (f) Briefly explain how corduroy fabrics are produced. (4 marks)
- (g) How is a bearded needle different to that of a latch needle? (2 marks)

2. (a). Draw the weave design, drawing in plan and lifting plan of the following twill weaves.

i. $\frac{2 \quad 1 \quad 2 \quad 3}{3 \quad 2 \quad 1 \quad 2}$ Compound twill weave

ii. $\frac{1 \quad 2}{2 \quad 1}$ Vertical herringbone twill

(10 marks)

- (b). Draw a Stitched Hopsack weave of your choice and briefly explain the purpose of introducing stitched yarns in Stitched Hopsack Weaves? (5 marks)

3. (a). What are the steps involved in developing a Crepe weave based on a Sateen Weave? (6 marks)

- (b) Develop a Crepe weave design using the technique of reversing a small motif. You may choose any motif of your choice. Please show every step involved in the construction of this weave. (9 marks)

4. (a). You have received an order to produce a thick (large) vertical striped design fabric using the colour and weave effect. Explain how you would achieve this, illustrating all the steps of development. (9 marks)
- (b). Describe the development method of dog's tooth design. (6 marks)
5. (a). What are the different ways by which a double fabric could be stitched? (5 marks)
- (b). Explain how a tubular fabric could be developed using the technique of weaving double fabrics. Clearly illustrate all the steps of weave design development. (10 marks)
6. (a). A buyer has requested to produce following types of fabrics. Briefly explain how you could achieve these. (6 marks)
- i. A single-coloured plain weave woven fabric with a striped effect.
 - ii. A two-coloured plain weave fabric with a crinkled striped effect.
- (b). What are the three (03) different ways in which variations could be introduced for warp pile fabrics? (3 marks)
- (c). Explain the difference between the production of negative warp pile fabrics and positive warp pile fabrics. (3 marks)
- (d). What is the difference between velvet structures and plush structures? (3 marks)
7. (a). Compare and contrast between warp and weft knitted fabrics. (4 marks)
- (b). With the help of diagrams explain the difference between the rib gating and interlock gating. (5 marks)
- (c). Write a short note on purl structure. (3 marks)
- (d). Single jersey fabrics are mostly knitted on sinker top machines. What are the features of these machines? (3 marks)

8. (a). Calculate the tex count of a spun yarn of 30,000 metres long weighing 900 grams. (2 marks)

(b). A warp knitted fabric is produced to have 20 wales/cm and 30 courses/cm in the grey state. The run-in is 150 cm for the back bar and 80 cm for the front bar, both bars being fed by 8 tex polyester yarn. Calculate the areal density of this fabric in gram/square metre. You may use the formula $\text{Areal density} = w_c T(\lambda_r + \lambda_w) \times 10^{-2} \text{g/m}^2$ to solve this problem. (4 marks)

(c). Draw the lapping diagram of the knitted structures whose chain notations are given below: (9 marks)

i. Front bar: 2 - 3 / 1 - 0
Back bar: 0 - 0 / 3 - 3

ii. Front bar: 1 - 2 / 1 - 0
Back bar: 1 - 0 / 0 - 1

iii. Front bar: 1 - 0 / 1 - 2
Back bar: 4 - 5 / 1 - 0

9. A grey fabric of 100cm wide has 267 ends/10 cm and 334 picks/10 cm. The warp and weft yarn counts are 25 tex and 36 tex 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 the same as that of the warp yarn. The length of the fabric required is 5000 metres. Allowance for waste is 4% for the warp and 2% for the weft.

i. Calculate the areal density of the fabric.

ii. Calculate the amount of yarn required for the main fabric (warp and weft separately).

iii. Calculate the amount of yarn required for the selvages. (15 marks)