The Open University of Sri Lanka
Faculty of Engineering Technology
Department of Textile and Apparel Technology

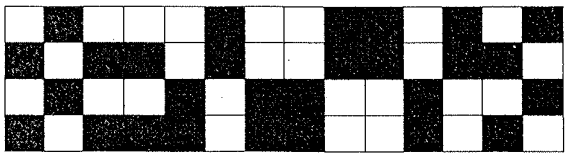
Study Programme/s	: Bachelor of Science in Engineering Honours Bachelor of Industrial Studies Honours
Name of the Examination	: Final Examination
Course Code and Title	**: TAX5648 Fabric Structure and Analysis**
Academic Year	: 2023/2024
Date	: 18th March 2025
Time	: 0930 - 1230 Hours

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 Eight (08) questions in five (05) pages.
5. Answer five (05) questions including Question 1, which is a compulsory question. Each question carries 20 marks.
6. Do not write answers to 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.

Compulsory Question

Q1. (a) Draw the drawing-in plan and lifting plan of the weave design given below. You should use minimum number of heald shafts to draw these plans. (04 marks)



(b) What are the four (04) rules (not features) that are used in the construction of satin / sateen weaves to ensure that the final design will have a smooth surface? (04 marks)

(c) Give four (04) differences between designs with extra warp and extra weft figuring? (04 marks)

(d) Name any four (04) common types of double fabrics. (04 marks)

(e) With the help of simple diagrams, explain the difference between rib gating and interlick gating. (04 marks)

Answer any four (04) questions from the following seven (07) questions given from Q2 to Q8

Q2. (a) Give a single design repeat of an unbalanced S twill weave. (04 marks)

(b) Taking a balanced twill weave as the base, develop a horizontal herringbone twill weave. (06 marks)

(c) Develop a weave of your own by combining a warp rib weave and a Matt weave. (06 marks)

(d) Name two (02) commercial varieties of plain and twill fabrics **each** and give their special features. (04 marks)

Q3. For all the three sections of this question, you should show all the steps involved in the development of the respective weave designs.

(a) Develop a twilled hopsack weave. (07 marks)

(b) Give the weave design of a crepe weave developed by using the technique of reversing the small motif. (06 marks)

(c) Briefly explain how a stepped twill design can be developed using the colour and weave effect. (07 marks)

Q4. (a) Develop a vertically extended 8-end sateen weave. (06 marks)

(b) Develop a honeycomb weave that can be woven using six (06) heald shafts. (08 marks)

(c) Briefly explain the features of the following woven designs.

i. Dobby design

ii. Jacquard design

iii. Leno weave (06 marks)

Q5. (a) Develop a woven fabric with alternate single ply and double ply constructions. (07 marks)

(b) Develop a simple terry weave design, which will have loops on both the sides. (07 marks)

(c) Three distinctive variations can be obtained in warp pile fabrics that are produced by insertion of wires. Briefly explain how these three variations could be achieved. (06 marks)

Q6. (a) The sinker is the second primary knitting element in weft knitting machine. It may perform number of functions dependent upon the machine's knitting action and consequent sinker shape and movement. State the three (03) functions performed by a sinker. (03 Marks)

(b) Briefly state what do you understand by the following four terms with reference to weft and warp knitting.

i. Course ii. Wale

iii. Overlap iv. Underlap (06 marks)

(c) Briefly explain how purl knitted structure is different to other basic knitted structures with reference to weft knitted fabrics. (03 Marks)

(d) Draw the lapping diagrams of the following warp knit (08 Marks)

i. Front Bed: 1-2/1-0//

Back Bed: 1-0/2-3//

ii. Front Bed: 1-0/0-1//

Back Bed: 3-4/1-0//

Q7. (a) Compare the relative closeness of the warp yarns in the following two plain weave fabrics.

i. 18^S cotton; 49 ends/inch and

ii. 32^S cotton; 64 ends/inch (04 marks)

(b) Calculate the resultant count of the following composite yarn. A three-fold yarn of 240 yards length made by doubling together 300 yards of 18^S, 280 yards of 32^S and 240 yards of 10^S yarns. (04 marks)

(c) Calculate the weight of warp and weft yarn required to produce a fabric woven to the following specifications.

Warp count = 32^s Cotton
Weft count = 48^s Cotton
Ends/inch = 96
Picks/inch = 64
No separate selvedges are used.

Warp length = 1250 yards
Width in reed = 52 inches
Fabric Length = 1200 yards
Fabric width = 48 inches

(12 marks)

Q8. (a) A dry-relaxed plain knitted worsted fabric is made from 60 tex yarn and has a stitch length of 6mm. Calculate the areal density of the fabric. Consider K_s at dry state to be 1900. (06 marks)

(b) If the stitch density of a dry-relaxed knitted fabric is 92, estimate the number of courses/cm and wales/cm. Consider $K_w = 3.8$ and $K_c = 5.0$ for dry relaxed state. (06 marks)

(c) A warp knitted dress material is produced and in the grey state it has 20 wales/cm and 32 courses/cm. The run-in is 210 cm for the back bar and 120 cm for the front bar, both bars being fed by 6 tex polyester yarn. Calculate the areal density of this fabric in g/m^2. (08 marks)