

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 in Engineering
Name of the Examination	: Final Examination
Course Code and Title	: TAX4361 Knitting Technology
Academic Year	: 2024/25
Date	: 07 th March 2026
Time	: 0930-1230h
Duration	: 3 hours

General instructions

1. Read all the instructions carefully before answering the questions.
2. This question paper consists of **Eight (8)** questions in **Four (4)** pages.
3. Answer the question one (Q1), which is compulsory and five (05) more questions from Q2 to Q8. Question one (Q1) carries 25 marks and questions two (Q2) to eight (Q8) carry fifteen (15) marks each.
4. Answer for each question should commence from a new page.
5. This is a Closed Book Test (CBT).

Compulsory Question

(Q1) (a) List three (03) reasons why the knitting industry has experienced significant growth compared to the weaving industry. (03 marks)

(b) State the functions of the following cams during the knitting process. (03 marks)

- I. Raising cam
- II. Stitch cam
- III. Guard cam

(c) Distinguish between "Laying-in" and "Plating" in weft knitting, with reference to how the needle hook interacts with the yarn. (04 marks)

(d) Draw the lapping diagrams for the following warp knitted fabric structure. (04 marks)

Front bar chain notation : 1-0/1-2/2-3/3-4/2-1/2-3

Back bar chain notation : 2-3/1-0/1-2/1-0/0-1/1-2

(e) Briefly explain why the pattern chain is considered more versatile than the pattern wheel in warp knitting? (02 marks)

- (f) State the mechanical movement unique to a fall-plate compared to a standard guide bar and state its function. (03 marks)
- (g) Imagine you have unraveled yarn from 10 repeats of a 6x3 rib fabric and its total length measures 54 cm. Calculate the loop length. (03 marks)
- (h) State three (03) common knitted fabric defects and provide one (01) potential cause for each. (03 marks)

Answer any five (05) questions from the following seven (07) questions.

- (Q2) (a) Compare woven and knitted fabrics in terms of how the yarns hold the fabric together and their dimensional stability. (08 marks)
- (b) Discuss the importance of the relationship between machine gauge and yarn count in the knitting process with reference to the following aspects.
 - I. The mechanical balance of the fabric. (03 marks)
 - II. The technical impacts of an improper match between these two parameters. (04 marks)
- (Q3) (a) The latch needle is often referred to as an "automatic needle." Briefly explain the technical reasoning behind this term and state one (01) major advantage it offers over the bearded needle. (05 marks)
- (b) Illustrate and briefly explain the loop formation process using a bearded needle, highlighting the key stages involved. (10 marks)
- (Q4) (a) Differentiate between "Negative yarn feeding" and "Positive yarn feeding" systems used in weft knitting with respect to the following aspects. (06 marks)
 - I. Operating mechanisms
 - II. Need for extra attachments
 - III. Impact on fabric quality
- (b) Briefly describe;
 - I. The unique needle bed arrangement of a circular purl knitting machine. (02 marks)
 - II. How it differs from a circular rib machine. (02 marks)
- (c) Unlike modern circular knitting machines, a sinker wheel machine has stationary needles. Briefly explain how yarn is fed and loops are formed on these needles. (05 marks)

(Q5) (a) I. Illustrate the needle arrangement used in the production of interlock fabrics. (02 marks)

II. Compare and contrast the 1×1 rib and interlock structures with respect to the minimum number of feeders required for their production. (02 marks)

(b) Briefly describe the formation of a Miss (Float) Stitch and its effect on fabric width and extensibility. (04 marks)

(c) I. Both Half-Cardigan and Full-Cardigan structures use tuck stitches. Briefly describe how the arrangement of these tuck stitches differs in these two structures. (04 marks)

II. State which of the above (Q5 c I.) two fabrics is thicker and briefly explain why. (03 marks)

(Q6) (a) I. With the aid of diagrams, distinguish between the "Overlap" and the "Underlap" of a warp knitted loop. (04 marks)

II. State the influence of the length of the underlap on the stability and width of the fabric. (02 marks)

(b) Differentiate between Tricot and Raschel warp knitting machines with reference to the following technical aspects. (09 marks)

- I. Type of needles used
- II. Method of fabric control
- III. Fabric take-up angle
- IV. Production speed

(Q7) (a) Assume you are a trainee textile engineer in a knitting production facility. Your supervisor has received a client order for a single jersey fabric. The fabric is to undergo wet finishing, with a target final tubular width of 65 cm. The yarn to be used is 25 Tex and the machine assigned for this trial is a circular knitting machine with 52cm diameter and 10 needles per cm on the needle cylinder.

The relaxation constants k_s , k_c and k_w of the fabric are 2160, 53 and 41 respectively in the metric system.

Based on the given data, perform the following calculations.

- I. Calculate the stitch length of the fabric. (03 marks)
- II. Calculate the area density of the fabric in grams per square meter (GSM). (04 marks)
- III. If the client switches to 30 Tex yarn but wants to maintain the same GSM, calculate the revised loop length needed. (03 marks)

(b) Calculate the front guide bar stitch length and back guide bar stitch lengths of a warp knitted structure, if front bar and back guide bar run-in values are 153 cm and 104cm respectively. (02 marks)

(c) A warp knit fabric originally has 25 wales per cm and 15 courses per cm, with a stitch length of 2 mm. If an identical fabric is manufactured with 18 wales per cm and 12 courses per cm, calculate the new stitch length. (03 marks)

(Q8) (a) Assume you are designing a fully fashion garment component as shown in Figure 1. The fabric is specified to have a density of 6 courses per cm and 5 wales per cm. Using these values, prepare a knitting statement for the component clearly showing all your calculations. (07 marks)

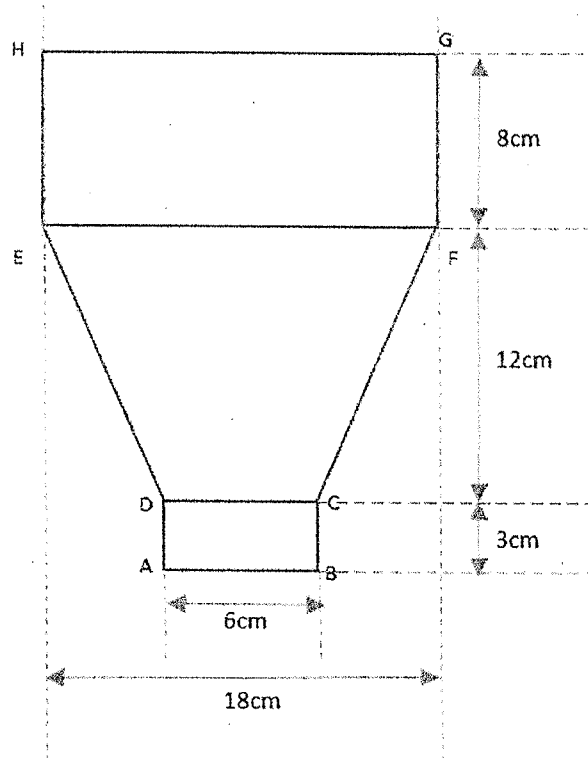


Figure 1

(b) I. State two (02) advantages of using knitted fabrics over woven fabrics in technical applications. (02 marks)

II. Differentiate between weft-knit and warp-knit spacer fabric production with respect to the type of machine used and the method of production. (06 marks)