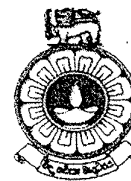


The Open University of Sri Lanka
Faculty of Engineering Technology
Department of Textile and Apparel Technology



Study Programmes	: Bachelor of Science Honours in Engineering/ Bachelor of Industrial Studies Honours
Name of the Examination	: Final Examination
Course Code and Title	: TAX4361 - Knitting Technology
Academic Year	: 2023/2024
Date	: 14 th March 2025
Time	: 0930-1230hrs
Duration	: 3 hours

General Instructions

1. Read all instructions carefully before answering the questions.
2. This question paper consists of **Eight (8)** questions in **Five (5)** pages.
3. Write down your Index Number in all the pages of answer scripts.
4. Answer the question one (Q1), which is compulsory and five (05) more questions from Q2 to Q8. Question one (Q1) carries twenty five (25) marks and questions two (Q2) to eight (Q8) carry fifteen (15) marks each.
5. Answers to each question should commence on 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 on the answer book.
7. Answers should be in clear hand writing.
8. Do not use red colour pens to write the answers.

Compulsory Question

(Q1)

- a) Compare the stretchability, drapeability and porosity of knitted and woven fabrics by using the symbols ">" and "<" to indicate which fabric type has a higher or lower property. (03 marks)
- b) What are the two (02) main categories of warp knitting machines? (02 marks)
- c) State four (04) reasons for the growth of knitting technology compared to weaving? (02 marks)
- d) Draw the point paper notation and yarn path diagram of "Half Cardigan" fabric. (03 marks)
- e) Illustrate the guide bar lapping notation for warp-knitted satin fabric. (03 marks)
- f) Briefly explain how do the pattern wheel and pattern chain differ in their function and suitability for different warp knitting applications. (02 marks)
- g) Imagine you have unraveled yarn from 10 repeats of a 5x4 rib fabric and its total length measures 63 cm. Calculate the loop length. (03 marks)
- h) A warp knit fabric originally has 15 wales per cm and 25 courses per cm, with a stitch length of 1.5 mm. If an identical fabric is manufactured with 20 wales per cm and 30 courses per cm, what will be the updated stitch length? (03 marks)
- i) Briefly explain why bowing is more noticeable in striped knitted fabrics. (02 marks)
- j) List two (02) advantages of electronic Jacquards over mechanical Jacquards. (02 marks)

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

(Q2)

(a) Briefly explain how does the relationship between yarn count and machine gauge affect fabric quality in weft knitting and why it is important to maintain a balance between needle hook size and yarn thickness. (05 marks)

(b) Briefly explain the mechanisms of negative and positive yarn feeding systems in knitting machines and state the advantages and disadvantages of each system. (10 marks)

(Q3)

(a) Illustrate and briefly explain the loop formation process using a bearded needle, highlighting the key stages involved. (10 marks)

(b) Briefly describe the function of the retractable raising cam and tuck cam in the formation of knit, tuck, and miss stitches in flat-bed knitting machine. (03 marks)

(c) Illustrate the needle butt path for tuck stitch formation in a flat-bed knitting machine having retractable raising cam and tuck cam. (02 marks)

(Q4)

(a) Illustrate and briefly explain the knitting action of a circular Rib machine, highlighting the key stages involved. (10 marks)

(b) How can a V-bed rib machine be used to knit purl stitch designs? Briefly explain the process of rib loop transfer across empty needles and how it influences fabric thickness and elasticity in purl stitch designs. (05 marks)

(Q5)

(a) Briefly explain the concept of plating in knitting. Provide three (03) practical applications of plated fabrics in textile products. (05 marks)

(b) Briefly explain how the needle arrangement differs between **rib gating** and **interlock gating** in double jersey knitting. (04 marks)

(c) Compare and contrast the knitting mechanisms of horizontal striping, vertical striping, and intarsia techniques in weft knitting. (06 marks)

(Q6)

(a) Briefly explain how the "Pillar stitch" is formed in warp knitting. Support your answer with chain notations for both open and closed pillar stitch constructions.

(05marks)

(b) Briefly explain the formation of pile in warp knitted fabrics, describing the role of the front and back guide bars.

(04 marks)

(c) Compare and contrast the **Tricot** and **Crochet** knitting machines in terms of the **loop formation process, guide bar system and yarn feeding mechanism.** (06 marks)

(Q7)

(a) Assume that you are responsible for producing a single jersey knitted fabric that will undergo wet finishing, resulting in a final tubular width of 50 cm. The fabric is to be knitted on a circular knitting machine with a diameter of 40 cm and a needle density of 8 needles per cm. The given wet relaxation constants for the fabric in the metric system are:

- Fabric relaxation constant (K_s) = 2160
- Course-wise relaxation constant (K_c) = 53
- Wale-wise relaxation constant (K_w) = 41

Given that the yarn count is 60 Tex and the manufacturing process results in a 5% yarn wastage, calculate:

i) The stitch length of the fabric (05 marks)

ii) The total length of yarn required to produce 1000 m² of fabric (06 marks)

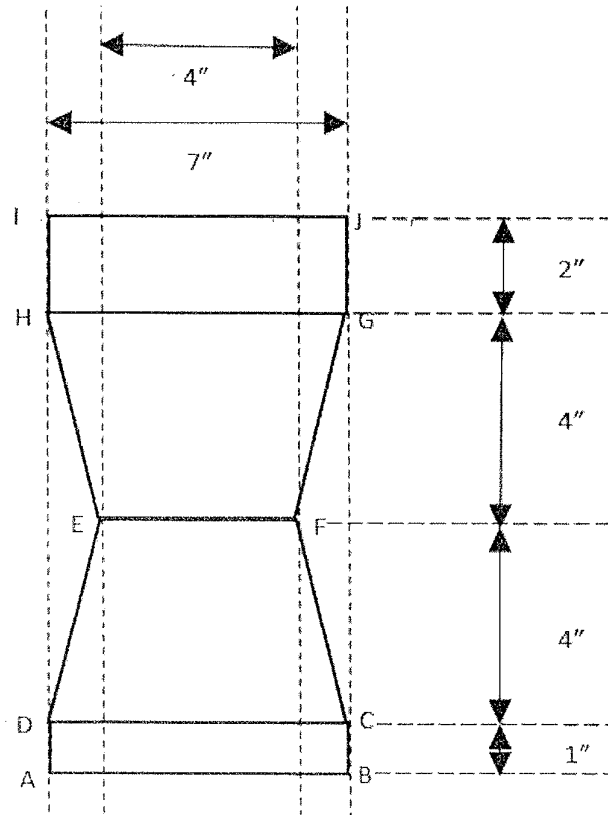
(b) Imagine you are working as a textile engineer tasked with designing a high-performance warp-knitted fabric for a new sportswear line. The fabric has the following specifications in the grey state:

- 18 wales/cm and 36 courses/cm
- Run-in for the back bar: 220 cm
- Run-in for the front bar: 120 cm
- Both bars are fed with 6 tex polyester yarn

Calculate the areal density of the fabric in grams per square meter (g/m²) based on the given parameters. (04 marks)

(Q8)

(a) Design a knitting statement for the fully fashioned garment component shown in the diagram below, considering the given fabric specifications of 20 courses per inch and 16 wales per inch. Ensure that all calculations are clearly shown. (09 marks)



(b) Name three (03) applications of knitted fabrics in technical textiles. For each application, mention one (01) advantage of using knitted fabrics. (06 marks)