

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	: TAX3459 Yarn Manufacture I
Academic Year	: 2024/25
Date	: 10 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) Why is it necessary to insert high twist to a spun yarn made of cotton, but not strictly necessary for a continuous filament yarn? (02 marks)
- (b) An 80s cotton yarn is to be converted into a yarn that is double in coarseness. Calculate the target count in Tex units. (04 marks)
- (c) State how the following factors should be adjusted on a cotton cleaning machine to increase the amount of trash extracted, in order to improve the cleaning efficiency. (03 marks)
- I. The spacing of the bars
 - II. The angle of the bars
 - III. The setting of the beaters to the bars
- (d) What is the purpose of the Scutcher in the blow room line of machinery? (02 marks)
- (e) A feed lap of 20 Ne is fed to a carding machine set at a draft of 100. Calculate the hank of the card sliver produced. (03 marks)

- (f) State any one (01) common fault found in lap formation and state a possible action that can be taken to eliminate it. (02 marks)
- (g) List any three (03) factors that influence the tension of the roving, before it is wound onto the bobbin. (03 marks)
- (h) State any three (03) operational areas that have been prioritized for automation in modern roving frames. (03 marks)
- (i) Name any three (03) important properties that a traveller material should have. (03 marks)

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

- (Q2) (a) I. State the primary function of "Ginning". (02 marks)
- II. Compare and contrast "Macarthy Gin" and " Knife Roller Gin" in terms of the following aspects. (06 marks)
- i. Mechanical striking action
 - ii. Production capacity
 - iii. Suitability for different staple lengths
- (b) I. Briefly explain the role of "Pneumatic Action (air currents)" in a blow room. (03 marks)
- II. List any four (04) essential requirements that must be met to ensure an effective air current installation to carry cotton. (04 marks)
- (Q3) (a) Explain the reasons for the introduction of "Automatic Bale Pluckers" in the blow room, with specific reference to the "human element error." (04 marks)
- (b) Briefly explain the technical considerations involved when processing a blend of cotton with man-made fibres in a blow room, focusing on the number of cleaning points and the risk of fibre damage. (04 marks)
- (c) I. State the four (04) main objectives of blending different types of fibres in a spinning mill. (04 marks)
- II. State any three (03) physical properties of fibres that should be nearly identical to ensure a successful blend. (03 marks)

(Q4) (a) State the four (04) main objectives of the carding process in spinning. (04 marks)

(b) Compare 'Stripping Action' and the 'Doffing Action' in a revolving flat card with respect to the purpose of **each action** and the relative direction of the wire points. (04 marks)

(c) Distinguish between "Flexible Card Clothing" and "Metallic Card Clothing" in terms of their construction and maintenance requirements. (04 marks)

(d) State any one (01) possible cause for each of the following carding defects. (03 marks)

- i. Excessive amount of Flat strip
- ii. Too many long fibres in the Flat strip
- iii. Non-uniformity of flat strip waste thickness

(Q5) (a) I. Define the terms, "Drafting" and "Doubling" used in a draw frame. (04 marks)

II. State the primary objectives of each "Drafting" and "Doubling" functions in the draw frame process. (04 marks)

(b) Briefly explain why the draw frame is considered as the machine mainly responsible for the final evenness of the yarn. (03 marks)

(c) Briefly describe the working principle of the following methods of measuring sliver mass in the draw frame. (04 marks)

- i. Capacitive measuring
- ii. Photo-electric measuring

(Q6) (a) Briefly explain the importance of the comber preparatory process and why shouldn't card sliver be fed directly to a comber. (05 marks)

(b) Compare the "Super Lap" process with the conventional "Sliver Lap/Ribbon Lap" process in terms of efficiency and quality. (04 marks)

(c) List the three (03) primary objectives of the combing process. (03 marks)

(d) Explain how the distance between the detaching rollers and the nippers influences waste extraction? (03 marks)

(Q7) (a) Briefly explain why an intermediate "roving" process is necessary between the draw frame and the spinning of yarn. (05 marks)

(b) I. Illustrate the physical shape of a roving bobbin. (02 marks)

II. Briefly explain why it has tapered ends. (04 marks)

(c) Briefly explain any two (02) critical parameters that must be controlled during the roving process to ensure yarn quality. (04 marks)

(Q8) (a) Explain why ring spinning is considered as the most expensive process in a spinning mill. (05 marks)

(b) Briefly explain the specific role of the "Traveller" in the winding and twisting process. (04 marks)

(c) Briefly explain the three (03) primary factors that determine the roller settings in a ring frame drafting system. (06 marks)