

NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

DEPARTMENT OF TEXTILE TECHNOLOGY

FINAL EXAMINATIONS MAY 2005

YARN TECHNOLOGY III TXT 4207

TIME: 3HOURS

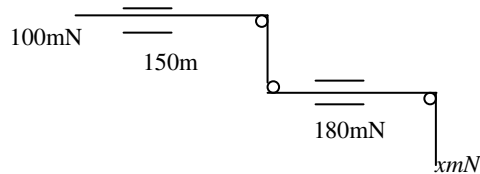
INSTRUCTIONS

Answer All questions in Section A and ANY THREE in Section B

SECTION A

1. What are the advantages of yarn doubling. (3 marks)
2. Explain the advantages of two-for-one twisting. (5 marks)
3. What are the objectives of winding. (3 marks)
4. (a) Define planned maintenance and give examples. (6 marks)
(b) A spindle-doubling frame is used in the doubling of 4 single yarns of 30 tex with a twist factor of 12 turns/cm tex^{1/2}. The spindle speed is 13 000 rev/mm. The machine has 300 spindles.
Calculate delivery rate (2 marks)
Production in Kg/8hr shift at 85% efficiency (3 marks)
5. (a) Explain (i) the wind of a winding system (2 marks)
(ii) transverse ratio of the yarn guide
6. Write notes to distinguish between constant winding and variable (spindle) winding. (6 marks)

7. A yarn with an input tension of 100mN is running through a system of guides and tensions as shown on the diagram below. The load applied to the tensioners are 150mN and 180mN, respectively, and the angle of lap around the three guides is 90° in each case. Calculate the value of the output tension if the coefficient of friction between the yarn and the surface over which it travels is 0.18.



(6 marks)

8. Develop a mathematical relationship between surface velocity in m/min, package diameter and rotational speed in revs/min (2 marks)
9. Explain what is known as the D/S ratio and why is it important. (2 marks)

SECTION B

Answer ANY THREE questions.

1. Discuss the problems of cotton dust generation in spinning mills, the discussion should include diseases associated with airborne dust in textile mills and how the Zimbabwean industry is responding to the problem. (20 marks)
2. (a) (i) Explain the function of yarn clearers. (4 marks)
(ii) Describe the types of electronic clearer devices and state the advantages and disadvantages of each system. (10 marks)
- (b) (i) What are objectionable yarn faults and how are they defined. (3 marks)
(ii) A cheese of traverse length 30 cm is wound on a precision winder onto a centre of 12 cm. By developing the surface of the cheese into a plane figure, draw one repeat of the yarn path on the centre, if the traverse ratio is 5/3. (3 marks)
3. (a) A precision winder, with constant spindle speed, is used for the production of cheese traverse length 150mm and nominal wind per double traverse. If the angle of wind is not to exceed 8° determine the maximum package diameter (8 marks)

- (b) Calculate the production of a card if the doffer is 1.1m in diameter and rotates at 25 revs/min. The draft from the doffer to the coiler is 1.2 and the delivered sliver is 38 ktex. Find production at:
- (i) kg/hr at 100% efficiency
 - (ii) kg/8hr at 88% efficiency. (6 marks)
- (c) It is required to produce a yarn with maximum strength from three single cotton yarns of 30tex having a twist factor of $385 \text{ tex}^{1/2}$ turns/cm. Calculate:
- (i) single twist
 - (ii) doubling twist
 - (iii) doubled yarn twist factor (6 marks)
4. The maintenance of a spinning machine is important if production targets are to be realised. Give a detailed discussion in support of the above statement by including the types of maintenance, their importance and justifications. (20 marks)
5. (a) Outline 4 types of yarn doubling methods, stating the advantages and drawbacks of each system. (15 marks)
- (b) With the help of a clear diagram explain how a central air conditioning station plant operates. (5 marks)

END OF QUESTION PAPER