

NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

**DEPARTMENT OF TEXTILE TECHNOLOGY
END OF SEMESTER EXAMINATIONS JUNE 2004
YARN ANALYSIS AND TESTING TXT 2220
TIME: 3 HOURS**

INSTRUCTIONS

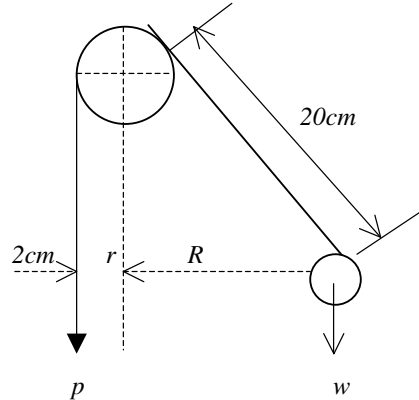
Answer **ALL** questions from Section A and **ANY 3** from section B. Section A carries 40 marks and each question in section B carries 20 marks

SECTION A

Answer **ALL** questions in this section.

1. Briefly explain the effect of fineness on yarn strength. (4 marks)
2. List four causes of periodic variation in yarns. (4 marks)
3. In yarn irregularity testing, how do periodic and drafting waves appear on the spectrograph. (4 marks)
4. Describe two strength testing systems stating the merits and demerits of each method. (6 marks)
5. What is inherent regularity and why is it important? (2 marks)
6. (a) From the fibrograph, what is meant by uniformity ratio? (2 marks)
(b) Calculate the uniformity ratio given that the mean length is 0.8in and the upper half mean length is 1.00in. (2 marks)
7. (a) Calculate the number of drafts needed for a cotton spun yarn of 35 tex and cotton fibre fineness of 2 decitex when 8 slivers are fed to the drawframe. (4 marks)
(b) Calculate the final coefficient of variation for the yarn above if the slivers fed have a CV% of 4.2%. (2 marks)
8. Define:
- elasticity (2 marks)
- toughness (2 marks)
9. Calculate the tenacity of a yarn 20cc and having a strength of 58N.(2 marks)

10. The diagram shows the schematic diagram of pendulum tester. Given that the weight of the pendulum is 100N, length of the pendulum is 20cm and r is 2cm.



- (a) Calculate the strength p of the yarn when $\theta = 21^\circ$. (2 marks)
- (b) Calculate the strength p of yarn when angle theta is 45 degrees

SECTION B

1. (a) Explain clearly what is meant by the term limit of irregularity. Calculate the expected irregularity for a 30tex cotton yarn spun from cotton with an effective length of 32mm and fineness of 1.9 denier. (8 marks)
- (b) The characteristics of spun yarn depend on fibre length, fibre fineness and amount of twist inserted. Explain clearly, with the aid of graphs why this is so and state the effects of changes in each of the above on the yarn produced. (12 marks)
2. (a) Explain with aid of graphs the factors that effect yarn strength (10 marks)
- (b) Outline the principle upon which the Uster-evenness tester operates. Explain how the results obtained may be interpreted from:
- U%
 - CV% (10 marks)
3. Discuss the working principle of three yarn testing machines. Explain clearly why the pendulum and inclined plane tester are not constant rate of loading. (20 marks)
4. (a) Use the equation by R Soedibjo Hardjortomo to estimate the amount of contraction on a yarn of 25 turns/inch and 40/lcc. (8 marks)

- (b) From the principles develop an equation for the corrected yarn count after twisting and prove that in the indirect system corrected yarn count is $N(\text{Subscript } f) = N(\text{sub }) (1 - \%C/100)$ (12 marks)
5. (a) Discuss and explain the operating principle of the micronaire testing machine and clearly describe how the testing machine can be used to measure cotton fibre fineness. (10 marks)
- (b) The HVI is a remarkable development in textile testing. Discuss this statement by indicating and explaining the various properties that can be tested on an HVI. (10 marks)

END OF QUESTION PAPER