

TTL 211 Structure and Physical Properties of Fibers  
Major Exam

28<sup>th</sup> November 2006

Max Marks 45

Duration 2 hrs

Que 1. Give brief answers to the following questions (any three)- (3X3= 9)

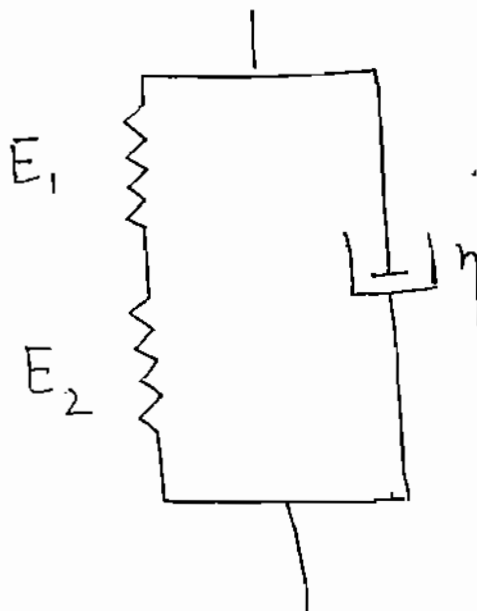
1. Most of the textile fibers are positively birefringent, where as some highly drawn fibers also show a zero or negative birefringence value. Explain with examples.
2. The heat evolved when wool absorbs water is 1340 J/g at 0% RH and only 550 J/g at 30% RH. Explain.
3. To avoid the problem of fog marking in synthetics, the current needed in weaving, carding and warping are  $0.003 \mu\text{A}$ ,  $0.07 \mu\text{A}$  and  $5 \mu\text{A}$  respectively for dissipating the charge. Justify it. Out of different textile fibers which fibers give the least or the maximum trouble. Why?
4. Thermal properties like specific heat and thermal conductivity of natural fibers depends on their moisture regain.

Que 2. With the help of a diagram show the expected creep behavior of viscose rayon at

- a) At 60% RH and 30% RH
- b) At Stress levels of 35.3 mN/tex and 70.6 mN/tex

Also explain how the contribution of primary and secondary creep to total creep will differ at varying stress levels as given in part (b). (6)

Que 3. Write the equation for the modified viscoelastic model as suggested in the figure given below for creep behavior. Give limitations of the model. (6)



Que 4. Which textile fiber would you choose for an application like a mountaineering rope. What are the desirable properties for such an application and the reason for your choice ? (6)

Que 5. A fiber 25 microns in diameter requires 10 minutes for water to reach the center and equilibrate. How long will it take water to reach the center of a-

- (i) very closely packed yarn of 14 of the same fibers
- (ii) tightly packed yarn of 1000 fibers
- (iii) loose yarn of 1000 fibers (6)

Que 6. Justify the following statements – (4X3=12)

- (a) There is hysteresis in moisture regain vs relative humidity for cotton.
- (b) Lustre of a textile fabric improves on ironing and calendaring. Mercerized cotton yarn and silk have higher luster than cotton.  
Explain the phenomenon.
- (b) Heat Setting not only improves the dimensional stability of synthetic fibers but also improves the mechanical properties.