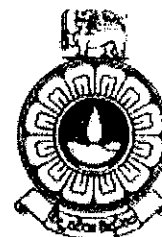


THE OPEN UNIVERSITY OF SRI LANKA

BACHELOR OF TECHNOLOGY/ BACHELOR OF INDUSTRIAL
STUDIES.



FINAL EXAMINATION- 2011/2012

TTX 5131 – STRUCTURE AND PROPERTIES OF FIBERS

DURATION – THREE HOURS

DATE: 24TH February 2012

TIME: 9.30 – 12.30 HOURS

Please write your Registration number on the dotted line given below:

Reg. No.:

Total no of questions = 8 No of questions to be answered = 6

Answer the question 1, (Part 1) which is compulsory and five additional questions. Each additional question carries 15 Marks.

PART 1

1. (i) What do you understand by the following terms:

(a) Di-functional monomers

(02 Marks)

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(b) Condensation polymerization

(03 Marks)

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(c) Addition polymerization

(03 marks)

(d) Inter-molecular interactions

(03 Marks)

(ii) What are the conditions to be fulfilled by polymer molecules to be suitable to form a fiber? (03 Marks)

(iii) What do you understand by the term "Packing density of fibers"

(03 marks)

(iv) What are the Thermoplastic properties of polymers?

(03 Marks)

(v) What do you understand by Orientation in Polymers?

(02 Marks)

(vi) Distinguish between "Capillary moisture" and "Bound moisture"

(03 Marks)

PART 2

2. Explain the following terms?

(15 Marks)

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|--|-------------------------|
| (a) Crystallinity | (b) Amorphous structure |
| (c) Co-polymers | (d) Fiber morphology |
| (e) Factors determining the moisture absorbency of fibers. | |

3. (i) Distinguish between the Glass transition temperature and melting point?
 (ii) What are the factors that affect the glass transition temperature of polymers?
 (iii) Explain the difference in thermal behavior of thermoplastics and thermosets and the reason for such behaviour. (15 Marks)

4. (i) Distinguish between a Linear polymer and Branched polymer? (15 Marks)
 (ii) Explain why textile fibers cannot be formed by branched polymers?
 (iii) What do you understand the term "Cross-linking of Polymer chains"?

5. (i) Using diagrams describe the man-made fiber production processes of wet spinning and melt spinning? (15 marks)
 (ii) Explain the main differences between the two processes?

6. Write short notes on the following: (15 Marks)
 - (i) Flame resistant textiles
 - (ii) Flame retardant textiles
 - (iii) Heat setting of polymers
 - (iv) Porous model
 - (v) Surface Moisture

7. (i) What do you understand by moisture content and moisture regain? (15 Marks)
 (ii) Explain how thermal conductivity of fiber materials varies with moisture regain.
 (iii) Write the standard equation for moisture content and moisture regain.

8. (i) What is a "High Performance Textile Fiber". Discuss their tenacity and thermal Characteristics? (15 Marks)
 (ii) Explain briefly the fibre identification methods through
 - (a) Light Microscopy
 - (b) The burning test
 - (c) Solubility test