

THE OPEN UNIVERSITY OF SRI LANKA
 DIPLOMA IN INDUSTRIAL STUDIES/ TECHNOLOGY
 TTX3231 - FIBRE SCIENCE & TECHNOLOGY
 FINAL EXAMINATION - 2009/2010
 DURATION: THREE HOURS



Date: 21st March 2010

Time: 0930 –1230 Hrs

Answer Question 01, which is **compulsory** and additional five (05) questions. Question 1 carries twenty-five marks and Questions 2 to 9 carry fifteen (15) marks each.

(01) Compulsory Question

- (i) Natural fibres are mainly classified into three (3) groups. What are they? Give one examples of fibres for each class. (03 Marks)
- (ii) Define following terms:
 (i) Monomer (ii) Polymer
 (iii) Co- polymer (03 Marks)
- (iii) What is the difference between "regenerated man-made fibres" and "synthetic fibres"? (02 Marks)
- (iv) What do you understand by 'condensation polymerisation'? (02 Marks)
- (v) Explain why a high melting point is more desirable for textile fibres. (02 Marks)
- (vi) Describe the term "thermoplastic". (02 Marks)
- (vii) What are the raw materials used to manufacture Nylon 6? (02 Marks)
- (viii) State two important properties and two end uses of "Nomex". (03 Marks)
- (ix) . What are the important features of the following fibres that can be observed when the longitudinal and the cross-sectional views are examined through the Microscope?
 (i) Cotton (ii) Wool (iii) Nylon (03 Marks)
- (x) What are the types of bonds present in cotton polymer? (03 Marks)

(02) (a) What properties do you expect from a polymer for it to be suitable for formation of fibres. Describe them.

(07 Marks)

(b) Explain how "crystallinity" of a fibre affects the "moisture absorbency", "chemical absorbency" and "dye ability" of the fibre.

(08 Marks)

(03) (a) Describe the morphological structure and polymer system of cotton fibre.

(07 Marks)

(b) Describe following properties of the cotton fibres.

(i) Tenacity

(ii) Dye ability

(iii) Water absorbency

(iv) Effect of sunlight

(08 Marks)

(04) (a) Describe the polymer system and intermolecular forces available in wool fibre

(05 Marks)

(b) Explain, why wool is of relatively low tenacity.

(02 Marks)

(c) Describe "setting" and "felting" of wool

(04 Marks)

(d) Explain the dye ability of wool fibres

(04 Marks)

(05) (a) Describe the polymer system of polyester fibre, elaborating the nature of the polymer and inter-molecular forces.

(06 Marks)

(b) Compare the following properties of polyester fibre with cotton.

(i) Thermo plasticity

(ii) Tenacity

(ii) Hygroscopic nature

(09 Marks)

(06) (a) What do you understand by the term "melt spinning" ? (03 Marks)

(b) Describe "dry spinning" process giving the principles involved. (12 Marks)

(07) (a) Discuss the importance of identification of textile fibres. (03 Marks)

(b) Describe **four** simple techniques used to identify textile fibres. (12 Marks)

(08) Describe the following physical and chemical properties with respect to textile fibres, and explain the relevance of these properties to the requirements of the final product made out of these fibres:

(i) Strength

(ii) Affinity to dyes

(iii) Thermo plasticity

(iv) Crystallinity of the polymer system

(15 Marks)