NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

DEPARTMENT OF TEXTILE TECHNOLOGY

END OF SECOND SEMESTER EXAMINATIONS – MAY 2011

TXT 1203 – TEXTILE AND FIBROUS ASSEMBLIES

TIME: 3 HOURS

TOTAL MARKS: 100

INSTRUCTIONS

1. Answer **ALL** questions from Section A and **ANY OTHER THREE** questions from Section B.   Section A carries **40 marks** and each question in Section B carries **20 marks**.

2. The first fifteen minutes should be spent reading the question paper and making notes.

3. Do not open your answer sheet until told to do so.

4. Marks will be awarded for skill in appreciating the scope of questions, clarity of argument and conciseness of presentation as well as for the knowledge displayed by the candidate.

SECTION A

Answer **ALL** questions in this section.

QUESTION 1

(a). Define the following:

    i.   Fibre.

    ii. Regenerated fibre.

    iii. Bast fibre.

    iv. Microfibre.   **(4)**

(b). List two examples of each of the following:

    i.   Bast fibre.

    ii. Regenerated carbohydrate fibres.

    iii. Synthetic fibres formed by polycondensation.

    iv. Synthetic fibres formed by polyaddition.   **(4)**

(c). Show the skeletal diagrams of the chemical structure of:

   i.   Cotton.
   ii. Nylon 6,6
   iii. Polyester.   **(6)**

(d). Outline the basic stages involved in the manufacture of both regenerated and   synthetic
    fibres.   **(4)**

(e).

   i.   With the aid of an equation, discuss the effect of acids on cotton.   **(6)**

   ii. Discuss the mercerization process.   **(5)**

(f).
   i.   Two major classes of protein fibres are keratin and secreted fibres. Give **two**
        differences between these two classes.   **(4)**

   ii. Explain why wool's hygroscopicity is one of its most important features.   **(3)**

(g). List **two** applications of each of the following fibres:

   i.   Silk.
   ii. Viscose.
   iii. Kevlar.
   iv. Flax.   **(4)**

SECTION B

Answer **ANModuleUNDERLINE** — Answer **<u>ANY THREE</u>** questions in this section.

QUESTION 2

a. Discuss **five** primary properties necessary for a polymeric material to make an adequate
    fibre.   **(10)**

b. Give two examples of aramid fibres. Identify the application areas for each and the
    relevant fibre characteristics utilized in those areas   **(10)**

QUESTION 3

(a). Using equations, describe the preparation of polyethylene terephthalate (polyester) by:

   i.   Transesterification.

ii. Direct esterification. **(10)**

(b). Outline any **three** chemical properties of polyester fibre and any **four** of its applications.
(5)

(c). How is cystine oxidized to cystic acid in wool? **(5)**

QUESTION 4

(a). With the aid of equations, explain the difference in the preparation of nylon 6.6 and nylon 6 fibres. **(15)**

(b). Briefly describe the production of cupramonium rayon (no diagram required). **(5)**

QUESTION 5

(a). Write notes on the production of viscose rayon. **(15)**

(b). Distinguish the structural properties of viscose rayon and cotton fibres. **(5)**

QUESTION 6

(a). Discuss any **five** applications of microfibres. **(15)**

(b). Prepare summarized notes on hollow fibres. **(5)**

END OF EXAMINATION QUESTION PAPER