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1ST SEM. 2016/17

UNIVERSITY OF SWAZILAND
FINAL EXAMINATION PAPER

PROGRAMME : BACHELOR OF SCIENCE IN TEXTILE APPAREL DESIGN AND MANAGEMENT YEAR II

COURSE CODE : TAD213

TITLE OF PAPER : FIBRE CHEMISTRY

TIME ALLOWED : TWO (2) HOURS

INSTRUCTIONS : ANSWER QUESTION ONE (1)

AND ANY OTHER TWO (2) QUESTIONS

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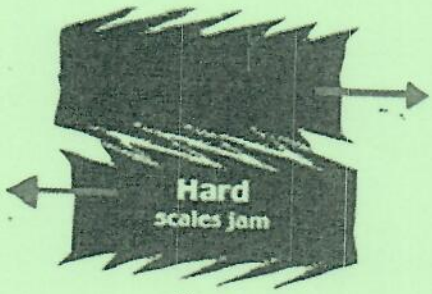
QUESTION 1(COMPULSORY)

a) List and describe the molecular requirements of fibre forming polymers **(12 Marks)**

b) Acrylic fibres based solely on acrylonitrile have a number of undesirable properties. List some of those properties **(4 Marks)**

c) With the aid of a diagram briefly describe the best method to produce acrylic fibres **(8 Marks)**

d) The figure below shows how the cuticle layers on wool can lock into adjacent fibres to cause felting. This property of felting in wool can be reduced or eliminated altogether by making changes on the surface of the fibres. Explain two processes that can be employed on wool to reduce the effects of felting **(8 Marks)**



e) Briefly describe the following types of copolymers
   i. Alternating
   ii. Block
   iii. Graft
   iv. Random

(8 Marks)

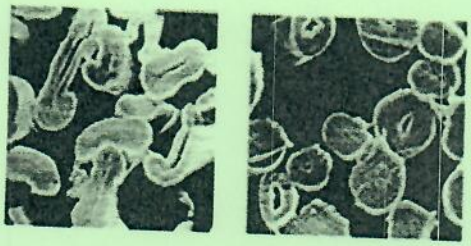
[TOTAL MARKS = 40]

QUESTION 2

a) What is the effect of increased crystallinity on the dyeability of PET fibres? Explain your answer **(4 Marks)**

b) Give a detailed description of the synthesis of Nylon 6.6 **(16 Marks)**

c) The figure below shows two crossection structures of cotton, name the treatment responsible for the changes in the cotton cross section **(2 Marks)**



Untreated cotton Treated cotton

d) Briefly describe the effect of the change in structure on the dyeability of cotton, explain your reasoning **(6 Marks)**

e) Name one dye class that chemically reacts with cellulose to affix colour **(2 Marks)**

[TOTAL MARKS =30]

QUESTION 3

a) Discuss the chemical processing of cotton **(12 Marks)**

b) Discuss the thermal degradation of PET fibres **(10 Marks)**

c) With the aid of a diagram briefly describe the structure of a mature cotton fibre **(8 Marks)**

[TOTAL MARKS = 30]

QUESTION 4

a) Briefly describe the following polymerisation mechanisms, giving an example of a fibre that is produced through each of the mechanisms.
   i. Addition polymerisation
   ii. Step growth polymerisation **(8 Marks)**

b) Discuss the bleaching of wool through oxidative bleaching **(12 Marks)**

c) Give **four (4)** properties of Nylon filaments **(4 Marks)**

d) Briefly describe the following polymer structures:
   i. Branched
   ii. Linear
   iii. Cross linked **(6 Marks)**

[TOTAL MARKS =30]