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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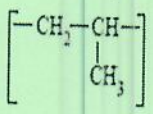
QUESTION 1(COMPULSORY)

a) Briefly describe the different types of copolymers **(8 Marks)**

b) Define polymerization and briefly describe the two main polymer formation mechanisms giving an example of a polymer formed through each mechanism. **(10 Marks)**

c) Describe any **five (5)** requirements for fibre forming polymers **(15 Marks)**

d) What is the molecular weight of polypropylene (PP), with a degree of polymerization of 3×10^4, given that the structure of the repeating unit for PP is:



(5 Marks)

e) Why is it important that the waxes found in cotton are removed prior to dyeing? **(2 Marks)**

[TOTAL MARKS = 40]

QUESTION 2

a) Briefly describe the following polymer structures:
   i. Branched
   ii. Linear
   iii. Cross linked **(9 Marks)**

b) Briefly discuss the preparatory processes involved in the chemical processing of cotton **(12 Marks)**

c) Briefly discuss the pyrolysis of polyamide fibres **(8 Marks)**

d) Name any **two (2)** chemical bonds found in wool fibres **(1 Mark)**

[TOTAL MARKS = 30]

QUESTION 3

a) Infra-red (IR) and Fourier Transform infra-red (FTIR) techniques are widely used to study polymeric materials. As a technique for local analysis, the utility of IR spectroscopy is however, limited by a combination of physical and practical factors. Give the two main limitations of the above mentioned techniques and a technique that can be used to overcome these limitations. **(8 Marks)**

b) Write brief notes on the effect of acids and alkali on silk **(12 Marks)**

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

d) PET is the most common type of polyester used in the production of textiles, name **three (3)** other polyesters besides PET that can be used to make textile products **(3 Marks)**

e) Cellulose I and cellulose II forms are the most significant in textile fibres. Explain the structural difference between the two forms **(3 Marks)**

[TOTAL MARKS = 30]

QUESTION 4

a) Acrylic fibres based solely on acrylonitrile have a number of undesirable properties. What are those properties? **(8 Marks)**

b) Name and briefly describe the spinning process that can be used to make acrylic fibres **(10 Marks)**

c) Draw a schematic diagram to illustrate a basic electrospinning setup and give **two (2)** process parameters that can influence the spinning process **(10 Marks)**

d) Give any **two (2)** classes of dyes that can be used on textiles **(2 Marks)**

[TOTAL MARKS = 30]