# UNIVERSITY OF SWAZILAND

## FINAL EXAMINATION PAPER

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| **PROGRAMME** | : | **BACHELOR OF SCIENCE IN TEXTILE, APPAREL DESIGN AND MANAGEMENT YEAR III** |
| **COURSE CODE** | : | **TADM 307** |
| **TITLE OF PAPER** | : | **COLOURATION TECHNOLOGY** |
| **TIME ALLOWED** | : | **TWO (2) HOURS** |
| **INSTRUCTION** | : | **ANSWER QUESTION ONE (1) AND ANY OTHER TWO (2) QUESTIONS** |

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## QUESTION 1 (COMPULSORY)

### SECTION A

a) Write the formula that shows the relationship between percent moisture regain (R) and percent moisture content (M) of a hygroscopic fabric.

**(4 Marks)**

b) Using the formula in (a) calculate the percent moisture content if the percent moisture regain of a fibre is 8%.

**(6 Marks)**

c) Describe **two (2)** ways in which the scouring pre-treatment benefited the cotton fabric before the dyeing process.

**(6 Marks)**

d) Compare and contrast **two (2)** classifications of natural dyes in terms of chemical structure.

**(6 Marks)**

e) State whether the following assertion and reason are true or false.

i) **Assertion:** for producing denims, indigo dyeing is carried out on yarns and not on fabrics.

ii) **Reason:** this helps to make twill denims using undyed weft to obtain a predominantly blue face and white back so that undergarments are not stained during use.

**(4 Marks)**

### SECTION B

**INSTRUCTION: Please choose the correct answer for the following questions. Justify your choice.**

f) A wool/acrylic blended fabric can be dyed to solid shade using a combination of which dye classes.

i) Direct and acid dyes

ii) Acid and basic dyes

iii) Vat and acid dyes

iv) Reactive and direct dyes

**(7 Marks)**

g) Which of the following dyes will be suitable for sublimation transfer printing of polyester?

i) Reactive dye
ii) Acid dye
iii) Vat dye
iv) Disperse dye

**(4 Marks)**

h) The dye bath of solubilized vat dyes has:

i) Alkaline pH
ii) Neutral pH
iii) Alkali and reducing agent
iv) A reducing agent

**(3 Marks)**

**[TOTAL MARKS = 40]**

## QUESTION 2

a) Dyes and pigments are common colourants used in textile colouration. Compare and contrast these colourants to demonstrate their differences.

**(4 Marks)**

b) A textile dye molecule should at least have the following in its structure. Choose the correct alternative in the list below and justify your answer.

i) One azo and one reactive group
ii) One chromophore and one auxochrome
iii) One solubilizing and one reactive group

**(6 Marks)**

c) Give the material to liquor ratio that jet dyeing machines are built to use. State the reason.

**(1 Marks)**

d) Give **three (3)** advantages of jet overflow dyeing machines.

**(6 Marks)**

**e)** In light of the dye and fibre interaction of the different dye classes match the elements in group 1 with those in group 2.

| GROUP 1 | GROUP 2 |
|---|---|
| 1. Acid dye | a) Ester bonds |
| 2. Disperse dye | b) Covalent bonds |
| 3. Reactive dye | c) Electrostatic bonds |
| 4. Direct dye | d) Hydrogen bonds |
| | e) Van der Waals forces |
| | f) Ether bonds |

**(4 Marks)**

f) Dyeing can take place at various stages of textile production. Explain stating the dyeing machine, how dye application can be achieved at the following stages.

i) Pre fibre stages

ii) Garment stage

iii) Yarn stage

**(3 X 3 = 9 Marks)**

**[TOTAL MARKS = 30]**

## QUESTION 3

a) Explain why the resist style of printing is preferred to the discharge style in the production of white and coloured prints, on aniline black.

**(5 Marks)**

b) Natural dyes can be obtained from a variety of natural sources. Describe **two (2)** methods that can be employed to extract the dyes from the different sources and give **one (1)** advantage of each.

**(6 + 2 = 8 Marks)**

**c)** In the dye extraction experiments conducted in class, which method in your view gave optimal results? Justify your answer. **(4 Marks)**

d) Name the thickener used in one of the printing practical sessions and describe how it was prepared.

**(5 Marks)**

e) Describe in brief **one (1)** after-treatment used for colour fixation and **one (1)** after-treatment used to free the goods from printing impurities.

**(8 Marks)**

**[TOTAL MARKS = 30]**

## QUESTION 4

a) Fully outline the reactive dyeing experiment you conducted under the following sub headings.

i) Pre-treatments
ii) Materials and equipment
iii) Method
iv) Results

**(4 X 5 = 20 Marks)**

b) Define the following terms.

i) Dye exhaustion
ii) Dye diffusion
iii) Colour saturation
iv) Colour models
v) Burnt out printing

**(5 X 2 = 10 Marks)**

**[TOTAL MARKS = 30]**