Faculty of Engineering

Department of Textile Engineering

Project (Thesis) on

Analysis of CIELAB Color space of cotton knit fabric dyed with reactive dyes.

Course code: TE-4214 **Course title:** Project (Thesis)

Submitted by:

Joy Saha ID: 171-23-266

Md. Omor Faruq ID: 171-23-280

Arman Mia ID: 171-23-286

Supervised by:

Md. Kamrul Islam

Lecturer

Department of Textile Engineering

Daffodil International University

A thesis submitted in partial fulfilment of the requirements for the degree of

Bachelor of science in Textile Engineering
Advance Wet Processing Technology

DECLARATION

We hereby declare that, this project has been done by us under the supervision of Md. Kamrul Islam, Lecturer, Department of TE, Daffodil International University. We also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree.

Prepared By:

Name	ID
Joy Saha	ID: 171-23-266
Md. Omor Faruq	ID: 171-23-280
Arman Mia	ID: 171-23-286

Department of Textile Engineering
Daffodil International University.

Letter of Approval

This project report prepared by Joy Saha bearing ID: 171-23-266, Md. Omor Faruq bearing ID: 171-23-280 and Arman Mia bearing ID: 171-23-286 is accepted in partial accordance with the **BACHELOR OF SCIENCE IN TEXTILE ENGINEETRING** degree requirement. Under my supervision, the said students has completed their project. I considered them honest, hardworking and enthusiastic during the research era.

Md. Kamrul Islam
Lecturer
Department of Textile
Daffodil International University

Acknowledgement

We specific our humblest feeling to almighty God, the owner of all sovereignty, the very merciful, and so the supreme international organization agency has given us the strength and probability to carry out this study.

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Abstract

Color features a semantic content that touching directly our sentimental world. it's a big influence on the aesthetic properties of textiles. Color is that the results of coloring a textile material depends on the chemical structure of the dyes and therefore the physical and chemical properties. makers area unit expected to supply their material with a high level of quality in color so it meets the wants of its customers. Role of fuel and depth of shade on CIELAB color areas were evaluated by information color 650 (reflectance spectrophotometer) to urge the distinction in color areas (DL*, Da*, Db*, DC* and DH*) of reactive colored material centered on this paper. the colour areas of colored materials shows higher lightness at higher concentration typically expressed by DL*. related color temperature of fuel is most for D65 (6500K). materials became darker once the colorant concentrations enlarged still as illuminants CCT. Samples showed proof of a lot of redness and spectral colour than the quality. Saturation level of dye additionally influenced absolutely in most cases i.e. a lot of intensive in higher dye concentration and material GSM.

-------Table of Contents-------

Chapter- One

Introduction

Introduction

This section gives an introduction to the study. It also declares the purpose and the base of this study and restrictions that were applied.

Fibre Reactive dyes, class of extremely colored organic substances that attach themselves to the substrates by a powerful chemical change by forming a chemical bond between the molecule of dye which of the fibre. The colour so becomes Associate in Nursing integral a part of the fibre and is tough to be removed by laundry that adhere by sorption. principally plastic fibre coloring with reactive dye considerably improves the product's color stability and wash ability. so reactive dying of cotton is presently the foremost pervasive dying method within the textile world. Dye-fiber bond formation is inspired by alkali. Reactive dyes are anionic in nature and polysaccharide additionally contains group, salt employed in dye tub, works as solution to neutral the fibre surface and encourage dye exhaustion. throughout coloring, under alkaline condition the reaction takes place between the reactive cluster of such dye and water rather than reaction with fiber, which ends up on the loss of dyes. This development is thought as dye chemical reaction. the speed of this chemical reaction becomes larger once temperature will increase. The effluent load becomes larger because of chemical reaction (A D Broadbent, 2001; Dr. V. A. Shenai, 1993).

Color will describe exactly by measurement the intensity of visible electro-magnetic radiation at several distinct wavelengths particularly spectral power distribution (SPD). Visual perception of color principally keen about the spectral composition of discovered energy. Color practiced as a characteristic of a surface. The 3 key properties of a surface color are Hue, Saturation and lightness. Hue permits a definite color to spot of Associate in Nursing object as red, blue, yellow, green and so on. Hue principally distinguishes one surface color from another. Saturation is termed as strength of Hue or intensity of a color i.e., vividness or dullness of color, it’s another name is intensity.

Lightness describes lucent intensity of color i.e., black (total absorption) or white (total reflection) (Deane B. Judd,1940). CIELAB is that the most complete color house outlined by the International Commission on Illumination that describes all the colors visible to the human eye and was formed to supply as a tool freelance model to be used as a reference. the colour coordinates were measured by exploitation CIE research laboratory because of having its widespread use. The CIELAB scale usually provides higher approximation to visual analysis of color distinction for terribly dark colours and expands the yellow region of alter comparison with Hunter L, a, b scale. Both scales are principally supported opponent color. The 3 coordinates of CIELAB represent the lightness of the colour (L* = zero yields black and L* = one hundred indicates diffuse white, a*, negative values indicate inexperienced whereas positive values indicate red and b*, negative values indicate blue and positive values indicate yellow.

Purpose of Thesis:

- Analysis of color space by spectrophotometer.
- Impact on dyed and observed fabric in shade.
- The consequence of adjusting the depth of the shade.
- Impact on salt and soda amounts in the shade.
- Impact on various properties of fastness, on cotton cloth.
- Application of reactive dyes to achieve some understanding.
- For a particular time, to know the method sequence.

Limitation of study:

- Most of the companies were not interested in becoming my respondent and completing the form.
- As a consequence of their need to take care of the protection of their valuable data, many businesses are not interested.
- Much of the respondent square measure busy due to their job they did not give the right time to collect proper information.

Chapter- Two

Literature Review

Dyeing:

Dyeing is a technique that, by applying different colors and their shades to a cloth, gives elegance to the textile. At any stage of the development of textile fiber, yarn, fabric or a finished textile product, like clothing and apparel, dyeing may be performed. The property of color fastness depends on two variables: the selection of the correct dye according to the textile content to be dyed, and the selection of the fiber, yarn or fabric dyeing process.

In order to achieve color with the desired color fastness, dyeing is the application of dyes or pigments on textile products such as fibers, yarns, and fabrics. The dyeing typically takes place in a special solution containing colorants and specific chemical materials. By absorption, diffusion, or bonding with temperature and time as main control variables, dye molecules are fixed to the fiber. Depending on the dye used, the bond between the dye molecule and the fiber can be strong or weak. Dyeing and printing are distinct applications; color is applied to a localized region with desired patterns in printing. In dyeing, the whole cloth is added to it.

Historically, the main source of pigment has been nature, with the colors being derived from animals or plants. However, human beings have developed artificial dyes since the mid-19th century to achieve a wider variety of colors and to make the dyes more durable for washing and general use. For various types of fiber and at different stages of the textile manufacturing process, different grades of dyes are used, from loose fibers to yarn and fabric to full clothing.

Acrylic fibers are dyed with simple dyes, while acid dyes are dyed with nylon and protein fibers such as wool and silk, and polyester yarn is dyed with dispersed dyes. A variety of dye types, including vat dyes, and modern synthetic reactive and direct dyes, are used to dye cotton.

History of Dyeing:

It's the Easter vacation of 1856, Cable Street, east London, and a young William H. Perkin is stooped over his laboratory table. Fumes and gasses arise from his work and struggle to strain of the small windows of the thin and incommodious lodging. The primitive workplace is on the highest floor of the building and right on top of his own residence. Through the open window, the sounds of hoof steps and restroom voices will simply be detected, however the enterprising chemist pays them no mind. His teacher, the well revered August Wilhelm von Hofmann, has left for Germany, giving the bold Perkin precious time alone to his work. Only a number of months past Hofmann had printed his exceptional hypothesis, that the synthesis of antimalarial from pitch is also attainable.

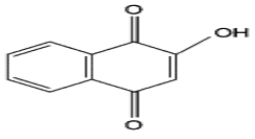
Whoever may bonk was for certain sure for achievement, quinine, a treatment for protozoal infection, was extraordinarily rare in nature, attractive a hefty worth with demand from the far-flung colonies. Perkin had taken to the work with vigor, impressing his teacher. fortuitously, Hofmann trusty his young assistant enough to figure on the project in his absence – the sector of chemistry was solely in its infancy, associated an gumptious intelligent assistant was a blessing and an excellent quality. This day, Perkin was experimenting with the substances derived from coal-tar, a harmful industrial waste made once burning coal and coke. Being within the throws of the economic revolution, finding some type of use for this poisonous residue was a possible gold mine.

Perkin had already completed one experiment employing a element of pitch, the poisonous methylbenzene. He'd isolated a spinoff, referred to as allyl-toluidine, then tried to remodel it into antimalarial by oxidizing it in an exceedingly mixture of acids. This take a look at led to failure, forgoing a reddish-black powder at very cheap of his tube. composed, he continuing, this point with another substance. Failure, after all, was merely another piece to the puzzle. The additional he unsuccessful, the clearer, he hoped, the image would become. This time he selected a less complicated compound, amine – associate oily liquid once more synthesized from pitch. It had the looks of oil however sadly smelt powerfully of rotten fish. However, his initial discomfort at the smell was quickly overtaken by his curiosity, and almost immediately the odor was solely his neighbor's drawback.

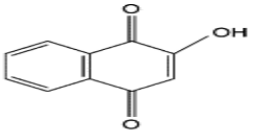
Once again, he mixed the substance with identical acids, and like before the experiment unsuccessful. This time, however, a black, muck was at very cheap of the tube. Marking that one off the list, Perkin affected to the sink and started to clean out the tube. Then he saw one thing terribly fascinating. on the facet of the glass, remained a bright purple residue. the colour was extraordinarily deep and vivid, and it clung to the glass mulishly. Fascinated, Perkin treated his new substance with alcohol and dabbed it with a fabric – the vivid purple transferred to the fabric absolutely. William Perkin had accidentally discovered the primary artificial dye, in purple no less. when additional experiments proving the dye's benefit, he filed for a patent in August eighteen56 at solely 18 years recent. gratuitous to mention, this discovery revolutionized cloth colouring and created Perkin an expensive man – conveyance bright colours to men and girls the globe over, at a fraction of their previous price.

Natural Dyes:

Applying a color pattern to a fabric is the most common technique. It is known as overprinting if it's done on colored cloth. Pressing dye on the fabric in a paste form produces the desired pattern. A thickening agent is applied to a small amount of water to prepare the print paste and dye is dissolved in it. As a thickening agent for printing, early starch was favored. Gums or alginates derived from marine algae are now favored because they allow greater color penetration and are easier to wash out. Since the combination of resins, solvents and water still causes thickening, most pigment printing is achieved without thickeners.



Juglone



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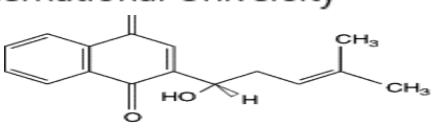
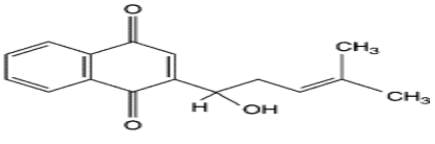
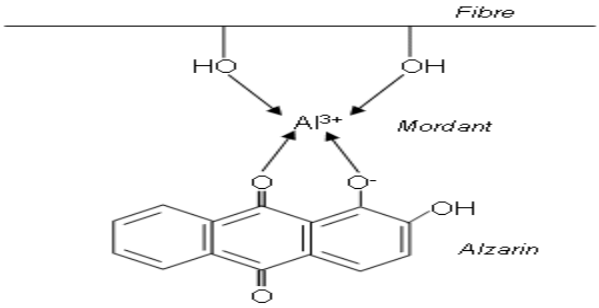




Synthetic Dyes:

Based on their chemical composition and the method of their application in the dyeing process, synthetic dyes are graded.

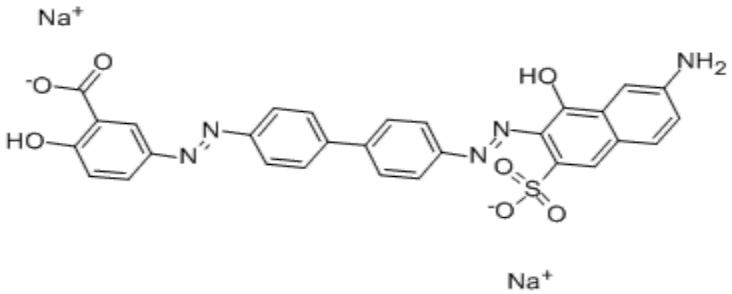


Basic (Cationic) Dyes:

Basic (Cationic) Dyes ar soluble and are chiefly want to dye acrylic fibers. they're principally used with a mordant. A mordant may be a agent that is employed to line dyes on materials by forming associate degree insoluble compound with the dye. With mordant, basic dyes ar used for cotton, linen, acetate, nylon, polyesters, acrylics and mod acrylics. apart from acrylic, basic dyes aren't terribly appropriate for the other fiber as they're not quick to lightweight, laundry or perspiration. Thus, they're typically used for giving associate degree when treatment to the materials that have already been artificial with acid dyes.

Direct (substantive) Dyes:

Direct (substantive) Dyes color polyose fibers directly while not the employment of mordents. they're used for colouring wool, silk, nylon, cotton, rayon etc. These dyes aren't terribly bright and have poor quickness to laundry though they're fairly fast to lightweight.



Mordant Dyes:

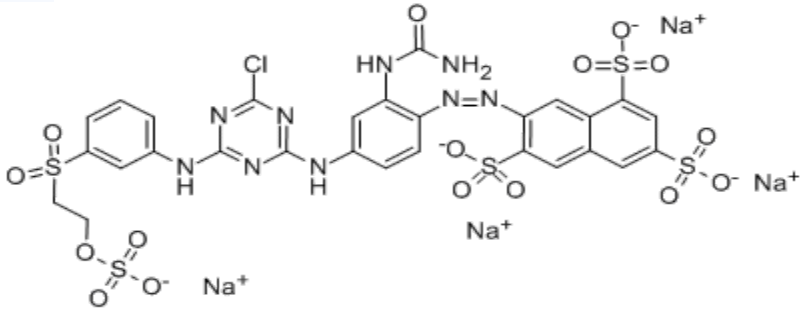
The mordant or chrome dyes are acidic in character. metallic element or K dichromate is employed with them within the dyebath or when the method of colouring is completed. this is often finished obtaining the binding action of the chrome. they're principally used for wool that gets a decent color fastness when treatment with mordant dyes. they're additionally used for cotton, linen, silk, material and nylon however are less effective for them.

Vat Dyes:

Vat dyes are insoluble in water and can't dye fibers directly. However, they'll be created soluble by reduction in alkaline resolution that permits them to affix to the textile fibers. succeeding oxidization or exposure to air restore the dye to its insoluble type. Indigo is that the original dyestuff. These dyes are the quickest dyes for cotton, linen and material. they're used with mordents to dye different materials like wool, nylon, polyesters, acrylics and mod acrylics.

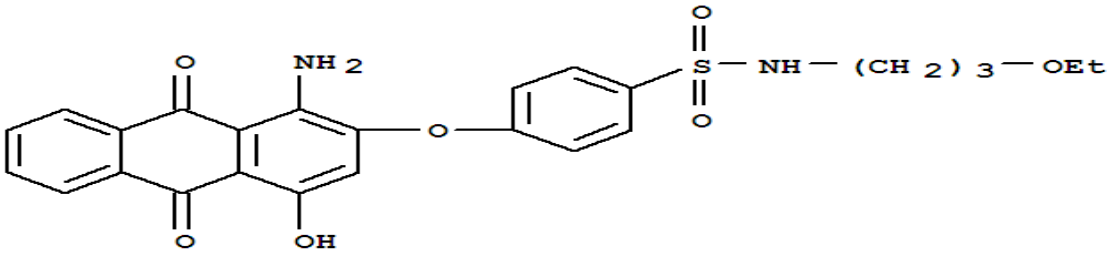
Reactive Dyes:

Reactive dyes react with fiber molecules to make a compound. These dyes, either applied from alkaline resolution or from neutral solutions that are then alkalized during a separate method. generally, heat treatment is additionally used for developing totally different shades. when colouring, the material is washed well with those so on take away any unfixed dye. Reactive dyes were originally used for polyose fibers solely however currently their varied varieties are used for wool, silk, nylon, acrylics and their blends additionally.



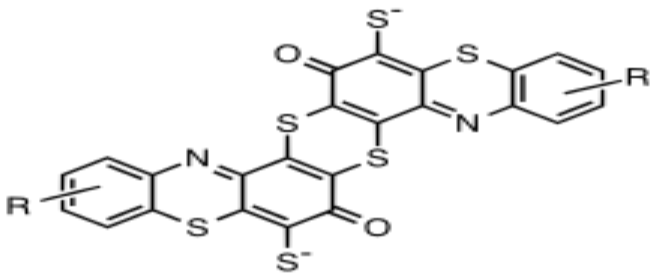
Disperse Dyes:

Disperse dyes are water insoluble. These dyes are finely ground and are offered as a paste or a powder that gets distributed in water. These particles dissolve within the fibers and impart color to them. These dyes were originally developed for the colouring of cellulose ester however currently they're wont to dye nylon, cellulose acetate, and acrylic fibers too.



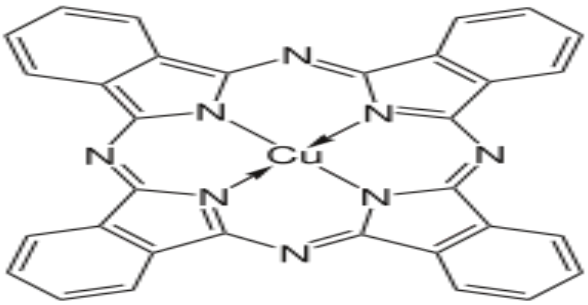
Sulfur Dyes:

Sulfur Dyes are insoluble and created soluble by the assistance of sodium hydroxide and metallic element sulphide. colouring is finished at warmth with giant quantities of salt in order that the color penetrates into the fiber. when colouring the material is altering for obtaining desired shades by exposure to air or by mistreatment chemicals. Excess dyes and chemicals are removed by thorough laundry. These dyes are quick to lightweight, laundry and perspiration and are principally used for cotton and linen.



Pigment Dyes:

Although pigments aren't dyes during a true sense, they're extensively used for coloring materials like cotton, wool and different manmade fibers because of their glorious lightweight fastness not have any affinity to the fibers and are appendant to the material with the assistance of resins. when colouring, the materials ar subjected to high temperatures.



Ready to Dye?

Equipment's:

· Non-reactive large kettle (stainless or enamel)

· The Scales (for weighing ounces and pounds)

· Spoons Estimation

· Gloves with rubber

· Glass jars with lids Pails from plastic (like laundry detergent comes in) Thermometer of · (candy or scientific variety)

· Wooden dowels or glass stirring rods

· Drying hangers or clothesline

· Colander or Strainer (non-reactive) Tea bags, cheese cloth, bags of muslin, old hosiery nylon

· Source of heat (stove or hot plate)

· The tags (old milk jugs make good ones)

· Continuous Marker

Fibers:

· Raw wool yarn (undyed & unbleached)

· 100 percent cotton muslin unbleached

· 100% floss or yarn embroidery cotton

· Yarn or silk cloth.

Chapter-Three

Methodology

What are Reactive Dyes?

Reactive dye is a dye class that gives the fiber a covalent bond and becomes an integral part of the fiber. These are commonly used to dye cellulosic fibers such as cotton, rayon, or flax, but reactive dyes may also be used to dye polyamide, wool, silk, and acetate fibers. Since this is the only form of dye with a reactive group, reactive dyes are so-called. To form covalent bonds, this group interacts chemically with the fiber polymer molecules. This covalent bond is formed between the reactive group and the cellulosic fiber terminal-OH group and the polyamide and wool fiber terminal-NH2 group.

Some trade names of Reactive dyes:

Brand Name	Manufacturer	Company
Remazol	Hoecht	Germany
Levafix	Beyer	Germany
Reactone	Geigy	switzerland
Primazin	BASF	Germany

In this analysis, In order to dye cotton fabric (Single jersey, Fleece, Teri) comprised of GSM 160, 180, 200, 220 we have used Remazol RR red, yellow, blue & Synazol ks red, yellow & blue color.

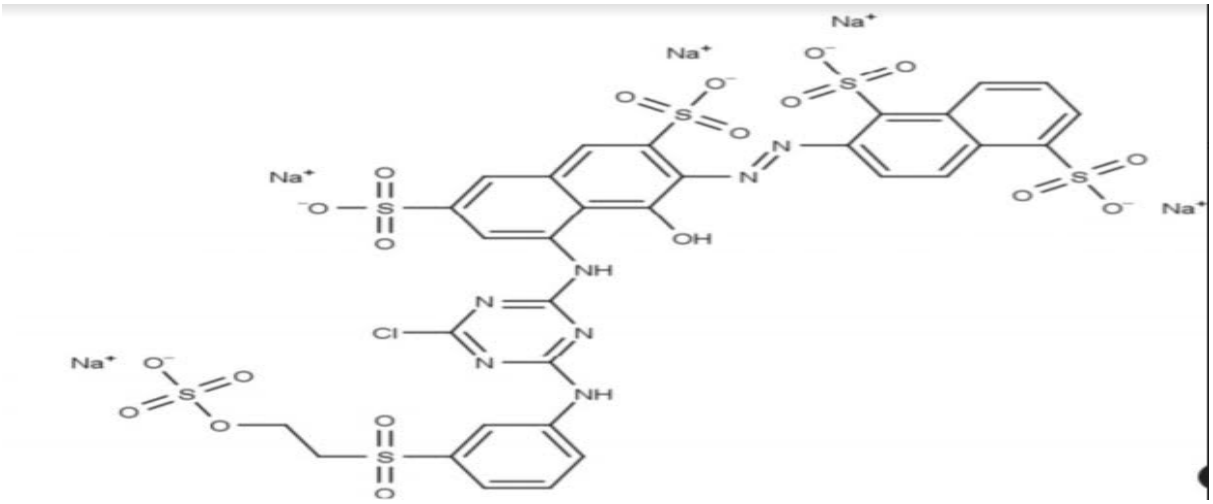


Fig: Remazol RR Red

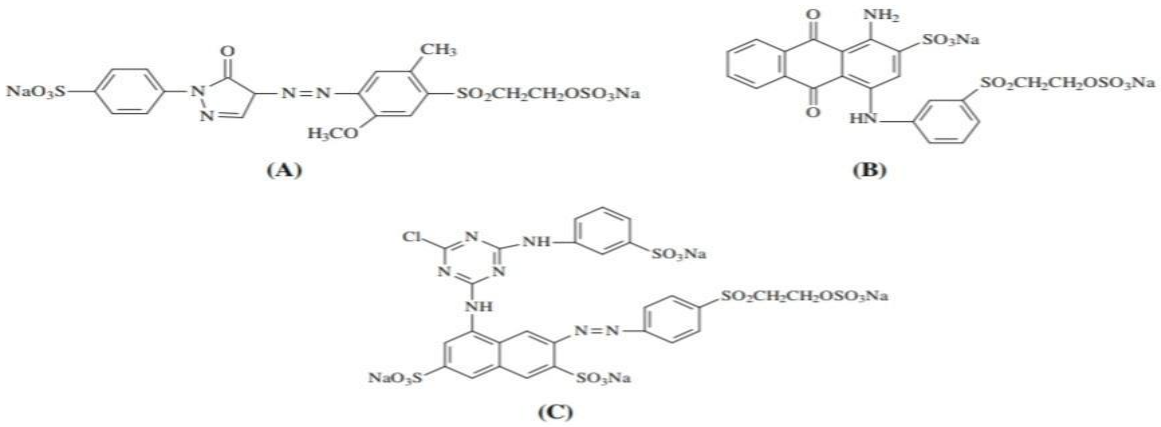


Fig: (A) Synazol KS Red, (B) Yellow, (C) Blue

Classification of Reactive Dyes:

01.On the basis of reactive group-

Halogen

- Triazine group: procion, cibacron
- pyrimidine group: reactone
- Quinoxaline group: Levafix

Activated vinyl compound:

- Vinyl sulphone: Remazol
- Vinyl acrylamide: primazine
- Vinyl sulphonamide: leva

02.On the basis of reactivity-

- Lower reactive dye: here pH is maintained 12-12.5 using NaOH in bath
- Medium reactive dye: pH is maintained 11-12 by Na_2CO_3
- Higher reactive dye: pH is maintained 10-11 using $NaHCO_3$

03.On the basis of dyeing temperature

Cold Brand Reactive Dyes

These kinds of dyes include high-reactivity reactive groups. In lower temperatures, i.e. 32-60 ° C, dyeing can be achieved. PROCION M, LIVAFIX E, for instance.

Medium Brand Reactive Dyes

Reactive groups with mild reactivity are included in this type of dye. Dyeing is also performed at higher temperatures, i.e. between 60-71 ° C temperatures, than that of cold brand dyes. Remazol and Livafix, for instance, are medium brand dyes.

Hot Brand Reactive Dyes

Reactive groups with least reactivity are included in this type of dye. High temperature is therefore needed for dyeing, i.e. for dyeing, 72-93 ° C temperature is required. Hot brand dyes are, for instance, PROCION H, CIBACRON.

Dyeing Mechanism of Reactive Dyes

- Exhaustion of dye in the presence of absorption of electrolytes or dye.
- Fixation of alkali under the influence.
- Washing-off of unfixed dye from the surface of the material.

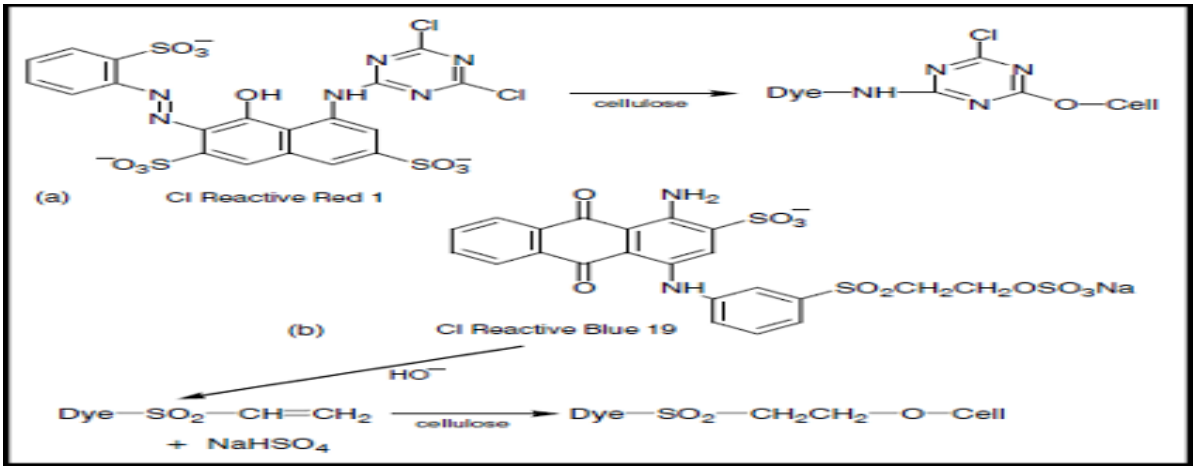
Absorption of Reactive Dyes:

An electrolyte is added to aid the exhaustion of dye when fiber is soaked in dye liquor. NaCl is used here as an electrolyte. This electrolyte neutralizes and assists the absorption of cotton. So, the dye is exhausted on to the fiber when the textile content is added to dye liquor.

Fixation of Reactive Dyes:

Dye fixation means the reaction of the reactive dye group to the fiber terminal-OH or-NH2 group and thus establishes a tight covalent bond with the fiber. This is an essential stage that is regulated by adding alkali to maintain proper pH. The alkali used in the dye bath produces proper pH and acts as the dye-fixing agent.

The reactions that take place in this stage are shown below:



Wash-Off of Reactive Dyes:

A good wash must be applied to the material after the dyeing is done, to remove extra and unfixed dyes from the surface of the material. For level dyeing and good wash-fastness, this is needed. A sequence of hot washing, cold washing and soap solution washing are performed.

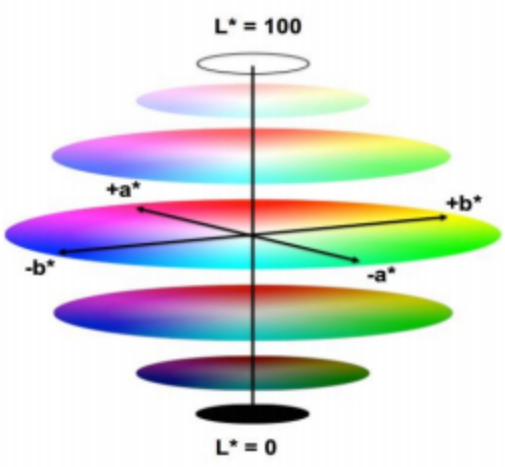
CIELAB Color Theory:

In 1931, the international standards body based in Vienna, the International Standards Body, Commission on Illumination (CIE: International d'Eclairage Commission), A mathematical model was developed to numerically represent all colors in order to The CIE XYZ Color Space is apparent to the human eye. The basis for CIE XYZ was for the calculation of many successive, more refined colorimetric systems and color requirements. Systems include CIE LUV, in addition to CIE XYZ, (L*u*v*), (L*a*b*) CIE LAB, and (L*C*h°) CIE LCH. Color as opposed to RGB and CMYK Models are unambiguous, with color descriptions characterized by CIE systems, Absolute and device-independent, i.e., not associated with, affected by, or dependent on, the features or capabilities of any system for color capture or rendering.

Published by the International Illumination Commission in 1976, CIELAB the method has become the widely recognized reference colorimetric scheme for Color Quantification and Contact. The reference color model used, CIELAB, is Via the industries of paper making and graphic art. CIELAB forms the basis of Color management and is usually the link space for ICC profile used for Mapping of the gamut. The basic CIELAB architecture and operating premise is Centered on scientific theory showing that retinal color is translated by the brain Stimulating the variations between light and dark (lightness) Red/green, and blue/yellow: and between mutually exclusive areas of opposing colors. Since a color should not be red and green or yellow and blue, we call this the "color opposition correlation principle". Have they ever seen a greenish red?

The CIELAB color model:

L* = Lightness (also referred to as luminance); the lightness or darkness of a color a* = red to green (+a = redder, -a = greener) b* = yellow to blue (+b = yellower, -b = bluer) Where the two “color” axes intersect = neutral gray



Chapter- Four

Experimental Details

Materials & Method:

100 per cent cotton knitted single jersey scoured-bleached for this study, fabrics were used, gathered from Bangladesh-based Magpie Knit Composite Textile Ltd. Density of the areal (GSM) was 160,180,200, 220 for the fabrics. The specimens are dyed with Remazol RR Red, Yellow, Blue and also dyed with Synazol KS Red, Yellow, Blue. The overall absorbance of the dye (λmax) at 430 nm and 550 nm, followed by the dyeing formula for the specifications.

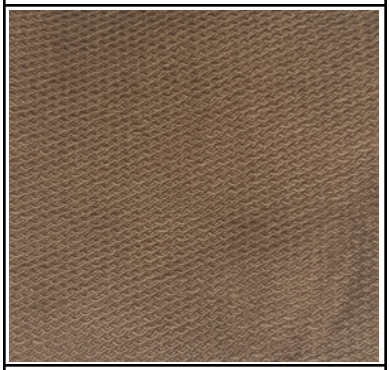
"Recipe of Reactive Dyeing"

Sample S/L No	Fabric Type	M: L	Dye % (Synazol)			Dye % (Remazol)			Glauber Salt	Soda
			Red	Yellow	Blue	Red	Yellow	Blue		
01	S/J	1:6	0.236	1.72	0.23				60	16
02	S/J	1:6				0.83	1.38	0.90	60	16
03	S/J	1:6				0.52	1.20	2.30	70	20
04	S/J	1:6	3.60	1.40	0.12				80	20
05	TERRY	1:6				0.0054	0.032	0.0124	20	05
06	TERRY	1:6	0.35	1.62	1.34				50	14
07	TERRY	1:6	0.024	1.66	0.34				50	14
08	S/J	1:6	0.26	0.96	0.28				35	10
09	S/J	1:6				0.92	0.50	3.00	13	11
10	S/J	1:6				0.002	1.24	1.64	50	12
11	S/J	1:6				0.782	0.5	0.66	40	12
12	S/J	1:6				0.04	0.12	0.106	25	06

Time= 60 Min & Temperature= 60°C

Figure of Dyed Sample

Sample-01

Orange
Sample-02

Brown
Sample-03

Navy

Sample-04

Red

Sample-05

Beige

Sample-06

Military

Figure of Dyed Sample

Sample-07

Olive

Sample-08

Camillo

Sample-09

Navy PK

Sample-10

Green

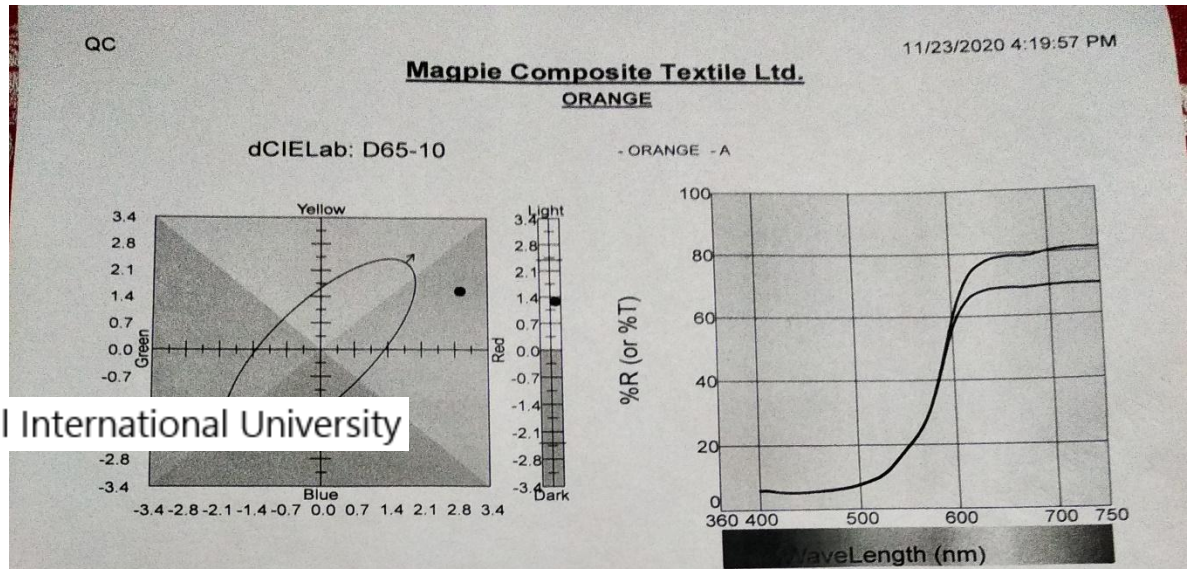
Sample-11


Grey
Sample-12

Grigio

Color space & wave length figure of dyed sample:

01.



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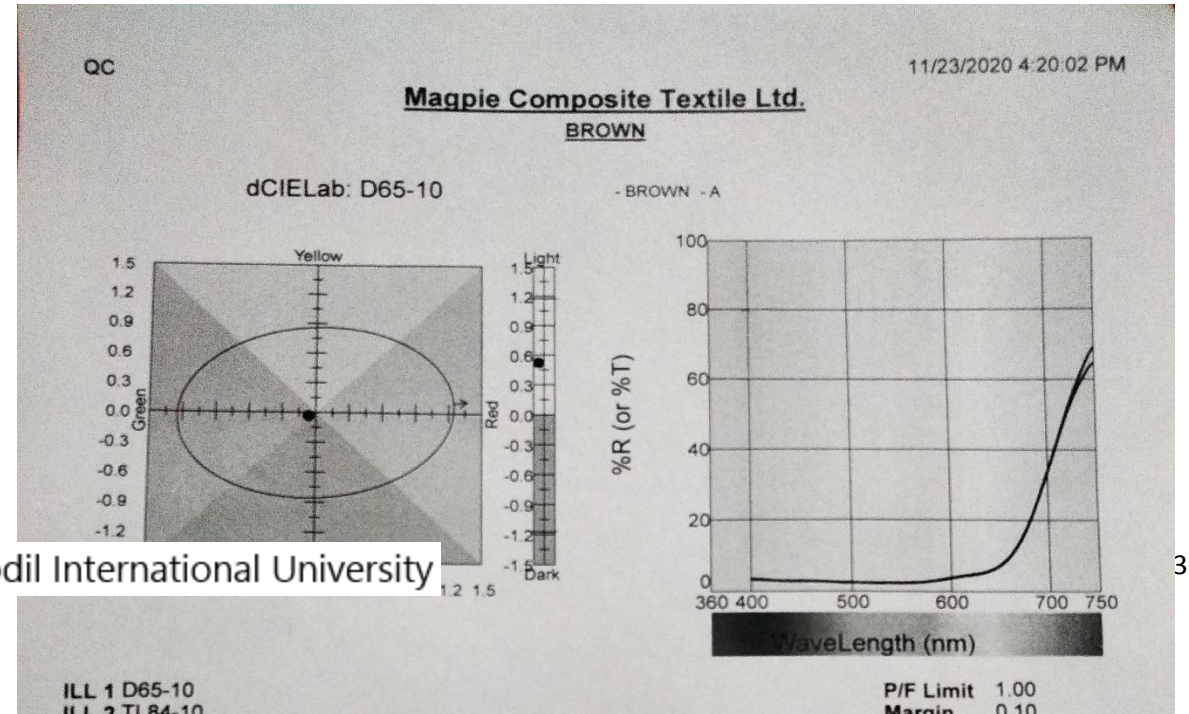
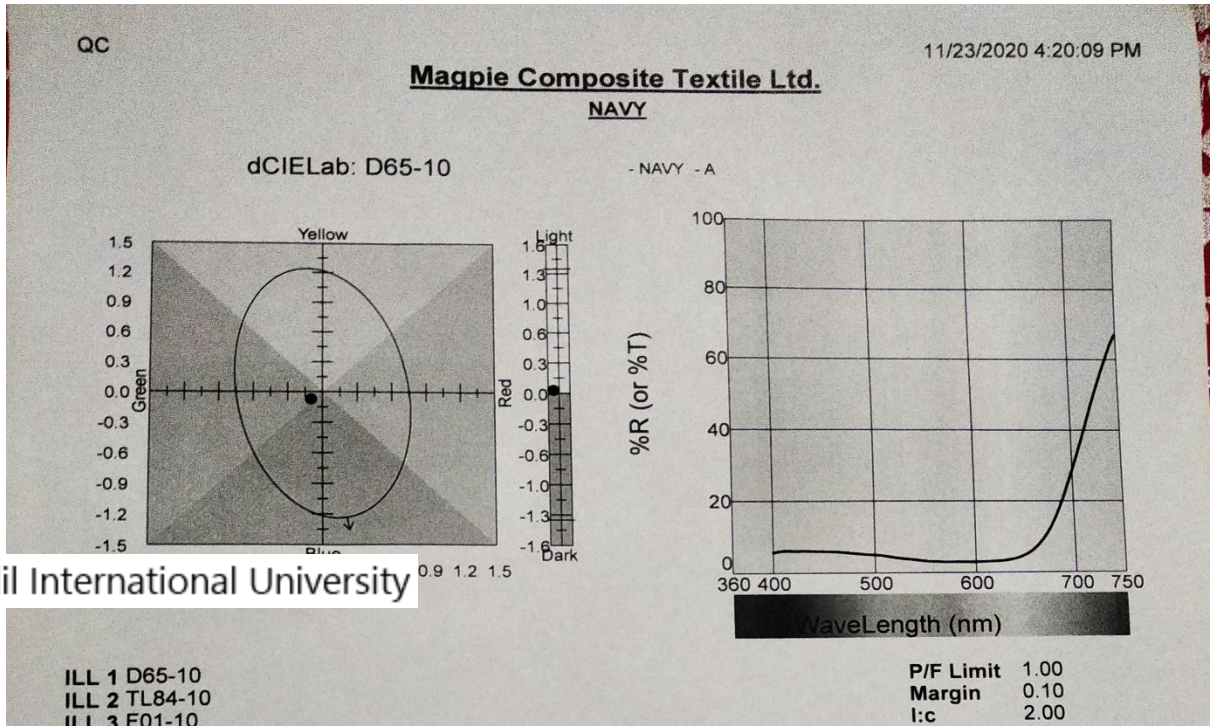

QC
11/23/2020 4:20:02 PM
Magpie Composite Textile Ltd.
BROWN
dCIELab: D65-10
- BROWN - A
Yellow
Green
Red
Light
Dark
%R (or %T)
WaveLength (nm)
ILL 1 D65-10
P/F Limit 1.00

03.



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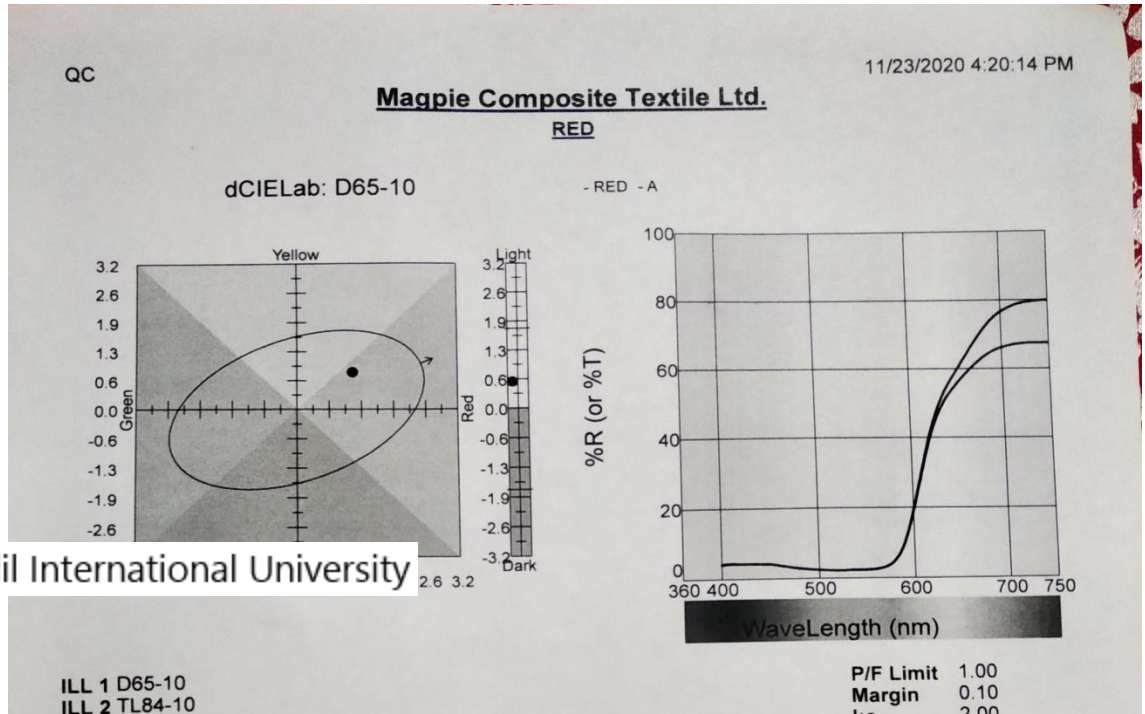
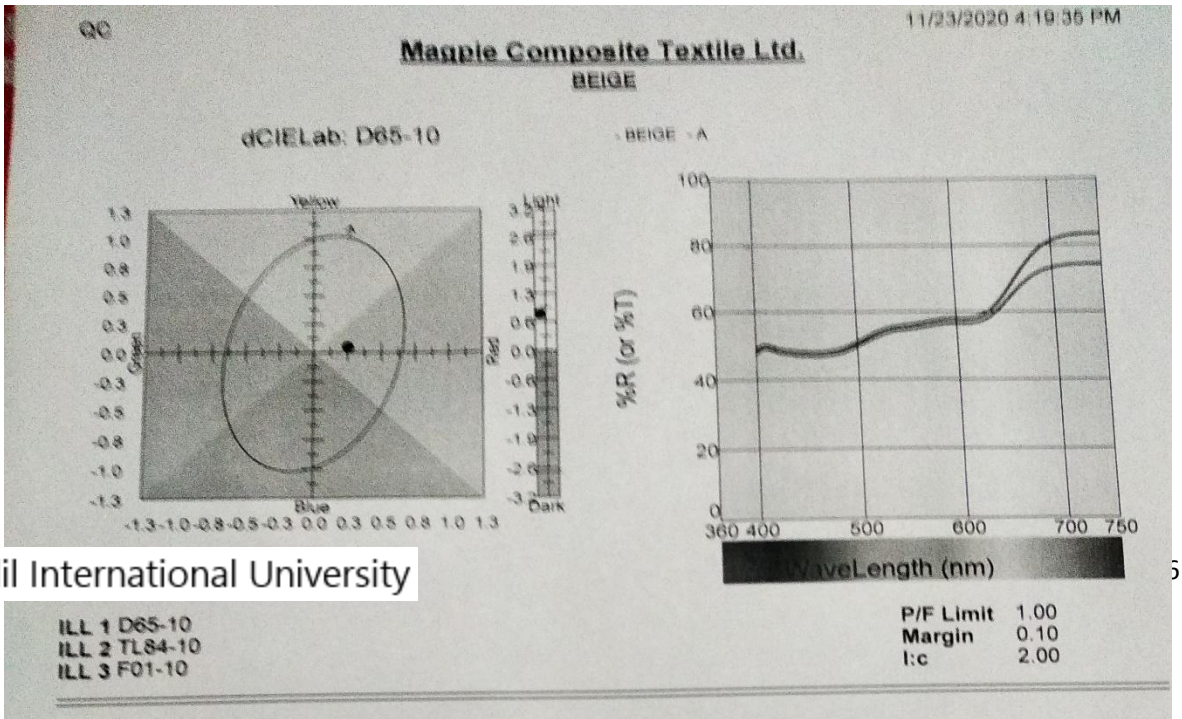

QC
11/23/2020 4:20:14 PM
Magpie Composite Textile Ltd.
RED
dCIELab: D65-10
- RED - A
Yellow
Green
Red
Light
Dark
%R (or %T)
WaveLength (nm)
ILL 1 D65-10
ILL 2 TL84-10
P/F Limit 1.00
Margin 0.10

05.



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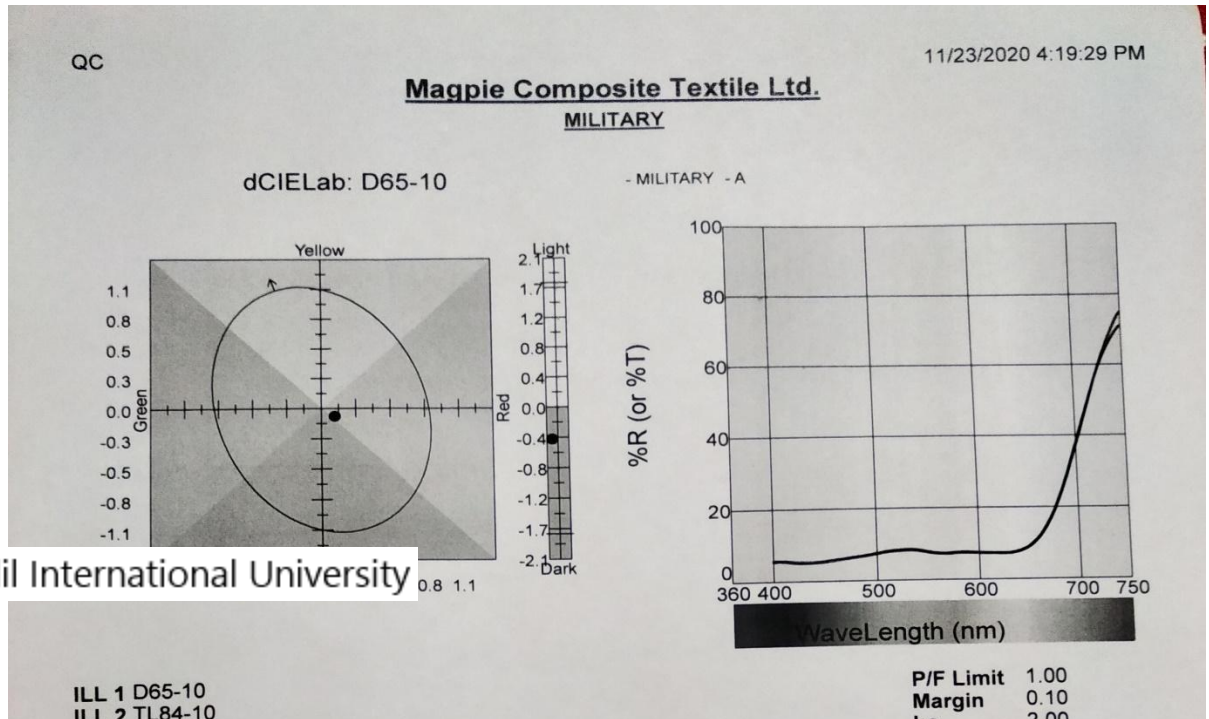

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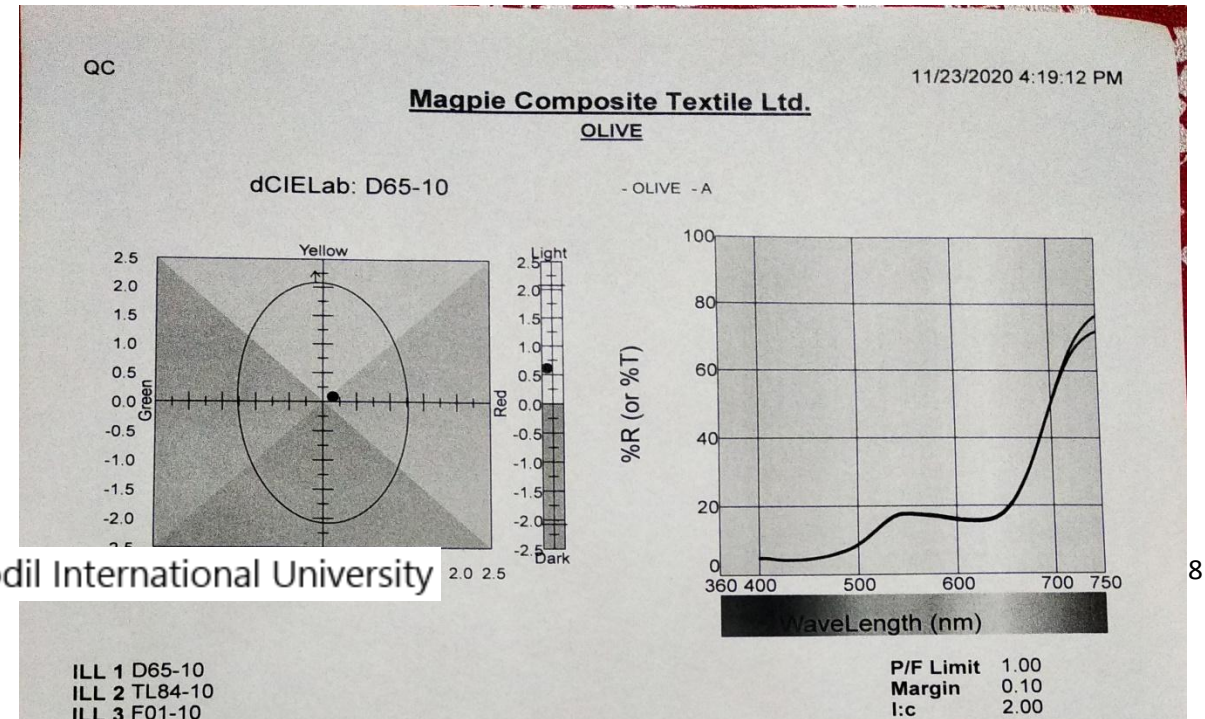

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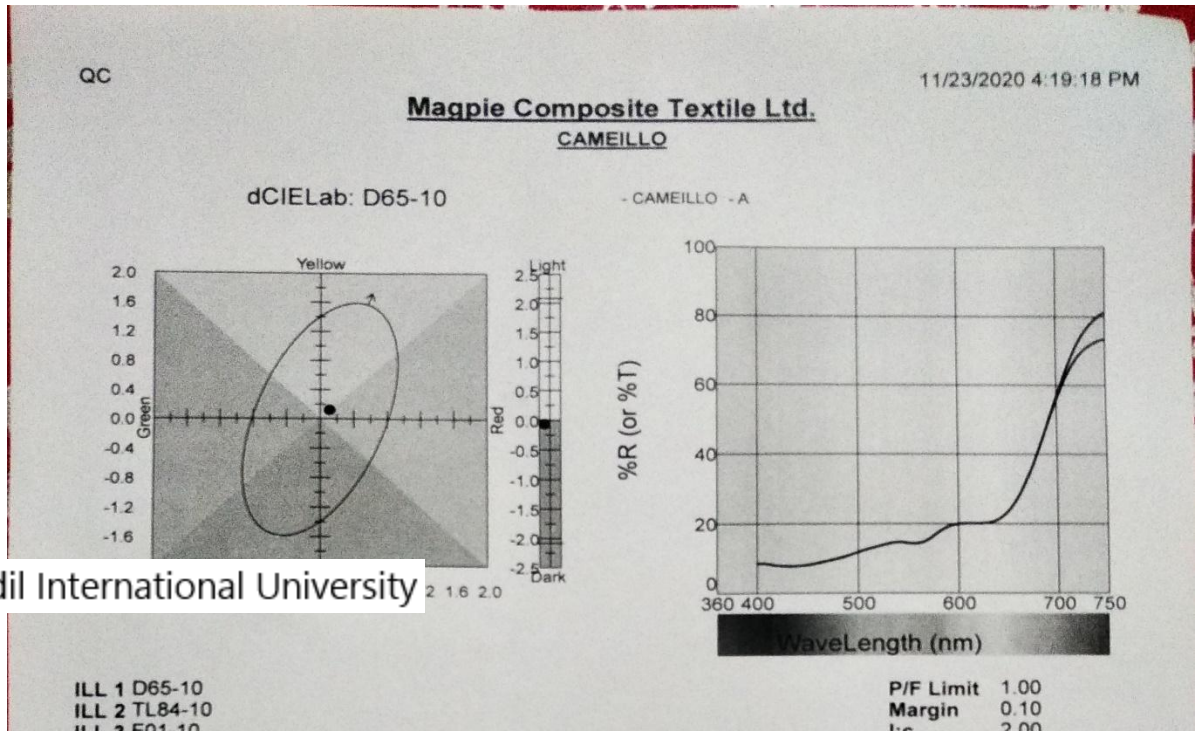

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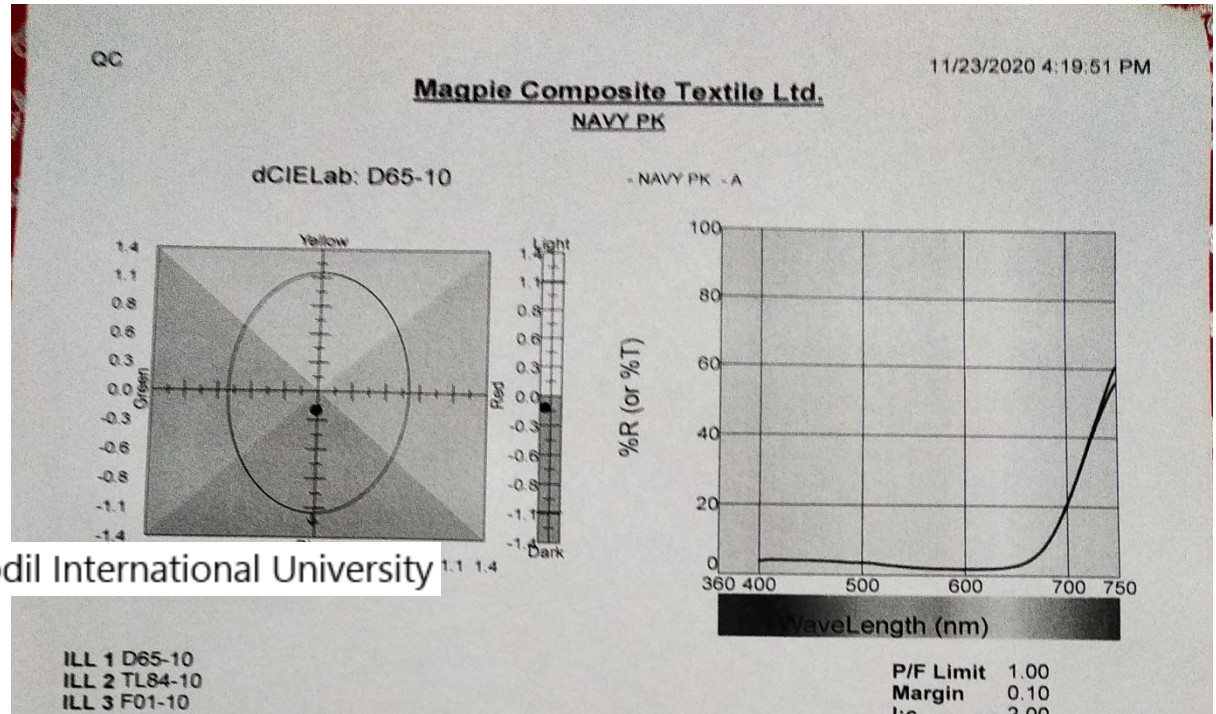

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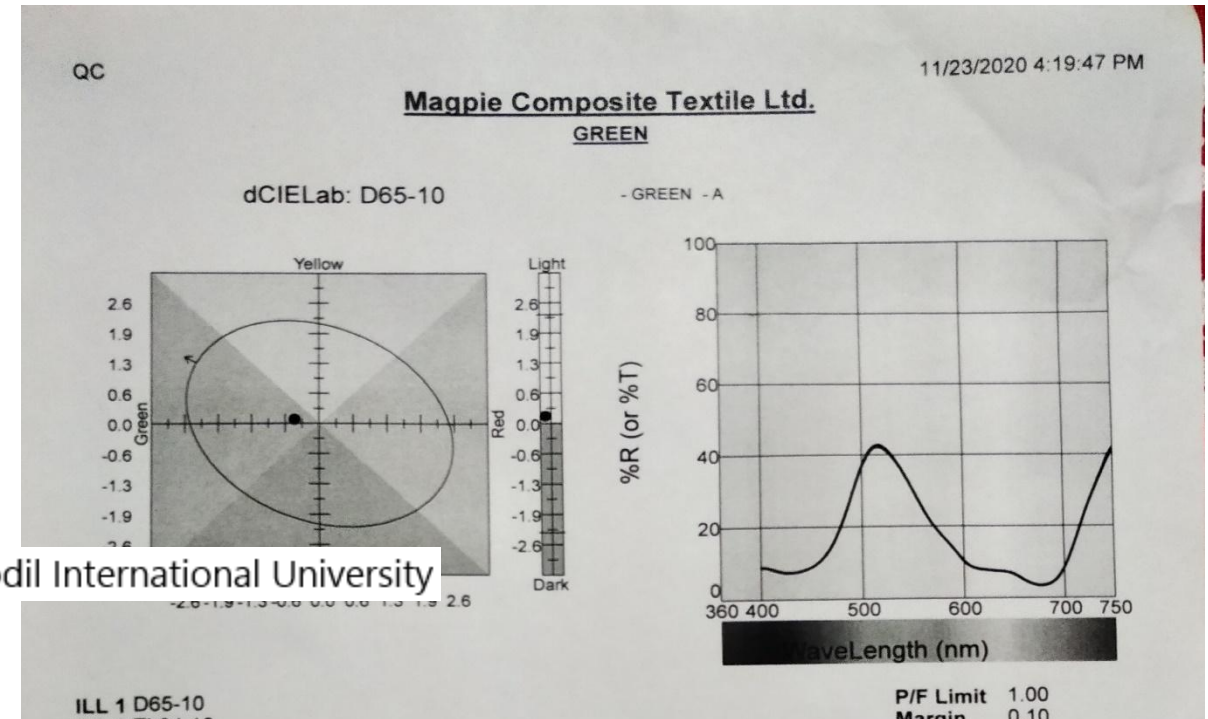

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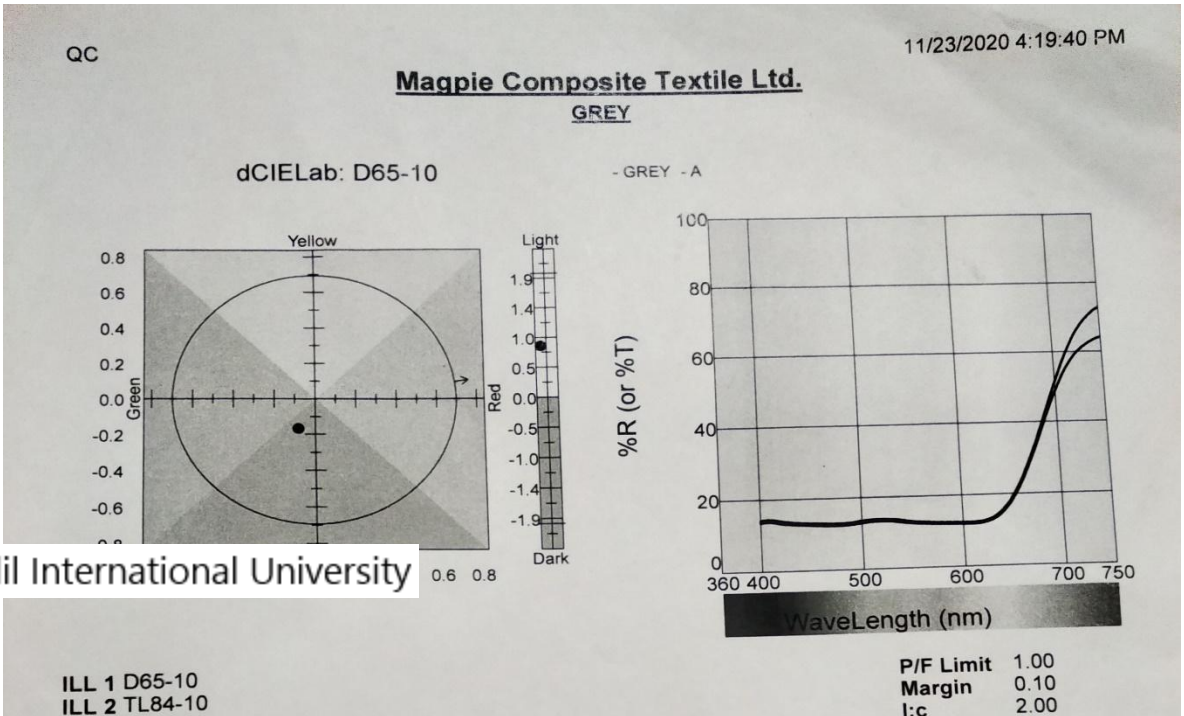

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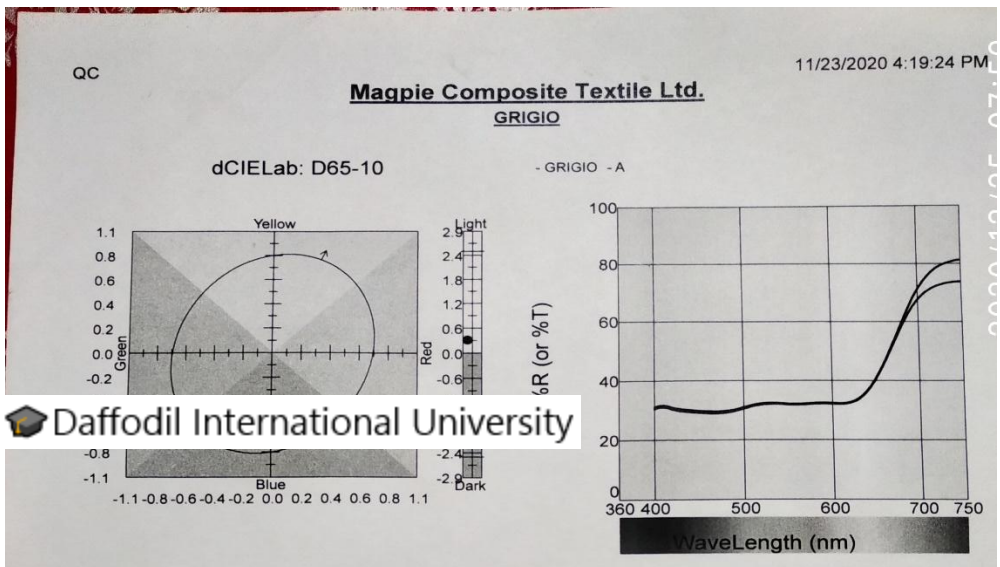


Chapter-Five

Result & Discussion

Sample Analysis:

The dyed samples were analyzed by Data color 650 (reflectance spectrophotometer) after the completion of the dyeing process. For sample analysis, 120 GSM fabric was taken as normal in all cases, i.e., 0.5%, 1 percent and 2 percent, and we compared the color space values with respect to such fabric for each dye concentration and illuminant. All the tests were performed in D65, A and TL84 as regular illuminants for calculating the color coordinates (Hue, Lightness and Saturation).

Results & Discussion:

Influence of Associated temperature of color of Illuminant on CIELAB color spaces

Each illuminant has a particular color associated with it. Temperature. Temperature Value of color spaces for CIELAB Significantly altered by viewing under various Enlightening (light source). The lightness (DL*) and the lightness of Hue (DH*) values have been specifically impacted by illuminant values. In the appendix, the results obtained were reported (Tables I), where it was seen that the values of lightness were for higher correlated colors, they were significantly greater. Illuminant temperature while the contrary color is shown by hue Outcomes. It can be identified clearly as the illuminant, D655 the overall CCT (6500K) is greater than illuminant, A(CCTT) 2856K) and a TL833 illuminant (CCT 3000K). For all cases, the color space indicator DL* value was higher at D65, i.e., for all dye concentrations compared to illuminant, A and illuminant, TL83 but DH* decreases with the associated color temperature increase of the illuminant. The color space hue, DH* became smaller than other illuminants at full CCT (D65) (A and TL83). Saturation (DC*) indicated that the effect of the illuminant was not in a normal manner, i.e., saturation was often higher in D65, but not always in all circumstances.

Figures 3 and 4 show that at greater CCT (illuminant D65) than illuminant, A and TL84, the lightness, DL* was maximum, which means that the fabrics in D65 were darker. When fabric GSM is also higher, the darkness is also greater. Hue, on the other hand, decreased with higher CCT with DH*. Da*(positive values indicate redness and negative values indicate greenness) and Db* can be represented by Hue, DH* (yellowness and blueness). The fabric became more red in all circumstances at D65 and maximum yellowness at Lower CCT (illuminant, A).

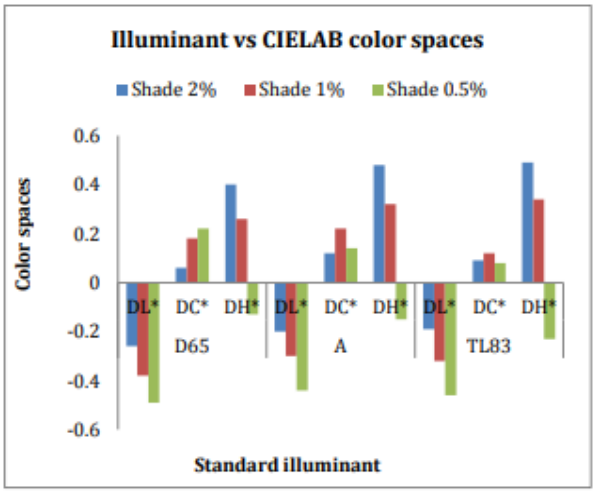


Fig. 3 CIELAB color spaces influenced by illuminants fabric GSM 160

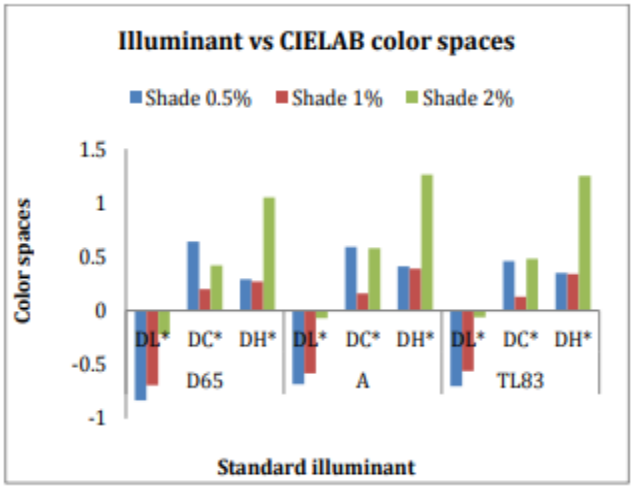
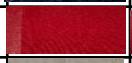


Fig.4 CIELAB color spaces influenced by illuminants fabric GSM 180

For unique GSM, CIELAB color spaces lightness, DL* was almost identical in all situations, but these values were decreased as the concentration of colorant increased. Maximum dye saturation in the case of higher GSM was observed at a lower concentration. The analysis shows that when fabric dyed with Remazol Yellow RR, the shade became more red more yellow at lower dye concentration than higher one as well as higher GSM.

Fastness to Wash Property of Dyed Fabric:

No of Sample	Color	Before wash	After wash	Multifiber Fabric					
				Ac	CO	NY	Po	ACR	Wool
01	Orange			4/5	4	3/4	4/5	4/5	4/5
02	Brown			4/5	2/3	3	4	4/5	4/5
03	Navy			4/5	4/5	3/4	4/5	4/5	4/5
04	Red			4	3	3/4	4	4/5	4/5
05	Beige			4/5	4/5	3/4	4	4/5	4/5
06	Military			4/5	3		4/5	4/5	4/5
07	Olive			4/5	3	3		4/5	4/5
08	Camillo			4/5	4	3/4	4	4/5	4/5
09	Navy Pk			4/5	4/5	4	4/5	4/5	4/5
10	Green			4/5	2	3	3/4	4/5	4/5
11	Grey			4/5	4/5	3/4	4	4/5	4/5
12	Grigio			4	4/5	3/4	4	4/5	4/5

Chapter- Six

Conclusion

Conclusion:

The collective response of three cells of the cone (response Peaking at wavelengths of 440nm, 555nm and 585nm For Blue, Green and Red respectively, i.e., combinations of Wavelength sensitivity) offers the opportunity to Luminosity and color differentiate. Color is nothing more than a color, Visual perception function that relies on the spectral A composition of the radiant energy observed. Color Achieved as a distinguishing feature of a surface, but its Feelings differ from observer to observer, illuminating to be lit. The findings of our inquiry allow us to say that the color spaces of the CIELAB ominously Influenced by dye and illuminant concentration. By viewing under different illuminants and dyeing at different concentrations, the transition in color spaces reveals major variations. As the associated color temperature varies from illuminant to illuminant, the findings suggest that at higher CCT (D65) and shade depth, dyed fabrics appear darker. There may be a higher concentration due to more dye uptake and thus less reflection, which also explains more dye absorption at higher GSM.

References:

- All the information is gathered from the manufacturing plant (Magpie Knit Composite Textile Ltd.)
- Lecture Sheet.
- Web: http:///textilelearner.blogspot.com.
- Md. Rahman, A.K.M. A.H. Asif, Md. A.B Siddique, Md. Rokonuzzaman (2014), effect of shade percentage on various properties of cotton knitted fabric dyed with reactive dyes, International Journal of Research in Engineering and Technology, Vol3(2), 339-343.