4.1 DYESTUFF CHEMISTRY

L	T	P
3	-	2

RATIONALE

It is essential for a diploma holder in textile processing to have knowledge regarding chemistry of synthetic dyes, classification of dyes and synthesis of selected dyestuffs. Hence this subject.

DETAILED CONTENTS

1.	Introduction to the chemistry of synthetic dyes.	(3 hrs)
2.	Classification of dyes from chemical point of view.	(4 hrs)
3.	Coal tar distillation and products related to synthesis of dyes.	(4 hrs)
4.	Intermediate processes – sulphonation, nitration, halogenations and amination.	(10 hrs)
5.	Colour and chemical constitutions (Witts Theory)	(4 hrs)
6.	Various forces responsible for dyestuff applications.	(2 hrs)
7.	Diazotisation and coupling.	(3 hrs)
8.	Acid – Bon acid, chicago acid, knoch acid, H-acid, tobias acid, K-acid, M-acid, gamma acid.	(6 hrs)
9.	Discussion on the chemistry of different classes (Reactive, Sulphur, Vat, Disperse) used for dyeing of textiles	(6 hrs)
10.	Identification/ Testing of various dyes on textile materials or in powder form	(6 hrs)

LIST OF PRACTICALS

1. Testing of direct dyes in powder/paste form and on dyed yarn/fabric/blends.
2. Testing of basic/modified basic dyes in powder/paste form and on dyed yarn/fabric/blends.
3. Testing of vat dyes in powder/paste form and on dyes yarn/fabric/blends.
4. Testing of acid dyes in powder/paste form and on dyed yarn/fabric/blends.
5. Testing of metal complex dyes in powder/paste form and on dyed yarn/fabric/blends.

6. Testing of disperse dyes in powder/paste form and on dyed yarn/fabric/blends.
7. Testing of reactive dyes in powder/paste form and on dyed yarn/fabric/blends.
8. Testing of sulpher dyes in powder/paste form and on dyed yarn/fabric/blends.

INSTRUCTIONAL STRATEGY

Teacher is required to discuss the basics of colourants and their application in context with textile process industry.

RECOMMENDED BOOKS

1. Dyes and their Intermediates by Abrahart.
2. Dyes and their Intermediates by Chatwal.
3. Introduction to the Chemistry of Dyestuffs by V.A. Shenai, Sevak Publishers, Mumbai.
4. Dyeing and Chemical Technology of Fibrous material by E.R Trotman; B.I. Publishers, New Delhi.
5. Dyes and Dyeing by Charles E. Pellow; Abhishek Publishers, Chandigarh.
6. Dye and their intermediates by Abrahart.
7. Fundamental Processes of Dye Chemistry by Fierz-David.

SUGGESTED DISTRIBUTION OF MARKS

Sr. No	Time Allotted (hrs)	Marks Allocation (%)
1	3	6
2	4	8
3	4	8
4	10	22
5	4	8
6	2	4
7	3	6
8	6	12
9	6	12
10	6	14
Total	**48**	**100**

4.2 TECHNOLOGY OF BLEACHING-II

L	T	P
3	-	3

RATIONALE

To effectively supervise the processing of textile in bleaching section, a diploma holder in textile processing must know about principles of bleaching, operations, materials, equipment and processes. Hence this subject. The emphasis, should be made on development of skills in bleaching through practice.

DETAILED CONTENTS

1. Impurities in wool (2 hrs)

2. Carbonising processes for raw wool and woolen fabrics. (2 hrs)

3. Scouring of wool in loose form, yarn scouring & piece scouring (10hrs)
   Methods of scouring-Emulsion & solvent scouring. Machines for scouring raw wool and fabric-description & mechanism.

4. Bleaching of wool with hydrogen peroxide, sodium hydro sulphite and sulfur dioxide (6 hrs)

5. Faults in woolen and worsted goods-listedness, vertical creases, weathering or drifting (2 hrs)

6. Silk- Degumming of raw silk, degumming of raw silk in blends with wool or acetate rayon. (6 hrs)

7. Bleaching of natural silk with hydrogen peroxide, sodium hydro sulphite. (8 hrs)
   Bleaching to tussah silk (wild silk)

8. Bleaching of secondary cellulose acetate. (2 hrs)

9. Scouring and bleaching of man-made fibres-polyester, polyamide, acrylic. (6 hrs)

10. Scouring & bleaching of P/V, polyester/cotton blends (2 hrs)

    Fluorescent Brighteners- methods of application, uses (2 hrs)

11. Preparatory processes for bast fibres-flax, jute, coir, hemp, sisal, ramie (2 hrs)

LIST OF PRACTICALS

1. To degum the given raw silk.
2. To bleach the given sample of silk with hydrogen peroxide.
3. To bleach the given sample of silk with sodium hydro sulphite.
4. To scour the given wool sample (loose form, yarn & fabric).
5. To bleach the given scoured wool sample with hydrogen peroxide.
6. To bleach the given scoured wool sample with sodium hydro sulphite.
7. To scour and bleach given sample of nylon.
8. To scour & bleach given sample of acrylic.
9. To scour & bleach given sample of polyester.
10. To scour & bleach given sample of P/C blend.

INSTRUCTIONAL STRATEGY

Teacher is expected to teach the topics keeping in view the practical/industrial practices. Students may be taken for textile insustry visit to demosnstrate various process of bleaching.

RECOMMENDED BOOKS

1. Technology of bleaching by V.A Shenai; Sevak Publication Bombay.
2. Scouring, Bleaching & Mercerisation by E.R Trotmon, BI Publication, New Delhi.
3. Art of dyeing by B.S. Chauhan.
4. Dyeing & Chemical Technology of Textile Fibre by E.R. Trotman, B.I. Publication, New Delhi.
5. A Glimpse on the chemical technology of textile fibres by R.R. Chakravorty; Caxton Press, New Delhi.
6. Bleaching of linen, cotton yarn and fabrics by Tailfer; Abhishek Publication, Chandigarh.

SUGGESTED DISTRIBUTION OF MARKS

Sr. No	**Time Allotted (hrs)**	**Marks Allocation (%)**
1	2	4
2	2	4
3	10	22
4	6	12
5	2	4
6	6	14
7	8	16
8	2	4
9	6	12
10	2	4
11	2	4
Total	**48**	100

4.3 TECHNOLOGY OF DYEING - II

L	T	P
3	-	3

RATIONALE

A diploma holder in textile processing must have sufficient knowledge and skills about principles of dyeing, operations, materials, equipment and processes. He should be able to execute various recipes for dyeing. Hence this subject.

DETAILED CONTENT

1. Acid dyes- Properties, method of application to wool and silk. (8hrs)

2. Acid mordant and metal complex –. Properties, method of application to wool and silk (10hrs)

3. Basic dyes-Properties, mechanism and method of application to cotton , wool, silk, and jute Dyeing of acrylic with basic dyes, its mechanism , compatibility, saturation limit, saturation factor, compatibility value. (8hrs)

4. Mineral colour – Principles of dyeing and application to cotton. (3hrs)

5. Disperse dyes – Properties, principle and application of disperse dyes to polyamide and polyester. (8hrs)

6. Pthalogen Blue – Alcian blue dyes–Principle, properties and applications on cotton. (4hrs)

7. Pigments – Principles, properties and its applications. (4hrs)

8. Oxidation colours – Prinicpal and mechanism of Aniline Black Dyeing (3hrs)

LIST OF PRACTICALS

1. Dyeing of wool with direct dyes (3 dyes).
2. Dyeing of silk with direct dyes (3 dyes).
3. Dyeing of wool with basic dyes (3 dyes).
4. Dyeing of silk with direct dyes (3 dyes).
5. Dyeing of wool with acid dyes (3 dyes).
6. Dyeing of silk with direct dyes (3 dyes).
7. Dyeing of polyester with disperse dyes (3 dyes).

INSTRUCTIONAL SRATEGY

Teacher is expected to cover the topics keeping in view the industrial approach. They should be taken for industry visit to demonstrate various processes.

RECOMMENDED BOOKS

1. Technology of Dyeing by V.A Shenai; Sevak Publishers, Mumbai.
2. Dyeing and Chemical Technology of Textile Fibres by E.R Trotman; B.I. Publication, New Delhi.
3. A textbook of Dyes by Arora.
4. Printing and Dyeing of Fabrics by James.

SUGGESTED DISTRIBUTION OF MARKS

Sr. No	**Time Allotted (hrs)**	**Marks Allocation (%)**
1	8	16
2	10	20
3	8	18
4	3	6
5	8	16
6	4	8
7	4	8
8	3	8
Total	**48**	100

4.4 TECHNOLOGY OF PRINTING-II

L	T	P
3	-	3

RATIONALE

A diploma holder in Textile processing must have through knowledge about principles & Practices employed for printing. He must be aware of various operations, materials, equipment and processes used for printing. Hence this subject.

DETAILED CONTENTS

1. Direct printing styles on cotton:- (16 hrs)

   Study of Printing by direct style with Direct, Reactive, Vat, Solublised vat, Pigments colours, NaptholColours. Description of Rapidozen and Rapid fast colour Concept of Illuminating colours (Vat, Indigosol, Aniline Black) and their printing along with rapid fast colour Printing with Aniline Black , Pthalo cynine (CPC)& Alcian Blue Dyes.

2. Discharge Printing style on cotton (8 hrs)

   Principles of Discharging, White and coloured discharge printing on direct, Reactive, Vat (Reduction & oxidation Discharge) Napthol & Indigosol dyed cotton fabrics.

3. Resist Style of Printing on Cotton (10 hrs)

   Principles of Resisting, White and coloured Resist Printing under Napthol, Reactive vat, solublised vat, Aniline Black colours, as ground colours. Concept of Khadi Printing, white & coloured Khadi Printings.

4. Special Styles of Printing (8 hrs)

   Study of following special styles of printing with reference to process, materials & equipment used.

   - Dyed style – Tie and Dye or Bandhani Print
   - Batik style of Printing
   - Crimp style or crepon style of printing
   - Burn out style
   - Poly chromatic printing:-
     • Flow form Technique
     • Dye wave Technique

5. Transfer Printing (6 hrs)

Introduction to transfer printing - principle, process, mechanism of dye transfer, conditions required. Flat, continuos and vacuum transfer printing machines Brief study of transfer paper printing methods. Advantages & Disadvantage of Transfer Printing

LIST OF PRACTICALS

1. To print a cotton fabric sample using direct dyes by direct style.
2. To print a cotton fabric sample by hot brand reactive dyes by direct style.
3. To print a cotton fabric sample by cold brand reactive dyes by direct style.
4. To print a cotton fabric sample by pigment colours.
5. To print a cotton fabric sample by Naphthal colour by base printing method.
6. To print a cotton fabric sample by discharge style of printing
7. To print a cotton fabric sample by dye weave techniqe of printing..
8 To print a cotton fabric sample by crimp style of printing
9. To print a cotton fabric sample by Tie and Dye styles.
10. To print a cotton fabric sample by batik style

INSTRUCTIONAL STRATEGY

Topics should be covered keeping in view practical/industrial approach Mill visits may be arranged to show them various aspects of printing.

RECOMMENDED BOOKS

1. Technology of Printing by Dr.V.A. Shanai; Sewak Publication, Mumbai
2. Textile Printing by I.W.C. Miles
3. Textile Printing by Joyci Storey; Thames & Hudson, London
4. The creative guide to fabric screen Printing by Pam and Stall ebras New Holland Publishers Ltd., London
5. Principles of cotton Printing by D.G. Kale ATIRA Ahmedabad
6. The Principles and Practicle of Textile Printing by Knecht, E and Fothergill; J.B. London
7. A guide to printing Techniques by Bast; Japan

SUGGESTED DISTRIBUTION OF MARKS

Sr. No	Time Allotted (hrs)	Marks Allocation (%)
1	16	34
2	8	16
3	10	22
4	8	16
5	6	12
Total	**48**	**100**

4.5 TEXTILE CHEMICAL TESTING

L	T	P
4	-	3

RATIONALE

A diploma holder in Textile Processing is responsible for controlling the quality of finished product. He is also required to supervise chemical testing of textiles. For this purpose, knowledge and skills about various chemical tests carried out in processing need to be imparted to him. Hence this subject.

DETAILED CONTENTS

1. Introduction to textile chemical testing-aim & scope (2 hrs)

2. Quantitative Analysis of Fibres in a Blended Yarn/Fabric (6 hrs)

   Introduction & method of determination of quantitative analysis of following blends: cots wool, Terry wool, Polyster cotton (PC), Polyster Viscose (PV), Acrylic wool (acru wool), Nylon & wool.

3. Discussion on various types of mechanical or chemical damages occurring to textile materials during the preparatory processes. Quantitative estimation of chemical degradation to cotton, wool, & polyester by the following tests with their principles and procedures: (12hrs)

   - Copper Number Test
   - Damage tests for salt and cystine linkages
   - Methylene Blue Test
   - Critical dissolution time
   - Cuprammonium fluidity test.

4. Discussion on tests for assessing the mercerization process - Barium Activity number,Axial Ratio,Deconvolution Count. (4 hrs)

5. Determination of fat and wax content in textile material (2 hrs)

6. Quantitative estimation of Processing chemicals – likes bleaching powder/ Sodium hypochlorite & hydrogen peroxide, acids, alkali, hydrosulphite (8 hrs)

7. Colour fastness Tests (26hrs)

   Introduction and importance of colour fastnes tests Method of evaluation of colour fastness by grey scales, international standards Methods of determination of colour fastness to washing, perspiration, hot pressing, sublimation, rubbing, wet scrubbing, light, sea water. Instruments used in colour fastness testing-laundrometer, perspirometer, crockmeter, exposure rack & light fastness tester .

8. Analysis of fresh water and effluent, (4 hrs)

LIST OF PRACTICALS

1. Identification of blend percentage in following blends:

    - P/C blend
    - P/V Blend
    - P/W/V Blend

2. To evaluate the desizing efficiency

3. To measure scouring loss of a cotton fabric

4. To evaluate wet ability of textile finished fabric.

5. To measure the washing fastness of different dyed sample by different international standard test methods and to grade them.

6. To determine the dry rubbing fastness of different given dyed sample and to grade them.

7. To determine the wet rubbing fastness of given dyed sample for various dyes and to grade them.

8. To determine the residual shrinkage in a finished fabric.

9. To determine light fastness of given sample using exposure rack.

10. To determine the changes in colour on hot processing.

11. To study the effectiveness of Dispersing agent by Filter paper test

INSTRUCTIONAL STRATEGY

Teacher should explain the importance of the topics in the industry and these should be covered keeping in view the practical approach

RECOMMENDED BOOKS

1. Textile auxiliaries & chemicals by A.A Vaidya-Nitra Publication
2. Textile auxiliaries by Dr. V.A Shenai, Sevak Publication ,Bombay
3. Technology of bleaching by Dr. V.A Shenai, Sevek Publication
4. Quality control in textile wet processing by D.K.Sinha, BIRA paper
5. Chemical Testing of Textile by Hall; Mahajan Publication, Ahemdabad
6. Handbook of Textile Testing and Quality Control by Grover; Mahajan Publication, Ahemdabad.
7. Quality Control of Cloth dimensions and the shrinkage of yarn and fabrics by Shirley Institute
8. Quality Evaluation of Textiles by R.kadian & M.Nagpal

SUGGESTED DISTRIBUTION OF MARKS

Sr. No	Time Allotted (hrs)	Marks Allocation (%)
1	2	4
2	6	10
3	12	20
4	4	6
5	2	4
6	8	10
7	26	40
8	4	6
Total	**64**	**100**

4.6 TECHNOLOGY OF FINISHING - I

L T P
3 - 2

RATIONALE

A diploma holder in textile processing must have necessary knowledge and skills regarding principles and procedures used for finishing. For this he should be acquainted with different types of processing machines used for finishing. In addition, relevant skills also need to be developed in him about operation of these machines.

DETAILED CONTENTS

1. Introduction, aims, and importance of textile finishing. (2 hrs)
2. Classification of various types of finishes. (2 hrs)
3. Study of finishes with respect to purpose, fabrics , chemicals and machine used. (2 hrs)
4. Damping – Purpose, Damping machines and their working. (3 hrs)
5. Softening and Stiffening (3 hrs)
   - 5.1 Temporary stiffening
   - 5.2 Temporary and Permanent softening
   - 5.3 Soft and stiff finishes on cottons
   - 5.4 Back filling, description of m/cs used for it
6. Calendaring- Principle, purpose & description of the following calendaring machines. (8 hrs)
   - 6.1 Chasing & Swiss calendaring
   - 6.2 Friction calendaring
   - 6.3 Scheriener calendaring
   - 6.4 Embossing calendaring
   - 6.5 Felt calendaring.
7. Principles, Construction and working of drying machines - (6 hrs)
   - 7.1 Stentors, float dryer
   - 7.2 Hydroextractor
   - 7.3 Festoon Dryer
   - 7.4 Drum Dryer\(Buti)
8. Textural Processes: - Purpose, principle and machines used in: (6 hrs)
   - 8.1 Raising
   - 8.2 Glazing (sheen & effect)
   - 8.3 Moireing (water effect)
   - 8.4 Beetling
   - 8.5 Cireing
   - 8.6 Gigging
   - 8.7 Shearing

9. Detailed description on various methods of producing crepe effects. (4 hrs)

10. Shrink proofing of cotton; Purpose, Principles and working of sanforising machine: Zero-zero finish. (4 hrs)

11. Semi permanent and permanent finishes: - Purpose, principles and method for following finishes: (8 hrs)

    11.1 Wash and wear
    11.2 Crease resistance
    11.3 Durable press
    11.4 Rot and mildew proof finishing.

LIST OF PRACTICALS

1. To study the efficiency of softener at varying concentrations on cotton (different varieties).
2. Preparation of starches and its applications at various concentrations on cotton (different varieties).
3. To provide soft and stiff finishes using softeners, starch and polyvinyl alcohol.
4. To draw line diagrams of different finishing machines.

INSTRUCTIONAL STRATEGY

Teacher is required to explain the concept and its application keeping in view the practical/Industrial approach

RECOMMENDED BOOKS

1. Textile Finishing by J.T. Marsh- B-I, Publications New Delhi.
2. Technology of finishing by A.J. Hall.
3. Textile finishing to fabric by Bernard P. Corbman Mc Graw Hill Internation Edition.
4. Technology of Finishing by Dr. V.A. Shenai; Sevak Publishers, Mumbai.
5. Textile Finishing by Murphy; Abhishek Publishers, Chandigarh.

SUGGESTED DISTRIBUTION OF MARKS

Sr. No	Time Allotted (hrs)	Marks Allocation (%)
1	2	4
2	2	4
3	2	4
4	3	6
5	3	6
6	8	18
7	6	14
8	6	12
9	4	8
10	4	8
11	8	16
Total	**48**	**100**

ENTREPRENEURIAL AWARENESS CAMP

The employment opportunities for diploma holders especially in public sector are dwindling. The diploma holders need to explore the possibilities of becoming entrepreneurs. For this, they must be acquainted with entrepreneurship development, scope of setting up small-scale industry, existing business opportunities, financial support available and various aspects of managing business. In this context, an entrepreneurial awareness camp is suggested. During the camp, experts from various organizations such as banks, financial corporations, service institutes etc. may be invited to deliver expert lectures. Successful entrepreneurs may also be invited to interact with the students. Students may be encouraged to read papers or give seminar during the camp on Entrepreneurship Development related topics.

The camp is to be organized at a stretch for two to three days during fourth semester. Lectures will be delivered on the following broad topics. There will be no examination for this subject

1. Who is an entrepreneur?
2. Need for entrepreneurship, entrepreneurial career and self employment
3. Scenario of development of small scale industries in India
4. Entrepreneurial history in India, Indian values and entrepreneurship
5. Assistance from District Industries Centres, Commercial Banks, State Financial Corporations, Small industries Service Institutes, Research and Development Laboratories and other Financial and Development Corporations
6. Considerations for product selection
7. Opportunities for business, service and industrial ventures
8. Learning from Indian experiences in entrepreneurship (Interaction with successful entrepreneurs)
9. Legal aspects of small business
10. Managerial aspects of small business

INDUSTRIAL TRAINING

The student shall be exposed to a structured and supervised industrial training in the processing industry during summer vacation for one month.

The industrial training may be arranged in following.

1. Textile industry involved in wet processing of fibre/yarn and fabrics.
2. Textile industries involved in printing of textiles and furnished fabrics like carpets.
3. Export houses related to textiles.
4. Laundry department in hotel industry.
5. Industries involved in manufacturing of dyestuffs/textile auxiliaries.

TASKS TO BE ATTENDED

1. Preparation of layout of the factory.
2. Manpower employed.
3. Type of manpower in the factory.
4. Organization structure.
5. Type of processing machinery installed.
6. Details of processing machinery installed (giving complete sketch of machinery observed by the students).
7. Type of work done.
8. Details of textile processes employed.
9. Details of raw material used.
10. Details of financial resources.

Note:

The industrial training shall be planned and supervised by the teacher. The teacher may prepare well thought out exercises/questions well in advance after visiting the concerned industry in consultation with the officer/manager of the factory imparting industrial training.

Every student will be required to prepare a report of the industrial training under the supervision of teacher concerned and shall submit two copies to the institutions for evaluation and record.